



Implementing a Sustainment Strategy for Federal Financial Management

June 2011

This paper addresses the findings and recommendations from an industry perspective on how to implement a Sustainment Strategy for federal financial management systems. The Sustainment Strategy will allow the federal government to better plan and track activities for assessing, maintaining, upgrading, modernizing and innovating, and retiring financial management systems and capabilities, while balancing other considerations such as emerging requirements, changing paradigms, budget constraints and investment controls.

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Advancing Government Through Collaboration, Education and Action

Executive Summary

ACT-IAC was asked by the Office of Management and Budget (OMB) to provide industry input on key issues with financial system modernization and to address the following questions:

1. Given that agencies usually maintain a hybrid environment including modernized system components integrated with legacy systems, how can agencies most effectively maintain functionality and improve performance over time? Is change management of this magnitude within the capability of most federal agencies?
2. When is a system truly on its “last legs”? What criteria should be used to make decisions between incremental investments in an existing system and larger investments in a modernization initiative?
3. Is there a way to incentivize software providers to introduce upgrades in a manner that best serves the tax payer?
4. What new paradigms exist or are just emerging that might help apply game changing approaches to the first three questions?

To address these questions, ACT-IAC organized a working group comprised of representatives from over 20 interested IAC member companies.

What ACT-IAC Found

Based on research, analysis, discussions, interviews, and data evaluation from both government and industry leaders, the working group developed a vision for financial management that focuses on creating and maintaining a Federal Financial Management Sustainment Strategy (Sustainment Strategy). At its core, this Sustainment Strategy consists of four main lines of action for consideration and potential execution by OMB, by federal agencies, and by industry:

1. **Apply “Capability Portfolio Management” to Manage Effectively in a Hybrid Environment** – Agencies can optimize financial system investment decisions by applying disciplined portfolio management to the range of financial management capabilities they require, and by focusing on making investment decisions based on those capabilities rather than specific systems.
2. **Use Standard Decision Criteria to Determine an Agency-specific Legacy System Strategy** – This report provides agencies a standardized decision framework to evaluate their legacy systems and determine whether a given system is truly on its last legs. The framework includes detailed spreadsheets designed to be flexible to adapt to each agency’s unique financial system environment.
3. **Establish New Lines of Communication to Streamline Software Upgrades**– The report outlines a plan to embed regular communication among executive leadership, agency program managers and the vendor community on topics such as changing requirements and new functionality. This includes a proposal to establish the role of Emerging Requirements Lead, to provide dedicated focus to

aligning requirements within and across federal departments and agencies and to provide a focus for vendor discussions with regard to software upgrades.

4. **Seize Opportunities from New Technologies, Deployment Models and Business Models** – The report identifies and analyzes nine new technologies, three financial system deployment methods and three emerging business models that could improve federal financial modernization and upgrade processes, including cloud and service based approaches.

The results of this working group are the beginning of an ongoing dialogue between government and industry to build out, evolve and execute a Sustainment Strategy for federal financial management systems.

For more information or to request a more detailed discussion of this report, please contact Miranda Braatz at mbraatz@actgov.org.

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American Council for Technology/Industry Advisory Council

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Introduction

Over the past few years, the federal government has been forced to operate under tight budgets while offering smarter, more transparent information and services to the public. These challenges are impacting all aspects of federal business from operations and maintenance to project implementations and upgrades. The federal government is scrutinizing business processes and supporting systems, including financial management, to determine what improvements and approach should be leveraged to sustain a fiscally responsible, highly functional, and compliant and secure operation.

As part of this initiative, Office of Management and Budget, released a memorandum ([M-10-26](#)) on June 28, 2010 calling for an immediate review of large-scale financial systems information technology projects. This memorandum also proposed a new strategy for financial management system modernization that replaces large-scale business transformations with a more segmented approach that focuses on essential business needs.

Later in 2010, ACT-IAC was asked by the Office of Federal Financial Management (OFFM), Office of Management and Budget (OMB) to provide industry input on some of the key implementation issues associated with the new strategy for financial management system modernization and to address the following set of questions:

1. Given that agencies usually maintain a hybrid environment including modernized system components integrated with legacy systems, how can agencies most effectively maintain functionality and improve performance over time? Is change management of this magnitude within the capability of most federal agencies?
2. When is a system truly on its “last legs”? What criteria should be used to make decisions between incremental investments in an existing system and larger investments in a modernization initiative?
3. Is there a way to incentivize software providers to introduce upgrades in a manner that best serves the tax payer?
4. What new paradigms exist or are just emerging that might help apply game changing approaches to the first three questions?

To address these questions, ACT-IAC put together the Financial Management Systems Modernization working group comprised of representatives from over 20 interested IAC member companies. This working group was empanelled under operating principles and guidelines as established by the IAC Board of Directors and in accordance with the IAC Code of Conduct.

Based on research, analysis, discussions, interviews, and data evaluation from both government and industry entities, the working group developed a vision for financial management that focuses on creating and maintaining a Federal Financial Management Sustainment Strategy (Sustainment Strategy).

The Sustainment Strategy provides government entities the ability to objectively assess and manage financial system components and determine the best path forward whether that be modernizing or maintaining a steady state. It recognizes that even with Commercial-off-the-Shelf (COTS) packages, no two system components are the same. What might be right for one government entity is not necessarily the appropriate path to success for another. By actively managing and aligning with a long-term business architecture, the Sustainment Strategy will allow a government entity to improve investment planning and control, realize the full life of a system while implementing incremental improvements, communicate clearly among all stakeholders, schedule modernization efforts when all criteria are met and leverage new technologies and processes that complement a hybrid environment.

The Sustainment Strategy concept portrays financial systems as a constellation of systems in different stages of a system’s life-cycle and recognizes the ongoing need to Assess, Maintain, Upgrade, Modernize and Innovate, and Retire system components while balancing common challenges such as budget and investment control constraints, emerging requirements and changing paradigms.

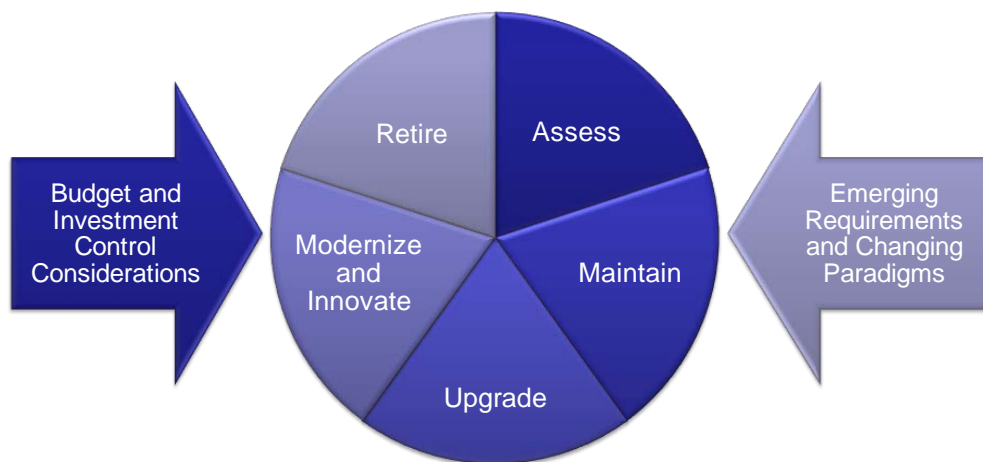


Figure 1: Sustainment Strategy – What to Do

Leveraging the concept of continual evolution depicted in Figure 1: Sustainment Strategy – What to Do, the Sustainment Strategy is built upon management concepts that will allow government entities to better plan and manage the steady state and modernization efforts of financial management capabilities while balancing outside constraints. The following list outlines the key components of the Sustainment Strategy:

1. **Portfolio Management** – recognize that the financial system consists of many components that will require multiple concurrent cycles of Assess—Maintain—Upgrade—Modernize and Innovate—Retire. Component analysis should focus on *capabilities* rather than the full systems and specifically address agency needs and challenges while aligning with a clearly defined, long-range vision/target business architecture.

2. **Standard Decision Criteria** – employ a tool outlining standard decision criteria to objectively determine the viability of maintaining the steady state of an existing component or capability.
3. **Communication** – establish a plan to communicate regularly among executive leadership, agency program managers and the vendor community on topics such as changing requirements and new functionality. Designate emerging requirements managers to serve as a focal point for considering government and industry driven upgrades.
4. **Education** – continually assess new technologies, deployment methods and business models that could improve federal financial modernization and upgrade processes, including cloud and service based approaches.

In addition, the sustainment strategy will be used by government entities to maintain the system, formulate future budget resources and plan subsequent operations and maintenance activities such as product upgrades. Figure 2: Sustainment Strategy – How to Do It shows the synergy of our proposed sustainment strategy aligned with all of the common phased processes from budget planning and the acquisition process to the Software Engineering Lifecycle (SELC) implementation. It illustrates that the sustainment strategy should be a critical ingredient and the foundation for the decisions made to accomplish successful portfolio management and investment control for financial system modernization. The common processes depicted are:

1. Planning Programming/Budget Execution (PPBE)
2. Capital Planning & Investment Control (CPIC)
3. Acquisition Review Process (ARP)
4. Software Engineering Lifecycle (SELC)
5. System Sustainment Strategy

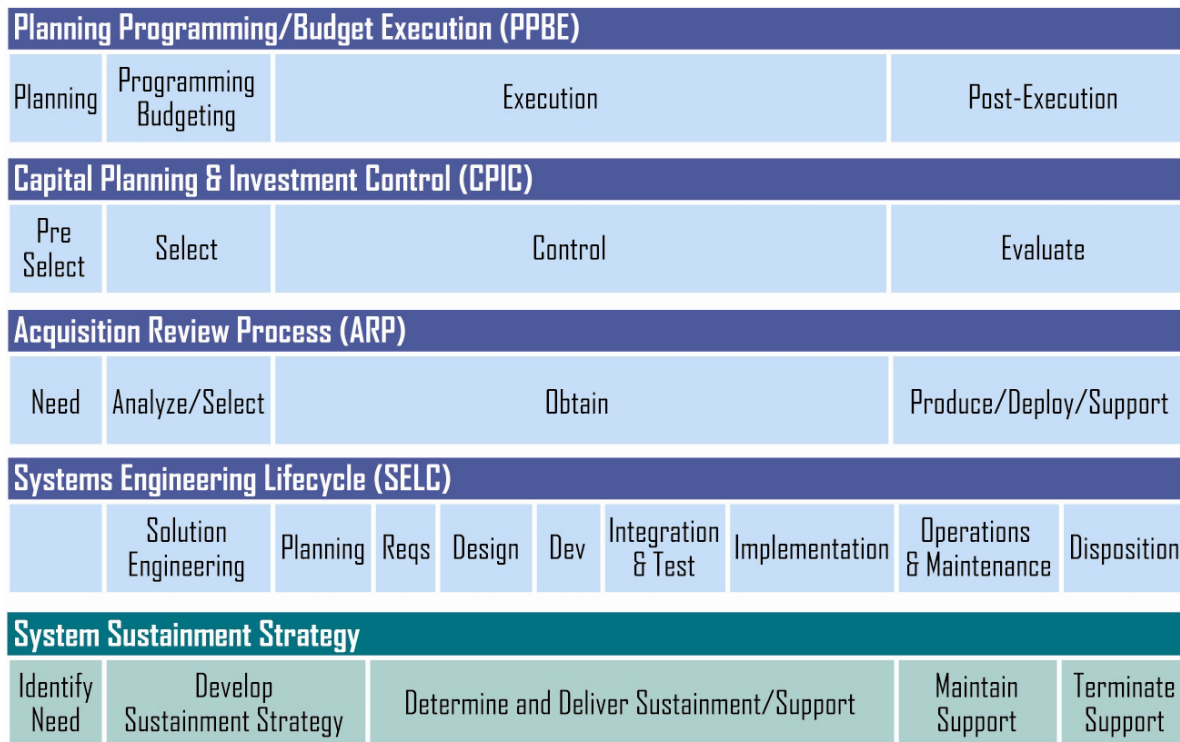


Figure 2: Sustainment Strategy – How to Do It

Lastly, the sustainment strategy and the upgrade process comply with the Federal Financial Management Improvement Act of 1996 (FFMIA) which requires all major departments and agencies covered by the CFO Act to implement and maintain financial management systems that comply substantially with the (1) federal financial management systems requirements, (2) applicable federal accounting standards, and (3) US Government Standard General Ledger (SGL) at the transaction level.

The paper is organized as follows:

- ▶ **Managing in a Hybrid Environment** – Implementing financial management system improvements by leveraging an incremental approach, using portfolio management to plan and manage in a hybrid environment, and identifying tools to assist in governing and implementing changes in a hybrid environment.
- ▶ **Getting the Most Out of a Legacy System** – Managing a steady state operation by recognizing when incremental improvements outweigh full financial system modernizations efforts. Included in this section are decision making criteria to be considered and measured when planning for a modernization effort.
- ▶ **Streamlining the Upgrade Process** – Analyzing how communicating at all levels will help agencies and federal financial management software providers better plan for and support upgrade initiatives.

- ▶ **Taking Advantage of New Technology and Processes** – Analyzing new technologies, deployment methods and business models that should be considered to help streamline modernization efforts.
- ▶ **References** – References per the content of this white paper are listed with respective sources.
- ▶ **Appendix A** – Decision Matrix tool to assist agencies in assessing the sustainment strategy of an existing system.

Managing in a Hybrid Environment

Purpose

OMB representatives presented the following question:

“Some critics have argued that a segmented approach to modernizing financial systems *will ultimately be more expensive* than a full-scale transformation, because of the costs and complexities associated with *simultaneously maintaining a partially modernized legacy system*. Yet, in practice, agencies usually maintain a hybrid environment that includes some modernized system components integrated with legacy systems. Given this reality, *how can agencies most effectively maintain functionality and improve performance over time? Is change management of this magnitude within the capability of most federal agencies?*”

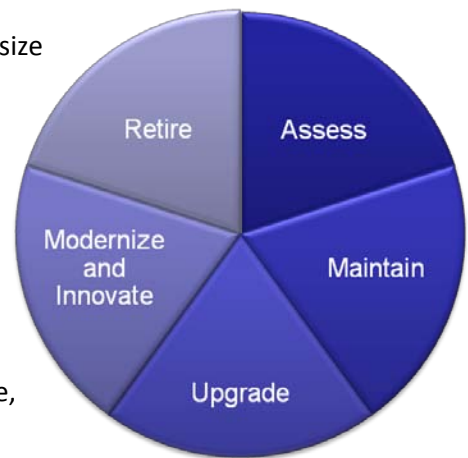
In other words, given the reality of today’s implementation experiences, and continuing resource constraints, how can we do better? In addressing the various elements of this topic, the team focused on the following subcomponents:

- ▶ How can agencies most effectively implement in an incremental fashion, minimizing impacts on their current functionality/operations, but providing tangible improvement over time?
- ▶ Are Federal agencies capable of handling the change management required for these incremental initiatives?
- ▶ Some feedback is that this approach will make implementations more complex and costly in the long run, and that agencies are not prepared to handle this increased complexity over a longer period of time. Can this be done, and how would you do it?
- ▶ Are there new technologies or approaches that would make an incremental approach cost less, with less risk?
- ▶ Are we asking the right questions?

Based upon our research and our own professional experiences, we believe the government entities can and do implement successfully in these “hybrid” environments. Of course, not all of these implementations are as successful as they could be. The following recommended steps can be taken to improve the success rate in these endeavors and build upon the concepts outlined in Figure 3: Managing in a Hybrid Environment:

- ▶ Clearly define the long-range vision/target architecture of the financial management systems, one that aligns each individual initiative with the target end-state, regardless of the size of the individual increment or project.
- ▶ Implement a Portfolio Management Process that focuses on tangible, useful improvements in capability (not systems). That capability can be provided through improvements in legacy systems, new systems, upgrades, or other initiatives, but remains aligned with a target architecture. It provides a paradigm of multiple, concurrent cycles of assessing new and existing capabilities, and deciding whether to maintain, upgrade, modernize/innovate, or retire systems that provide those capabilities.
- ▶ Provide more flexible governance and contract management to allow for timely course corrections throughout the life-cycle. These course corrections should respond to changes that are the natural result of the learning curve (by both the agencies and their contractor support) and may include project redirection based on emerging requirements, budget constraints, and changing technology.

Figure 3: Managing in a Hybrid Environment



The rest of the discussion addresses each of the above questions in more detail, and provides some recommendations on how the government can implement improvements in an overall approach to financial systems modernization efforts.

Background

To fully assess the challenges of operating in a hybrid environment – where modernized systems are phased in, a structured approach was taken:

1. **Identification** – The various ways that agencies have implemented using a phased approach were identified. This analysis revealed that agencies have successfully taken an incremental approach to implementation efforts; however, no one size fits all. Examples of incremental implementations include (1) focusing on a single module at a time; (2) implementing the full core financials suite through phases by organizational unit; and (3) implementing a subset of the full core financials suite. Each of these approaches can be implemented within the target timeframes (18-24 months) and some in shorter timeframes, depending on the size of the agency. Although the private sector also segments implementations by business process, that approach is far less common in the federal sector.
2. **Analysis** – The use of these “incremental” implementation approaches against the “Big Bang” implementation approach was analyzed. Although most agencies implement using a phased approach, no clear preference is apparent in the private sector, and each implementation approach has clear advantages and disadvantages.

3. **Interviews** – Agency representatives were interviewed to add to the perspective of the industry experience. The team identified three agencies, each with different implementation experiences (one that has recently gone live; one that has been in production for over five years; and one that has taken an organizational approach to implementation). Agency representatives were interviewed using a standard set of questions, and their views are presented in this report without attribution.
4. **Research** – Industry practices were discussed with leading third party analysts to get views on the state of commercial-off-the-shelf (COTS) implementations in both the public and private sectors. Although the analysts had limited data on the federal implementations, they did provide substantial insight into private sector approaches for comparison purposes.
5. **Tools** – Potential tools were identified and assessed – some new and some that have been around a while. The goal was to understand how to improve the capability within the hybrid environment. While no tools can serve as “magic bullets”, specific types of tools can substantially assist agencies in addressing the most prevalent challenges in these types of implementations (e.g., data cleansing/conversion, business process changes, organizational change management, and integration/sharing of data between systems).
6. **Best Practices** – Finally, a list of best practices/key considerations was developed to assist agencies in planning and managing these improvements. These best practices included those gathered as a result of the steps above.

Discussion

The industry is moving from large, one-time implementation efforts (“Big-Bang”) to phased or incremental development efforts. Several definitions and examples of a phased approach must be considered in assessing what is most suitable for a particular agency implementation. No matter what implementation approach is taken, understanding the value and objectives of the investment is critical. To establish the best practices used in managing a hybrid environment, an assessment of the types of phased modernization efforts was completed, along with a comparison of an incremental versus a big-bang implementation approach.

In addition to assessing discrete implementation approaches, it is evident that few financial systems operate in a vacuum. To more fully understand the implementation approach, it is important to step back and view them in the context of the overall portfolio of systems and capabilities. Portfolio Management provides a framework for understanding and scoring the existing application portfolio and proposed investments. A review of current best practices is included, while highlighting feedback from government experts with successful implementation experience. In addition, some tools that government can leverage to bring more consistency to implementation efforts are discussed.

Types of Phased Modernization Efforts

Large, complex system implementations introduce many risks to the implementing organization. A major failure during the implementation could cause significant operational issues and prevent the organization from executing key business functions. In the federal government environment, low

tolerance for the political fallout occurs when major failures are publicized. Recently, establishing smaller "phases" of an implementation is a renewed focus, so that failures can be contained and corrected prior to impacting the larger organization.

The four primary approaches to breaking up a systems project into independent phases are modular, business process-focused, functional grouping, or organizational grouping. Table 1: System Implementation Approaches provides a description of each approach, the risks and benefits associated with the approach, and agencies examples that have leveraged the approach successfully. Combinations of these approaches can also be used successfully.

Approach	Description	Risks and Benefits	Agencies
Modular	Distinguished from the other options by implementing a single module or group of modules at a time (e.g., Accounts Receivable)	<ul style="list-style-type: none"> Initially provides the low risk, but does introduce gradual increasing complexity over time May take longer, but can be done within manageable timeframes for small agencies Works best for agencies that have fairly homogenous business processes within the targeted user community that is fairly small Lengthy implementation of modules creates a higher probability of "requirements drift" between the start and finish, which may mean more rework over time. 	<ul style="list-style-type: none"> US Customs and Border Protection US Coast Guard
Business Process Focused	Implements a full business process (e.g., Procure-to-Pay) for the entire organization.	<ul style="list-style-type: none"> Offers high potential for operational cost savings Requires integration/sharing of data with other systems Introduces significant change management requirements Works best with agencies that have lower external integration requirements for the business processes being modernized and the business processes have very few data touch points Potential to significantly increase downstream rework if modernization of interconnected 	<ul style="list-style-type: none"> GSA Private Sector

Approach	Description	Risks and Benefits	Agencies
		business processes are not fully integrated and aligned.	
Functional Grouping	Implements multiple modules, but a subset of overall solution.	<ul style="list-style-type: none"> Provides lower risk, with gradually increasing complexity Can be fully implemented within target timeframes for small organizations. 	<ul style="list-style-type: none"> Department of Education US Social Security Administration
Organizational Grouping	Implements full core financials by organizational (or geographical) unit. It can provide both short and long-term momentum. Best practice for this approach starts with easiest, then toughest, then the remainder of the organization.	<ul style="list-style-type: none"> Agencies that might have heavy external legacy system integration requirements that are unique to particular sub-organizations would find this approach more appealing in order to avoid multiple changes to these interfaces within each phase. Agencies need to take an upfront look at where particular organizational differences may affect the global processes intended to modernize and make sure that the sequence of the organizations is set up, so that it is least likely to cause extensive rework as each organization is brought online. 	<ul style="list-style-type: none"> US Air Force and US Transportation Command Health and Human Services

Table 1: System Implementation Approaches

Phased vs. Big-Bang – Opportunities and Challenges

In the commercial environment there is no obvious preference between phased and “Big-Bang” implementations; however, industry recognizes that strengths and weaknesses exist with each. Large projects have traditionally had a lower success rate than smaller projects. A “divide and conquer” approach that decomposes a large implementation into clear, relatively independent phases can greatly improve the chances of success. A phased approach allows for course corrections and lessons-learned to be folded in earlier, while helping to detect derailers earlier. This approach can be important if the business requirements are not fully known in advance and are subject to change. On the other hand, a well-planned and managed Big-Bang is often the most efficient, both in terms of time and cost.

In the federal space, analysis of whether the “Big-Bang” approach to financial system implementations is more successful than an incremental approach revealed that in most cases an incremental approach is better suited. Summarized examples of incremental or phased implementations in the federal government are:

- ▶ **US Department of Education (ED)** – ED urgently needed a solution for its legacy core financial systems project. It was unable to reconcile transactions, and was experiencing the third year of a disclaimer opinion on their financial statements. ED selected a COTS software solution (using a small number of ED-specific requirements). It implemented accounts receivable (AR) and general ledger (GL) first; then program funds/integration with program systems, and finally administrative funds/integration with administrative systems. All phases were completed in approximately 20 months and were a major contributor to ED’s ability to regain a clean audit opinion one year ahead of schedule.
- ▶ **US Office of Personnel Management (OPM)** – The legacy environment was disparate and relied on a heavy use of cuff record systems. OPM was unable to reconcile transactions, internal controls and traceability to source transactions were lacking, and the year end-close was especially cumbersome. OPM focused on implementing an integrated approach utilizing enterprise resource planning (ERP) business process flows. Additionally, the first release included the introduction of dashboard reporting, including financial and reimbursable agreement information. The results were that Release I and II were completed in approximately 18 months, and the first year end-close was a significant improvement over the previous one.
- ▶ **US Air Force and US Transportation Command (USTRANSCOM)** – In the legacy environment, commanders were challenged with the lack of integrated financial systems, limited visibility of financial data and broken audit trails. The Air Force Defense Enterprise Accounting and Management System (DEAMS) focused on implementing core accounting for the HQ of USTRANSCOM. The next implementation will be the remaining bases associated with USTRANSCOM followed by incremental roll-outs to the remaining Air Force bases. The final phases will be rolled out to the Air Force Materiel Command and the Air Force Space Command. The initial results were a successful closeout for FY10 at HQ TRANSCOM and data cleansing of legacy data before entering into DEAMS.
- ▶ **US Social Security Administration (SSA)** – The SSA project was a complete financial system transition from a mainframe-based financial package, no longer supported by the software vendor, to a COTS ERP financial package. Phase I of the implementation involved deployment of the new applications at only the SSA central office. SSA had a number of field offices that continued to use the legacy system. The successful results allowed SSA to achieve better control of Agency funds as well as data consistency across the Agency. The new system eliminated the need to provide accounting updates to multiple databases while providing the same level of detail directly from the accounting system on a more current basis. In addition, SSA executed a most recent major upgrade better, faster, cheaper by allowing the vendor to perform the upgrade in their hosted environment.

- ▶ **US Customs & Border Protection (CBP)** – CBP replaced its core business systems to achieve an integrated business system that could provide real-time, accurate business information for its users. CBP completed the implementation over several years with each phase completed on schedule and resulting in unqualified audit opinions in each year since implementing the system.

In discussions with the industry-leading analysts referencing the commercial sector, an obvious preference is not apparent between phased and “Big-Bang” implementations. Analysts have found that both approaches have strengths and weaknesses. Commercial companies usually have more specific, quantifiable objectives in mind, such as headcount reduction or a move to shared services when undertaking a financial systems modernization project. Phased implementations are generally more expensive, but present lower risks. Smaller organizations, those with more standardized business processes, and those with a culture that readily adapts to change are more likely to be successful using the “Big-Bang” approach.

Table 2: Big-Bang vs. Phased outlines the opportunities and challenges for the Big-Bang and Phased approaches to financial system implementations follow:

Big Bang		Phased	
Opportunities	Challenges	Opportunities	Challenges
Quicker path to the target solution	Higher risk due to a larger impact	Overall risk is reduced	Multiple systems to maintain, reconcile and operate
Reduced maintenance and support costs because multiple systems do not need support	Longer timeframe involved for achieving the partial/initial capability	Ability to identify/correct issues early on during the implementation life-cycle	Multiple sets of license fees for operating different legacy systems
Fewer interfaces have to be created, especially temporary interfaces	A very high degree of complexity	More time to address the tough challenges, such as data and people	May need additional or temporary interfaces
In theory, “pain” is over sooner	Less flexibility/opportunity for identifying issues and needed course corrections	The ability to control costs better	Operational Change Management over a longer period of time

Table 2: Big-Bang vs. Phased

The conclusions drawn by the experts show that large commercial organizations are increasingly using a “Phased/Big-Bang” approach, which includes all integrated modules, implemented at one organizational unit to prove the system works, and then at the remaining organizational or geographical units. This

approach leverages the benefits of an integrated system (usually all financial modules are implemented at the same time).

Overall, a new modernization approach for financial management systems must recognize that “one size does not fit all”. Every government agency is different with different business requirements and missions. Smaller agencies may benefit from a “Big-Bang” approach where larger agencies have been unsuccessful. A phased or incremental approach to modernization reduces risk, provides capability earlier, and provides more time to address the typical challenges.

Financial systems must be owned at the agency level, with commitment of all senior leaders—they cannot be just the Chief Financial Officer’s (CFO’s) initiative. Government project leaders who have “been through the wars” are critical to a successful modernization effort. Real financial system implementation project management experience is essential to achieving success.

Portfolio Management - A Better Approach

Traditionally, federal agencies have planned and implemented financial management systems as discrete projects to install and deploy a specific software component or suite of components. This methodology entails a project with a discrete start and end, and a perspective of only those business processes included in the project scope. In reality, the financial management system in most agencies today comprises a mixture of solutions, that may include new, modernized components working in concert with older, custom solutions and other, new business intelligence solutions to deliver the full range of financial functionality needed. Moreover, modernized solutions may be rolled over in phases over a period of many years, resulting in an extended period characterized by a continually changing mix of solution components.

This new reality demands a different approach to financial management system planning and oversight. A Federal Financial Management Sustainment Strategy is best considered through the adoption of portfolio management principles for managing their financial management system strategy. With portfolio management, federal managers can gain a holistic perspective of their financial management capability and the systems that deliver it. They can better determine which investments:

- ▶ Align best with strategic objectives and offer the most benefit for the agency
- ▶ Represent the best use of limited time, money and resources
- ▶ Are failing to meet their objectives, and whether they should be continued or abandoned.

Adopting the portfolio management discipline will better enable agencies to understand the trade-offs of their resource allocation decisions, and more readily identify the interdependencies of projects and the implications of their decisions.

We encourage the government to move from a mindset of thinking of delivering financial management “**systems**” to one of delivering financial management “**capability**.” That capability may be delivered through a portfolio of automated and manual processes that should be viewed as a whole when

planning for modernization. Within that portfolio, component systems used to deliver those processes may be in various stages of their life cycles. Some may be in the process of being implemented and rolled out; some may be in “steady state” operation, while others may be approaching major upgrade or retirement.

Portfolio management techniques will aid in assessing the implications of new and emerging requirements on the existing system portfolio, and the schedule and resource demands they represent. This holistic view will also aid in decision making when other conditions change, such as shrinking or delayed funding, staff shortages, or other budget constraints. By considering the portfolio and the capability it delivers instead of assessing each component system in isolation, agencies can make more informed decisions when balancing the demands of limited resources, expanding requirements, and strategic business objectives on system priorities and the resultant allocation of resources.

Best Practices / Key Considerations

During the course of our discussions with government and industry representatives, the team received a lot of feedback on best practices and other key considerations to take into account when planning and implementing financial management capability improvements. Those best practices are presented below.

Best practices in the commercial sector start with strong business-driven governance. Projects are guided by specific quantifiable objectives such as: implementing new revenue generating business process, achieving cost savings that provide an attractive ROI, and achieving new or upgraded compliance requirements.

Best-practice commercial organizations are implementing strong portfolio management programs to guide and track project investments as part of a governance strategy. To be successful, organizations must actively consider change management to prepare and guide the organization through the change caused by the implementation(s). To lower costs and best utilize commercial tools provided by industry, commercial organizations are modifying non-value-added business functions (e.g., business processes/functions that do not provide a competitive advantage) to adapt to the commercial tools, which minimizes customization work and the cost and time associated with upgrades.

The challenges facing commercial organizations are similar to the Federal environment. A successful effort requires strong governance and business and technical executive support.

Key considerations for success can be summed up as follows:

1. Agency leadership commits to and supports clearly defined target end-state with defined interim states.
2. Priorities, risk, scope and schedule are vigilantly managed using a portfolio management approach.

3. Governance and contract management allows for timely “course corrections.” Strong governance includes strong project management with enforced deadlines so that agencies can learn early of failures. Using tools to mitigate risk is also strongly encouraged.
4. When the hybrid environment includes a phased implementation, the phased approach should be tailored to an agency’s culture, leadership, partners, and experience. One size does not fit all!

Best practices can be summarized across people, process and technology.

People

- ▶ **Plan for change-management in advance:** Even the best technical solutions will struggle to succeed if the end-users do not understand the rationale behind the initiative, are not kept informed on its progress and impacts, and are not properly trained or otherwise prepared for the new system and its associated business process changes. Consider the impact the change will have on the organization. Plan in advance how to best communicate and implement the change (change management).
- ▶ **Identify strong advocate(s) to fight inside battles:** The advocate should be a well-respected leader in the finance team - someone who knows the organization, its culture and decision making mechanisms. The advocate must be someone who fully believes in the effort. The integrator, without a strong advocate, will be less likely to be seen as an integral and important part of the agency’s ongoing efforts.

Process

- ▶ **Implement portfolio management:** Effective and optimized change begins with a strong, portfolio management governance process. Effective portfolio management requires that an organization have a clear view of: its business functions represented as a business architecture; a target-state enterprise technical architecture that supports the business architecture; the existing systems – the business functions implemented in these systems, compliance issues with the systems, and the costs to operate; and where the biggest existing barriers to modernizing lie. Summarizing all of these dimensions using a balanced scorecard will suggest incremental change and inform priorities for those increments, e.g., which systems/functions should be replaced immediately, which can wait, and which are consistent with the future targets.
- ▶ **Target early wins:** For increments that take a long time, consider further decomposing the effort into smaller chunks with early wins. Early (and on-going) wins help keep energy and momentum going through the entire effort, and enable course corrections and important organizational learning to be folded in early. Early wins can also be important if the agency does not have a successful implementation track record or an element of mistrust or doubt exists between IT, the integrator and the rest of the organization.
- ▶ **Rigorously apply traditional project management techniques:** The project management process should focus on managing risk and scope, including all of the relevant types of risk (schedule, cost, data conversion, change management/human capital, security/information

assurance, internal control, technical and business value risks). Project status, including an honest discussion of risks, should be reported at frequent and regular intervals to engaged senior executives.

- ▶ **Use repeatable methodologies to implement capabilities incrementally and more rapidly:** The Agency's system development process should use a defined, repeatable methodology such as Software Engineering Institute's Capability Maturity Model Integration (CMMi), Agile Software Development, and/or specialized ERP implementation methodologies based on these concepts. Methodologies such as these provide the organization with best practices and defined processes that align with the system engineering life cycle (SELC) and promote informed decision making, responsive risk management, effective performance measurement, secure configuration management, strong quality control, and rapid delivery. These methodologies also enable the agency to better maintain a steady state system within hybrid environments by providing the procedures and tools to continuously assess system viability throughout the program life cycle.
- ▶ **Provide a degree of contract flexibility:** The agency should consider an acquisition strategy that provides more flexibility (e.g., IDIQ with a ceiling with incremental fixed-price task orders that allows both parties to leverage what they learn as the project progresses). Both clients and integrators learn as the project progresses. A flexible contract structure allows the team to capitalize on that learning to the benefit of the government.
- ▶ **Manage expectations:** Agencies need to have the expectation that the work is not complete after a set of successful iterations. Technology changes rapidly. Even business processes are subject to change over time. The goal of strong governance and process is to take advantage of technology advancements to relentlessly drive down the total cost of implementing while driving up important business capabilities. This work is never done.

Technology

- ▶ **Understand the capabilities of the technology being selected:** Finding and selecting the right technology requires a clear definition of the long-range vision and target business and technical architecture. Agencies should consider methods to get better educated on what is being purchased. Mechanisms for doing this include:
 - Complete a detailed vendor evaluation prior to tool selection. Note that an effective vendor evaluation will require an understanding of the business architecture and end-state enterprise technical architecture, as well as a scorecard to be completed by each of the evaluators.
 - Find several agencies with similar needs and challenges that have successfully implemented. From these agencies, build a team of trusted advisors that can help coach and mentor the effort.
- ▶ **Minimize customizations to COTS/GOTS products and maximize configurations of COTS/GOTS products:** Select COTS/GOTS tools that implement a process that works for the agency right from "the box." Minimizing customizations to COTS/GOTS tools will ensure upgrade costs and

effort are minimized, giving fast and cheap access to new capabilities while reducing support risks.

- ▶ **Employ tools to manage risk:** Tools that can lower implementation risks in key problem areas should be employed.

Feedback From Government Representatives

Input from senior financial executives in several federal agencies was solicited on the new guidance from OMB regarding financial system modernizations. The individuals consulted have broad experience in federal financial management modernization, including participation in modernization efforts at more than one agency, and with varying approaches and degrees of success. Their experiences include not only the initial implementation of modernized systems, but also on-going maintenance and upgrades.

The views expressed by these individuals indicated consensus on several key points:

- ▶ **One size does not fit all:** While federal agencies share a common set of core requirements for financial management, any framework or policy for how financial management system modernization must not dictate a “one size fits all” approach to these initiatives. Each agency’s unique set of existing financial and program systems, agency culture and readiness for change, data quality, and business process complexity must be taken into consideration when determining the course of action that will best meet the business needs of the agency and have a low risk of failure. While a Software-as-a-Service (SaaS) model may work well for one agency, for example, it could be highly risky and unsatisfactory in another agency that has deeply integrated financial and program systems.
- ▶ **Begin with the end in mind:** A critical success factor in financial management modernization is a clear definition of and continual focus on the desired end state, especially given a paradigm where financial management systems are a mix of modernized and legacy applications over the long term. Steven Covey’s second habit in his Seven Habits of Highly Effective People is to “begin with the end in mind.” He states that, “If your ladder is not leaning against the right wall, every step you take gets you to the wrong place faster.” Taking your focus off the target, or, even worse, not having a clear vision of the target, quickly leads to scope issues and wasted time and effort.
- ▶ **Financial systems do not exist in a vacuum:** The importance of understanding the full business process implications of the financial business processes being modernized cannot be underemphasized. This understanding becomes even more important when implementing incrementally. Full recognition of the processes that precede, follow or surround a financial process will prevent costly oversights that can lead to audit and control issues, process breakdowns, or even implementation failures.
- ▶ **Program system integration may be the key drivers of scope and phasing:** Integration of the financial system to the agency’s program systems may be among the most important factors to consider when determining a financial system phasing plan. Considerations such as business process interaction, data quality, ability to send and/or accept new data required by the

modernized system, and the like, may be more important to success than the key financial management functions.

- ▶ **It can't be just the CFO's project:** As stated previously, the commercial sector focuses on strong business-driven governance – that is, most commercial enterprises strive to develop an aptitude and cadence adopting new systems and upgrades, so it can quickly uptake the latest capabilities and gain competitive advantage while dominating competitors. That's not to say they upgrade and implement new features blindly – rather commercial enterprises generally have a very good understanding of the as-is business processes, target to-be processes, and the business case driving each decision to implement upgrades and other changes in technology in their environment and how it'll impact the bottom line (revenue, cost savings, quality, customer service/retention, etc).

Federal agencies should maintain a similar competitive attitude in how they look at system decisions and governance. Agencies should not view the ERP/Financial systems and upgrades as a necessary evil / sunk cost / burden that has to be dealt with just to produce financial statements and meet mandatory requirements. Rather, agencies should use a modernization effort as an opportunity to improve critical business operations, create additional cost savings, and generally provide much better service and transparency to constituents and citizens. This attitude needs to permeate the leadership of an agency across operations critical to the mission, not just the CFO's office.

- ▶ **Experience matters:** Implementing financial management systems is not for the faint of heart, especially given the nature. Wherein the financial processes interact with so many program systems, financial management system implementations should be led by professionals who have “been through the wars” and understand what it truly takes to achieve a successful implementation. Inexperienced leadership and project management have likely been significant contributors to the large number of failed federal financial management systems implementations over the years. Project leadership and oversight cannot be outsourced to contractors—the government team must bring those skills to the table.
- ▶ **Contracting must be on the team and understand the rules:** Buying financial systems and the implementation is accomplished through complex contractual arrangements that require careful and constant management. To be successful, the contract structure must provide a means for regular “course correction” as both government and contractor discover and learn throughout the project, and the relationship established between the contracting office, implementation organization and the contractor team must be one of collaboration and mutual trust. The contracting team must be skilled in managing these types of contracts and relationships, which are much more complex and nuanced than purchasing goods, for example. The positive news from our discussions was the belief that the Federal Acquisition Regulation (FAR) provided sufficient flexibility to create the terms, conditions and climate for success, when used skillfully.
- ▶ **Shared services works:** The individuals interviewed had implemented shared services models in several incarnations, from obtaining shared services from external, non-government

organizations to providing shared services across agency components from a centralized internal organization. Shared services offer significant benefits in terms of more efficient operations and more consistent data and business processes.

Tool Options That Help Manage in a Hybrid Environment

Managing a hybrid environment comes with many challenges. The top four challenges include: Data, People and Process, Integration, and Target Solution. This section will discuss these four challenges and the tools (see Figure 4: Tools to Assist in Managing a Hybrid Environment that could be used to address them.

1. Data Challenges: Data cleansing and data conversion is a challenge in **all** implementations, and tools to help in this process can have a tremendous impact on the project's success. **Data mining** can help identify data issues/potential solutions prior to initiating data conversion steps. **Master Data Management (MDM)** and related tools provide a structure and process to organize the data in preparation for the modernization efforts. MDM also offers the same benefits on an on-going basis in a hybrid or heterogeneous environment. MDM's ability to bring consistency and integrity to data records at an enterprise level makes it a critical component when implementing enterprise business intelligence and analytics within an enterprise hybrid environment.
2. People/Process Challenges: End-user adoption of the target solution and their preparation for the business process changes can be daunting. **Visualization** tools can facilitate process redesign and increase user acceptance by addressing these challenges earlier in the implementation lifecycle. **Business Process Management (BPM)** tools can automate workflow and monitor efficiency, and can be tailored to address business processes that operate in concert with or independent of the financial systems solution.
3. Integration Challenges: **Interface/integration** tools that leverage standards can minimize point-to-point interfaces. Accelerator tools can "jump-start" an implementation by providing a pre-configured solution. **Business Intelligence (BI)** tools integrates and reports data from disparate systems and can leverage results from data mining as well as other analytics.
4. Target Solution Challenges: **Portfolio management tools** can help rationalize, prioritize, and schedule both legacy and new modernization efforts. Additionally, portfolio management tools promote strong configuration management and can help to maintain alignment with the target solution and overall business architecture.

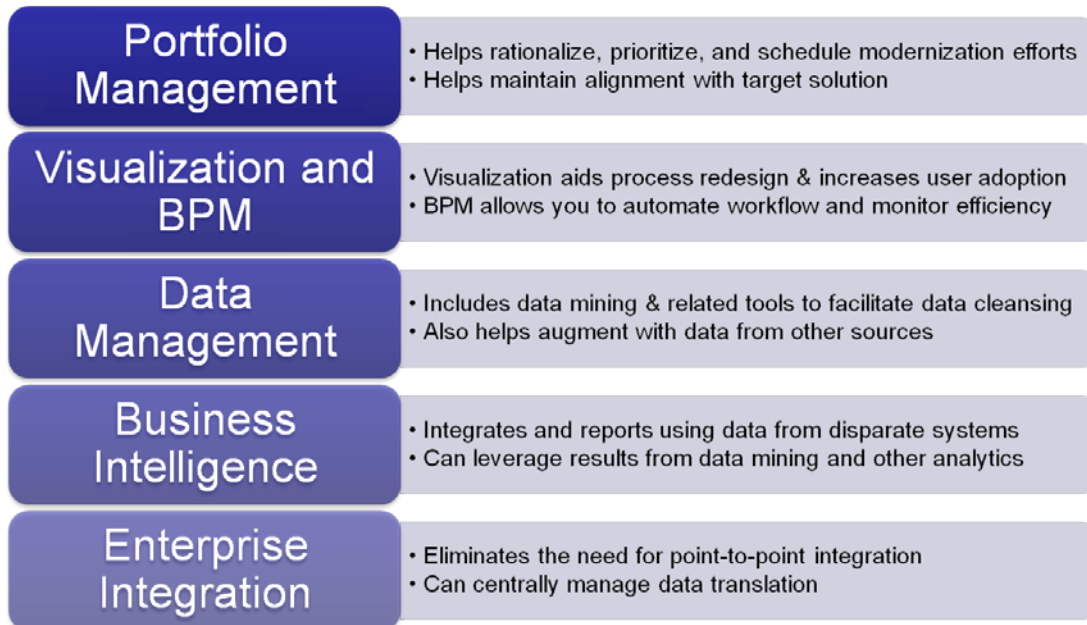


Figure 4: Tools to Assist in Managing a Hybrid Environment

With so many different offerings of each of these tools, the agency should research which types of tools can have the most impact on the success of financial systems implementations. Agency research should include general review of analyst reports, combined with evaluation/recommendation by other agencies, system integrators, and employees who are familiar with requirements and how the tools will be used upon implementation. Agencies should also take into account existing skillsets and experience on the teams to minimize lead time and risk.

A “silver bullet” does not exist, but leveraging these tools could help an agency better manage a hybrid environment.

Recommendations

As mentioned in the introduction to this section, agencies can implement and manage successfully in a hybrid environment. Some specific things can be done to improve the chances for success:

1. Keep the incremental improvements focused on a long-range vision or target architecture that is supported by management and is used to guide the agency direction and priorities.
2. Leverage a portfolio management process that focuses on specific capabilities, not systems that the agency needs to address. These capabilities could be addressed by improving the legacy system, upgrading to a newer version of the COTS solution, or implementing entirely new capabilities/systems.
3. Providing more flexible governance and contract management to better support the focus on “capability” as opposed to systems, and provide more opportunity for “course corrections” as implementations progress, to take advantage of better information and knowledge by both the agency and industry representatives.

Hybrid environments do provide other opportunities for federal agencies –time and focus on the aspects of system modernizations that typically present challenges regardless of the size, scope, or implementation approach of the endeavor. All agencies tend to struggle with data cleansing and conversion; agreeing to and institutionalizing business process changes; change management challenges associated with the adoption of the new technology; and the efficient and effective sharing of data between systems. The hybrid environment provides an opportunity for agencies to focus more attention and resources on those issues. We recommend that agencies take proactive steps to separately focus on these issues – whether a part of a system implementation acquisition or not.

The portfolio management strategy provides a paradigm where agencies can more clearly articulate specific needs, and address those needs in more incremental phases as dictated by budget constraints and emerging requirements. Managing a continual need for improvements while maintaining legacy system capability in this hybrid environment is not a short-term phenomenon; it is the state that agencies will have to accommodate for the foreseeable future.

Finally, tools – some old, some newer – can help agencies address major challenges. The issues around standardizing business processes can be helped using the new business process management (BPM) tools that can generate automated capabilities to be used in lieu of or in conjunction with other systems. Visualization tools help move the technology adoption process earlier in the systems development lifecycle by providing screen mockups and business rules during the requirements and analysis phases. Business intelligence and data integration tools are essential to sharing data within these hybrid environments. These tool capabilities, along with other functional capabilities, can be managed, prioritized, and sequenced using portfolio management tools. While no “magic bullets” exist, these tools can be leveraged to provide the structure, discipline, and best practices to help address these challenges. The government should take action to further investigate and vet the use of these tools to address these challenges.

Impact Statement

The study team believes that implementing these recommendations will have a positive effect on the state of capability improvements in the federal sector. Specifically, we envision a situation where the following exists:

1. Agencies are able to maintain capability of the existing systems, and improve functionality over time, within the confines of a constrained budget situation.
2. Large, multi-year system improvement projects are replaced by smaller, incremental initiatives that focus on specific capability improvements.
3. Agencies proactively address the typical modernization challenges – data, business process standardization, technology adoption, and integration – as an essential part of or as a prerequisite to major systems modernizations.
4. Agencies leverage the discipline, best practices, and structure that automated tools provide to address these typical challenges.

5. Governance and contract mechanisms supporting the major enhancements that provide the appropriate amount of flexibility to allow both agencies and service providers to accommodate changes and lessons learned in earlier phases.
6. A modernization approach that is consistent with the government's focus on smaller, more achievable initiatives that can be implemented quickly, and improved upon over time.

Alternatively, agencies may continue to be challenged by the size, scope, and complexity of large systems implementations (even though they may be implemented incrementally). The failure rates of these initiatives will continue to be higher than acceptable, wasting scarce taxpayer resources. We believe that the recommendations presented in this report are critical to improving the status quo.

Getting the Most Out of a Legacy System

Purpose

When is a system on its “last legs”? At what point should investments in existing systems cease and those monies be invested into modernization efforts? Is it possible to identify criteria that will help agencies decide where to invest financial management systems dollars?

Agencies can employ standard decision criteria to objectively determine the viability of an existing system. These criteria help decide if it's better to continue making incremental improvements to a legacy system, or, if it is time to start investing in a new system/modernization initiative. Moreover, continued investments in viable legacy systems have the potential to enhance steady state operations over time.

Criteria have been identified and organized into a Decision Framework. The Framework (see Figure 5: Decision Criteria Framework for Assessing When a System is Truly on its “Last Legs”) is an integral part of the overarching Federal Financial Management Sustainment Strategy. In the model presented below, four categories of criteria are outlined in the decision framework used to identify and quantify the risks and impacts of continuing the legacy system (however, depending on the unique system and/or agency, additional groups of criteria may be identified):

1. Compliance and Internal Controls
2. Functional Quality
3. Technical Quality
4. Other Risk Areas Related to Continued Use of the Legacy System.

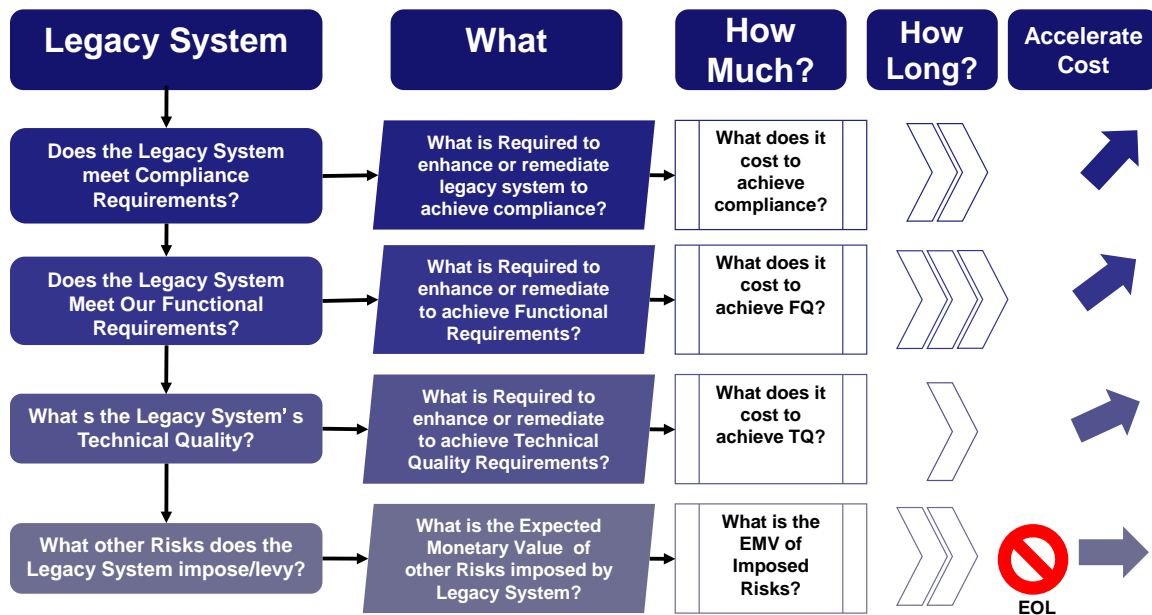


Figure 5: Decision Criteria Framework for Assessing When a System is Truly on its “Last Legs”

Using the framework to assess a legacy system provides insights for predicting when a legacy system will really be on its “last legs.” The framework is an affirmative process – what do we need to do to keep the legacy system going and moving forward – understanding the current issues, but also anticipating future risk and cost.

Background

OMB has asserted that a frequent and central theme used to support an agency’s request to acquire and implement a new, modern financial management system is the state of the system or systems to be replaced. In many instances agency representatives have indicated that it is critical to move forward with these projects because the current system is “on its last legs.” This assertion has been repeated in reviews of current and ongoing agency financial system modernization projects and as agency budgets are presented.

During the Association of Government Accountants (AGA) Federal Financial Systems Summit on January 20, 2011, Danny Werfel, Controller, OMB, expressed his concern about the “last legs” rationale. Last legs refer to a current or legacy system being at risk of imminent failure or demise. However, this rationale was in fact a generality and these systems, while not current in the look, feel or features, can continue to operate and meet an agency’s basic needs. Mr. Werfel cited examples where financial system modernization initiatives have taken years to plan and execute or in some cases, where initiatives have failed. And yet, the legacy systems that remain in place have continued to operate and support “clean” financial audits. Clearly there is a need for a systematic approach to reviewing the viability of existing (“legacy”) systems and determining the optimal point for upgrade or replacement.

Discussion

Drawing from a broad and deep base of experience and cross-disciplinary subject-matter expertise (financial management, IT, and management practices), a framework for systematic decision making is presented which is based on (1) hypothesis; (2) elements of analysis; and (3) working assumptions. These components are discussed below:

- ▶ **Hypothesis.** Focused on the promise of sustainable systems, the following hypothesis emerged: *Agencies can employ standard “decision criteria” to objectively determine the viability of an existing system (e.g., possibility for incremental improvement vs. investment in a modernization initiative) as well as the potential to enhance steady state operations over time.* The intent is not simply to prove or disprove the hypothesis, but to find a way to assist an agency in conducting its own assessment.
- ▶ **Elements of Analysis.** The discussion and analysis largely focused on the process of how to apply standard criteria to a set of federal agencies that are anything but standard. Agencies differ in size, organization, infrastructure and mission. Therefore, the manner in which standard criteria are applied needs to also provide for adequate flexibility. This is achieved by:
 - Establishing a guiding principle that given the broad footprint of agencies, the response to this question cannot simply be binary – yes or no, black or white. Assessments will likely be made along a continuum. In addition, we anticipate that the response and any follow-up guidance or analysis will be **descriptive – not prescriptive**, in order to generate discussion and provide data as input.
 - Determining the key functional and technical elements, as well as any other elements or requirements to assess against cost, priority, time, and feasibility. These elements are general “categories of operability” which an agency may already have developed in support of procuring a new system. Based on these elements, agencies can assess each applicable category on a predetermined scale or continuum.
 - Offering a set of tools to assist agencies in gathering and analyzing data to determine, for the specific legacy system in question, those categories of operability applicable to that system.
- ▶ **Working Assumptions.** In order to accurately and completely test the hypothesis, a set of working assumptions was developed. These assumptions serve to narrow the type of system which is the subject of our assessment and specify particular areas of focus and analysis:
 - System scope and area of inquiry is focused primarily on the “core” accounting system. However, system extensions (e.g., property, contracts, procurement), integrations (e.g., programmatic and grants systems), and reporting/decision support systems must be considered as well.
 - Area of focus includes not only system (e.g., functional and technical) considerations, but also agency readiness, compliance and impact.
 - Knowledge and availability of historical costs is needed to project costs going forward.

- Analysis must recognize the wide disparity among agency profiles. Consideration and resulting tools must account for ranges of available resources (e.g., staff, expertise, capability, capacity and availability of funding); current audit and compliance status; and organizational preparedness (e.g., leadership, structure, readiness/acceptance of change, cultural impact, etc).

In the sections that follow, additional information is provided along with detail on the analytical process as well as potential options and alternatives for determining the value and method of applying and evaluating standard and objective criteria to determine a system's viability. A recommended approach and a starter/sample data set designed for "core" accounting system assessments is also presented.

Analysis of Options

Options to extend the life of a system are identified and categorized into three areas: (1) Optimize, (2) Offload and (3) Host. The "Optimize" category works to improve the overall efficiency of the current system. The "Offload" category moves functionality off the core financial system to other specialized systems. In the "Host" category, the system is migrated to a third party hosting provider which may in turn offer additional efficiencies, service guarantees and cost savings. The steps that follow comprise a set of alternatives and options that employ each of these categories:

1. **Identify the Status Quo, including Cost of Ownership.** Use a Concept of Operations (CONOPS) or other system documentation to determine how the system has evolved from the baseline requirements. Leverage this documentation as an opportunity to update system requirements and specifications if they have not been maintained over the years. Also, the total cost of ownership (TCO) of the legacy system must be understood. Fully understand the operating cost, the cost of doing nothing and the cost of change is important. The cost of change must encompass all costs including training, downtime and impacts to efficiency. The true costs of a system go beyond what is reported on the OMB Exhibit 300.

Understanding the cost of ownership, or baseline costs, for legacy systems is critical input informing the business decision to replace or upgrade an agency's core financial system. These costs can also be the most difficult to accurately identify. In today's environment, costs are typically limited to Operations and Maintenance (O&M), platform, and licenses. These costs are relatively straight forward, but other related costs must be included to understand the real cost of operating the legacy environment. These costs include: developing and maintaining individual tracking systems, supporting internal and external requests for data, supporting audits and production of mandated reports, and supporting new requirements. These are described below:

- ▶ **Develop and Maintain Individual Tracking Systems:** Programs and projects within an agency require real-time information regarding commitments, obligations and payments associated with a program or performance objective for effective management. Often times, this information is not readily available, if it is available at all, at the level required to manage. Therefore, cuff or custom systems are developed to track and monitor the

data outside the financial system. *Clearly, costs are incurred to develop and maintain these systems as well as to reconcile to the financial system of record as questions arise.*

- ▶ **Support Internal and External Requests for Data:** As agencies address the possibility of constrained budgets, management requires data that is often complex and enterprise-wide. At the same time the desire to make greater levels of information available to the public requires agencies to produce a variety of data at increased levels. *If the data is not readily available in the financial system or is resident in multiple systems, then resource requirements increase to aggregate data required to satisfy the requests.*
- ▶ **Support Audits and Production of Mandated Reports:** Many agencies today are receiving clean audit opinions with older legacy systems. However, the process can be resource-intensive and introduce risk that resources may not be available to perform day-to-day operations while supporting the audit. *Data and functionality is typically not at the level to support detailed data pulls in legacy environments; therefore agencies may incur increased costs for resources to meet audit requests.*
- ▶ **Support New Requirements:** The true cost of implementing new requirements in a legacy environment is often difficult to ascertain. Many of these requirements entail not only system changes, born by each individual agency, but also data standardization and changes to data (e.g., meaning, values, elements, etc). Resources are required to cleanse the data and provide the structure and analysis to standardize the data and implement the requirement.

To truly understand the costs associated with operating and maintaining legacy systems as part of a decision to upgrade or replace core financial management systems agencies must have a standard way of accounting for all costs associated with these systems. *Option: OMB could consider developing a standard costing model inclusive of all related costs.*

2. **Assess Data within the System,** is a separate, though related, task. Find ways to optimize the data model and data architecture by assessing patterns of data and usage, as they often change over time. Commercial off-the-shelf (COTS)-based systems are typically designed well out of the box, but one-off customizations often do not go through the same amount of technical rigor. Though the data model of COTS-based systems is not really open to change, the underlying database structures may be modified for performance. Examples include segmenting the data in the database into logical fragments of information based upon how the information is used or optimizing the storage and retrieval of data between the database software and storage hardware by distributing the load across multiple hardware sets.
3. **Define the Interfaces from the Core Financial System to Other Systems.** Identify opportunities to optimize the interfaces. For example, combine individual interfaces or create a semi-structured database as an intermediary between core financial and other systems to offload the job of data transmission from the primary system. Also, identify cases where interface jobs continue to run for an interface that is no longer required.

4. **Identify Functionality that can be “Offloaded” from the Core System to other Specialized Systems.** General financial reporting and analytics is a prime example. Reporting was a core feature of many older financial systems when they were designed. These reporting requirements have expanded beyond the accountants to support program management and other operational needs. Reporting sophistication has increased and now provides a separate specialized reporting platform. The data architecture of older systems is often strained by current financial management analytical tools. An example of a functional area to offload would be grants or payment processing; much in the same way that payroll was offloaded. Consider offloading a core set of functionality to a platform designed specifically for that functional process to reduce load on the core system.
5. **Consider Migrating Existing Software to a New Hardware or Technology Platform.** For systems challenged by an aging hardware platform, migrating to new platforms or environments, such as a UNIX, Linux or Windows may result in benefits from cheaper hardware and may also more easily take advantage of newer hardware optimization technology like virtualization and cloud computing.
6. **Seek the Services of a Hosting Provider.** Hosting providers enable you to move your platform as-is to either dedicated or shared hardware platforms. A hosting provider may also enable the migration from one hardware platform to another in either a dedicated or shared infrastructure environment.

Recommendations

Using the Framework and working through the process will give an assessment team insight about the system that would not have been discovered using other methods. Those insights, framed through the business intelligence and experience of the team members and the pragmatic approach described below, will bring value to the agency.

The decision framework is designed to guide an assessment team through discovering how the core financial management system is working in the agency and how well it is addressing the agency’s needs. The “how it is working in the agency” part seeks to understand the complexities and interplay of business operations and organizational structures (people), the processes being used, and the interdependencies of technologies employed.

Complex relationships among multiple systems that collect financial data or project data, data that are critical inputs to the agency Financial Management System (FMS), may exist. Manual and automated portions of a business process that represent throughput bottlenecks or opportunities for automation may exist. Different business units might have different input processes or tools to feed data into the FMS. Points in the end-to-end business process where the same data are collected multiple times may cause data quality issues. Some organizations may emphasize data quality, whereas other organizations may place less emphasis on data quality. Data marts may exist in some organizations, whereas only limited reporting capabilities may be in others. These examples provide an understanding of how the FMS is working in the agency, and understanding how it works is fundamental to understanding how

well it works. The “how well it is working” part seeks to identify and quantify the risks and impacts of continuing to sustain the FMS, across four categories as follows:

1. Compliance and Internal Controls;
2. Functional Quality;
3. Technical Quality; and
4. Other Risk Areas Related to Continued Use of the Legacy System.

Where it Fits

This decision framework is an integral part of the overarching Federal Financial Management Sustainment Strategy. Through this activity, the team will evaluate the ability to continue to use the legacy system, and help to more thoroughly and accurately identify and plan for sustaining the system. That analysis will also give the team more insights to better predict when the system really will be on its “last legs.”

How it Works

The decision framework is an affirmative process – what is needed to keep the system going, and forward looking – understanding the current issues, but also anticipating future risk and cost?

The decision framework is not intended to discover all the deficiencies in order to promote a new (replacement) system. But, deficiencies in compliance and internal controls that represent risk to the business are present. Understanding where the functional capabilities of the system are lacking or under-serving a business need is important. For example, are there manual workarounds creating inefficiencies, process throughput bottlenecks, or just adding cost?

Technical issues that are hindering the opportunity to take advantage of modern technologies like virtualization, cloud computing, or business intelligence (BI) technologies must be understood, including where technical limitations are causing an increasing proportion of the annual budget to be allocated to IT infrastructure and IT operations and maintenance rather than enhancing and improving business operations, data accuracy, and compliance. Other risk areas must be understood, so a risk management approach to accept, mitigate, exploit, or share those risks can be defined.

Some models seek precision in predicting real world outcomes. That is, they attempt to create a model that will precisely predict what will occur to the real world things they represent. This decision framework model does not have the same objective, and it will be frustrating for those who try to apply it that way. However, the real value of this decision framework is to illuminate where the system can be improved, so it can be sustained for some extended period of time. Working through the steps to gather information in the templates will illuminate the real world organization structures, the opportunities for business process improvement, and the situations where automation and other technologies can simplify and improve business transactions.

This approach is designed to serve by helping to surface hidden details and provide insights or visual clues about the real world situation. As stated earlier, the decision model is descriptive and not prescriptive. Even though the decision models are in a spreadsheet and numeric values are applied and totals calculated, they are not designed to produce a prescriptive answer (e.g., yes, continue sustainment, or no, replace the system).

Relevant Assumptions

The scope of this decision framework is focused primarily on a core accounting system. However, system extensions, integrations and reporting/decision support must be considered as well. The scope includes not only system (functional and technical) considerations but agency readiness, compliance and impact.

In developing the decision framework, the likelihood of disparity in agency profiles was considered. Assessment teams using the decision framework will need to adapt the tool to their specific circumstances and environment, adjusting discovery processes and weighting factors, for example, to account for agency specific variations (e.g., audit and compliance status, organizational readiness, size scope and complexity, etc).

The Decision Framework

Hundreds of variables and agency-unique situations would need to be considered to precisely predict if and when the current core accounting system might need to be replaced. That outcome is not the objective here. The decision framework is an affirmative process – identifying what we need to do to keep the system going, and forward looking – understanding the current issues, but also anticipating future risk and cost.

The decision framework (see Figure 5: Decision Criteria Framework for Assessing When a System is Truly on its “Last Legs”) asks the questions related to the four categories of sustainment:

1. Does the system meet compliance requirements?
2. Does the system meet the functional requirements?
3. What is the state of the systems technical quality?
4. What are the other risk items related to legacy system sustainment?

It also asks: “What” – what is required to enhance or remediate the system to achieve the objective? Then asks “How Much” – how much will it cost to achieve the objective? And asks “How Long” – how far into the future will that investment in sustainment (enhancement or remediation) take us? And, what are the cost trends for each specific item (an in aggregate), for sustainment.

The decision framework is an abstraction – a generalized process – to help an agency establish a more comprehensive understanding of the current situation and determine the best path forward. It is also a filtering mechanism so that the most important, highest risk, and highest cost sustainment items are identified and focused on. This framework quantifies risk and cost using the generally accepted risk

management practice of Expected Monetary Value (EMV) of the financial impact of potential project actions, initiatives, and risks. And, then uses EMV to prioritize sustainment initiatives.

So, what is important to know in order to evaluate the sustainability of the legacy system? The framework considers four major categories of the system and its business environment, as follows:

Compliance and Internal Controls Assessment Framework

The system needs to be assessed to determine if it can continue to support the compliance requirements of the business. Understand if all the necessary internal controls are in place and working to validate compliance, and, if the compliance and reporting requirements are not being met intrinsically by the legacy system, understanding the costs for achieving compliance (remediation, manual processes, additional resources, add-on systems, etc.) is required. The Compliance and Internal Controls matrix includes all the following areas:

1. Information Assurance – Federal Information Security Management Act (FISMA) and DoD Information Assurance Certification and Accreditation Process(DIACAP)
2. Federal Systems Requirements – Federal Managers Financial Integrity Act (FMFIA), Joint Financial Management Improvement Program(JFMIP), and Financial Systems Integration Office(FSIO)
3. Federal Accounting Standards – Financial Accounting Standards Board(FASB)
4. United States Standard General Ledger (USSGL) at the transaction level
5. Internal Control over Financial Reporting – Federal Managers Financial Integrity Act Internal Control Over Financial Reporting (FMFIA ICOFR)
6. Financial Improvement and Audit Readiness (FIAR)
7. GAO Financial Audit Compliance Testing (GAO financial audit manual)
8. Standard Financial Information Structure Reporting (DoD's SFIS)

So, how should the Assessment team use this matrix and what goes into it?

This matrix is an amalgam of all the items from the eight compliance areas above that the assessment team wants to escalate. In each of the eight compliance areas above, many items of non-compliance, weak controls, or lack of controls may exist. The assessment team should review the reports generated through those existing compliance activities and determine (1) which, if any, of the identified compliance issues are relevant/related to the FMS, and (2) the level of risk and cost to remediate or fix the identified compliance issue. Then, if any issue rises above a threshold the Assessment team defines, the issue should be included in this matrix under one of the eight compliance categories.

For example, within the FISMA compliance area, OMB Circular No. A-123 establishes a minimum set of controls to be included in federal automated information security programs. Agencies are already self-reporting FISMA compliance status. If controls exist that an agency has not fully implemented, those deficiencies are identified in the FISMA report, and a Plan of Action and Milestones (POA&M) is created

to describe how and when the item will be addressed. The assessment team should review the agencies' FISMA report to determine which, if any, of the deficiencies are relevant to the Financial Management System. And, if FISMA compliance items related to the FMS system exist, the Assessment team should evaluate the level of risk and the cost to remediate or fix the item.

After working through all eight compliance areas, the assessment team will have a comprehensive list of compliance issues related to the legacy system. Some postulate that individual risks viewed one at a time can give a false sense that “things are OK.” But when risks are identified across functional areas and across different categories or risk, the combination of those collective risks may paint a very different picture; one where a much higher level of risk is apparent than when viewed individually.

Having a complete list does not solve the compliance and controls concerns, but it does provide a better starting point for addressing legacy core system compliance and control issues. Frequently, several compliance and control issues have a common root cause. Fixing the root cause can eliminate multiple risk items. Using a sum of the EMV of the multiple risk items might reveal that fixing the root cause could actually reduce the expected life cycle cost of the FMS and thereby, extend the useful life of the system.

A more detailed overview of the decision framework as it relates to core accounting is presented in [Appendix A: Decision Matrix](#).

Impact Statement

In the absence of consistent guidelines, agencies and OMB have limited ability to determine, in a standard and objective manner, whether a legacy system is, in fact, on its “last legs,” and thereby the status quo would be maintained.

However, working through our initial hypothesis by following the processes recommended above and by utilizing the types of tools provided, agencies can develop a substantial list of areas that impact legacy system sustainability, including:

- ▶ Descriptive information regarding system deficiencies and/or shortcomings (e.g., compliance, internal control, functional quality, technical quality, or other risks);
- ▶ The impact to agency business due to “less-than-perfect” capabilities of the legacy system;
- ▶ Estimated additional costs to be incurred to augment the legacy system in order to make up/compensate for “less than perfect” capabilities; and
- ▶ Estimated time and cost to fully remedy (i.e., permanently fix) the identified “less than perfect” capabilities.

Under the recommended approach, agencies and OMB will more likely have the added insight required to make better decisions about whether a system is on its “last legs”, along with whether and what kinds of immediate or future action should or could be taken.

Streamlining the Upgrade Process

Purpose

OMB representatives presented the following question:

Is there a way to incentivize software providers to introduce upgrades in a manner that best serves the taxpayer?

By leveraging the sustainment strategy concepts, government entities can facilitate a standard, streamlined upgrade process associated with the federal financial management systems across departments and bureaus. The sustainment strategy is designed to facilitate communications between the federal government and the software vendors, standardize the upgrade process, and decrease the amount of system customization common within past federal financial management implementations. The sustainment strategy supports the upgrade process and includes coordination, communication, planning and timing among all stakeholders, specifically the Office of Management and Budget, the agencies, and the vendor community.

The upgrade process is one part of the proposed strategy to sustain an agency's financial management system throughout its lifecycle. The strategy includes the methodology and alternatives where the government may take advantage of improvements in functionality and technology to the products and services that comprise the financial management system and enterprise.

Background

In June 2010, the Office of Management and Budget halted all financial management system modernization efforts across the federal government and subjected each of these programs to a thorough review before any further investments would be made. Most of the federal agencies that participated in these reviews have faced long standing challenges associated with operating, maintaining and modernizing these financial systems. In many cases the modernization of these systems involves upgrading the financial system. Agencies have had to contend with rapid and advancing technological improvements, the process to keep up with demand, policy and process changes, significant complexities involved with systems upgrades.

Investigation

In order to gain insight into the many challenges and identify an effective framework to improve the sustainment of these systems and the upgrade process, a series of interviews were conducted with public and private sector professionals across the federal community. The interview questions and data gathered included:

- ▶ **What is an Upgrade?**
 - A new version of the software issued to satisfy new functional or technical requirements.
- ▶ **Why Upgrade?**
 - Add new required functionality.

- Sustain system and stay current with vendor’s versions or compatible with technical architecture.
- ▶ **When to Upgrade?**
 - Most agencies plan and budget upgrades over a 1-3 year cycle.
 - Consider other agency business priorities and requirements and adjust schedule as required.
 - Look at risk (e.g., is functionality or technology needed? Is staff ready? Are business processes ready? Is the upgrade touching other agency systems and are they ready?)
- ▶ **How do you budget for upgrades?**
 - Plan for upgrades at set time schedules of 1-3 years; budgeted for in-budget cycle or O&M.
 - Develop timeline based on program needs, available investment funds, and/or availability of appropriated funds.
 - Understanding Treasury/OMB regulations and what the vendor will be releasing in the next few versions can help you budget for what you might need.
- ▶ **How do you staff for upgrades?**
 - Examine skill sets required; look internally, and if necessary, consider contractor support to provide the extra manpower as federal hiring does not allow for staffing spikes.

Based on this common understanding, we are able to move into a discussion related to how to create a more consistent, standardized approach to upgrades and system sustainment.

Discussion

Agencies recognize the importance of upgrading their financial systems, and many have already begun efforts to implement or upgrade financial systems to alleviate some of their long-standing problems. In recent years, many of the CFO agencies have implemented new financial systems to provide reliable financial information in support of the government wide initiatives. The upgrade process is a critical component in keeping these systems viable over the long-term in support of this initial investment. As described in OMB Memorandum 10-26, many of these modernization efforts have faced challenges resulting in cost overruns and failure to realize program goals. We understand the complexities associated with financial management system modernizations. To reduce the complexity of systems maintenance once these systems are successfully implemented in an agency, we offer an approach to streamline the upgrade process across agencies for those that are planning or intend to upgrade their systems.

Vendor Upgrade Process

Typically, software vendors will construct and release upgrades for many reasons, such as to satisfy functional or technical requirements to their existing products, to fulfill emerging requirements introduced by federal customers such as new government policies and mandates, or to close security gaps. Vendors often encourage agencies to adopt these upgrades to take advantage of the new functionality, to comply with new government policies and mandates, and maintain baseline compatibility with the vendor’s latest version for the purposes of system sustainment and production support.

These product upgrades, depending on the state of the system and product configuration, may require significant time and resources to implement; therefore, proper planning and budgeting are necessary to ensure the best upgrade path and sustainment strategy.

To determine the best and most practical upgrade process, all stakeholders need to take into consideration the risks associated with the upgrade including minimizing operational downtime, a major concern. As agencies consider whether to proceed with the recommended upgrade, some questions that need to be addressed such as: Is the upgrade in compliance with all applicable regulations? Is the agency or bureau ready for the upgrade? Did they budget enough funds to support this effort? Do they have staff with the appropriate skill set to support this task? Would they require/need contractors to support them?

When approaching an upgrade it is also important to remember that the complexity of the upgrade increases in direct proportion to the complexity of the agency's technical and operational architecture. For example, if an agency's software has been customized, has numerous point-to-point interfaces to other agency functional systems (e.g., procurement) or program systems with financial data, or has numerous custom reports, the complexity of the upgrade increases proportionally. Significantly more pre-planning and communication within the agency will be required, as well as testing. Upgrades that impact interfaces to systems not owned by the CFO organization will further affect the need to coordinate and pre-plan with other organizations in the agency. Conversely, federal agencies without software customizations and which have been able to standardize business processes and integrate other functionality areas into their financial systems architecture will experience less complexity with an upgrade.

Analysis of Options

From the discussions we had with federal agencies and the vendors, no "one size fits all" approach will work when it comes to federal agencies. While much commonality is already expressed through standards, differences in size, scope and mission are apparent. All of these factors affect an agency's approach to, implementation of and use of its financial system and its functionality. Smaller or less complex agencies may be able to implement a COTS package with minimal interfaces and specialized reports and without feeling the need to customize software. Larger, more complex agencies may require many disparate interfaces to mixed programs systems (contains both program and financial data) or the development of custom reports for program and other areas beyond those provided with the COTS solution, and request that functionality be added to the software that may not be of similar value to other agencies. Many agencies are a combination/blend of the two extremes. Because of this, various levels of complexity are introduced into the upgrade process both from the software perspective and the ability of an agency to prepare and budget for the upgrade itself.

Even so, agencies do need to keep their software current not only to maximize the long-term viability of the software and initial their investment, but to also keep current with new federal functional requirements and take advantage of business opportunities offered by new, emerging technologies. The

agencies we spoke with recognized this, but also expressed a desire to improve the upgrade process to minimize its impact on agency resources, budget, and operations.

OMB's question asks if there is a way to incentivize vendors to improve this process. In looking at this question and through discussions with OMB, members of the FSAB, and stakeholders, we realized that the solution is less about incentives and more about closer communication and coordination between the senior executives of the federal financial management community and the vendor community. With greater senior level involvement on both sides, coordinated, informed decisions could be made early about new functionality, the introduction of emerging technologies and how to mitigate the impact on current federal agency operations. This solution also enables the agency to consider investments in terms of **capability** across mixed systems instead of a more typical, narrow upgrade process that focuses on one system or functionality at a time. Improvement will also be realized through introduction of an overall strategy for financial systems that incorporates the need to upgrade the software in some manner. Further, grouping agencies of similar complexity together could facilitate the development of upgrade strategies and business cases for upgrades. It could also facilitate analysis and discussion on how best to bring more complex agencies long-term into a less complicated, more standard environment.

To realize this, we recommend that upgrade paths/strategies consistent with complexity groupings of agencies be made part of the overall sustainment strategy being proposed. The approach to streamlining the upgrades process includes:

- ▶ Assess departments/bureaus on a continuum
- ▶ Recognize the system complexity in each agency and group similarly complex agencies together to devise an overall approach and business case
- ▶ Drive agencies to standardize by decreasing customizations (software/reports) and point-to-point interfaces (strive for integration)
- ▶ Align the financial system and its implementation with technical architecture of the agency and lifecycle of systems interfaced with the system
- ▶ Increase coordination and communication between federal agencies and software vendors (See detail in recommendations)
- ▶ Establish a sustainment strategy that facilitates planning and timing of software upgrades
 - Improve Investment Control
 - Manage emerging federal requirements at executive levels
 - Better align upgrades with vendor release schedules

Specific recommendations to streamline upgrades within an overall Sustainment Strategy are discussed below.

Recommendations

Strengthening Program Governance and Opening Stakeholder Communications

Federal agencies and software vendors can work together to establish a sustainment strategy that facilitates planning and timing of software upgrades. The strategy will benefit government and taxpayers, and reward industry through better investment control, portfolio management, and management of emerging requirements. The effort will take coordination across OMB and executive leadership, agency leadership and program management, and the vendor community.

Taking into consideration all the factors that complicate upgrades, a key recommendation of the group is that federal agencies be evaluated as to the complexity of their financial management operations. Once this is done, we recommend grouping agencies of like complexity, and then work with the software vendors to devise upgrade strategies and schedules that match federal agencies circumstances. If this were done, better estimates could be made of costs and ROI, enabling agencies to be better positioned to determine when and how to upgrade, or when and how to use other approaches. Further, the vendor community would be better able to work with the agency groups to make recommendations to them on how to reduce the complexity of the financial systems technical and operational architecture to reduce the complexity of the functional and technical upgrades going forward. This will allow them to be better positioned to take advantage of emerging technologies, such as cloud computing, and to ultimately streamline operations. Additionally, the proposed expanded Financial Systems Advisory Board and the Emerging Requirements Lead (explained below) could work with these federal “complexity groups” and the vendors to determine when and how to implement new financial management requirements into the software.

OMB and Executive Leadership

The government should consider implementing the following recommendations:

- ▶ Expand Financial Systems Advisory Board (FSAB) membership
 - Add other experts to executive management, appointing battle tested program managers and leads from the “frontline” who have implemented or upgraded systems and understand the specific challenges and the risks to success
 - Add liaisons from Treasury and GAO to promote transparency in the review process
- ▶ Define requirement standards and socialize to agencies
 - Complete revision to A-127, to include guidance such as:
 - Maximize configurations and minimize customizations
 - Define standard business processes (in line with original FMLOB and FSIO)
 - Promote business process standardization
 - Define FSAB review requirements and expectations
 - Define self certification process for Vendors
 - Require ROI upfront and require it from agencies in their budget requests
 - Provide clear business case documenting direct costs, operational and intangible pros and cons to define purpose and scope of a given project
- ▶ Define standard sustainment strategy
 - Define levels of operations and maintenance from minor bug fixes to major upgrades

- Provide guidance on how to minimize subsequent cost and complexity of upgrades while maintaining compliance with Treasury and other government-wide requirements
- Provide upgrade path and schedule/cycle examples to consider against budget constraints and agency needs
- Guidance on business process reengineering and change management
- Guidance on how to maintain systems within hybrid environments

Agency Leadership and Program Management

The government should consider implementing the following recommendations:

- ▶ Improve identification of emerging requirements that drive upgrades. (See Figure 6: Emerging Requirements Identification and Validation Process for a proposed process flow to facilitate the identification and evaluation process for new requirements.)
 - Appoint an Emerging Requirements Lead (ER Lead) to identify requirements triggered from various sources such as Treasury, OMB, and new business processes to:
 - Reduce RICE-W development and system customization
 - Work with the vendor community more closely to plan upgrades within products
 - Facilitate upgrade process by defining a timetable for requirement changes and establish agreement on them across government
 - Provide requirements directly to vendors to incorporate into the software
 - Add government-wide requirement review and approval authority to the CFO Council
 - ER Lead presents new requirements to CFO Council for consideration
 - CFO Council reviews changes, determines viability and benefits
 - CFO Council recommends actions to be taken by agencies
 - Consider the cost/benefits of the change before asking industry to implement it including a clear business case documenting direct costs, operational and intangible pros and cons to define the purpose and scope of the project
- ▶ Improve Communication
 - Communicate with industry what government wants via standards, not through prescriptive specifications
 - Provide proactive change management that articulates benefits of the upgrade to stakeholders
 - Engage the private sector more often. Tell them more and ask more of them during the pre-solicitation and requirements definition phase.

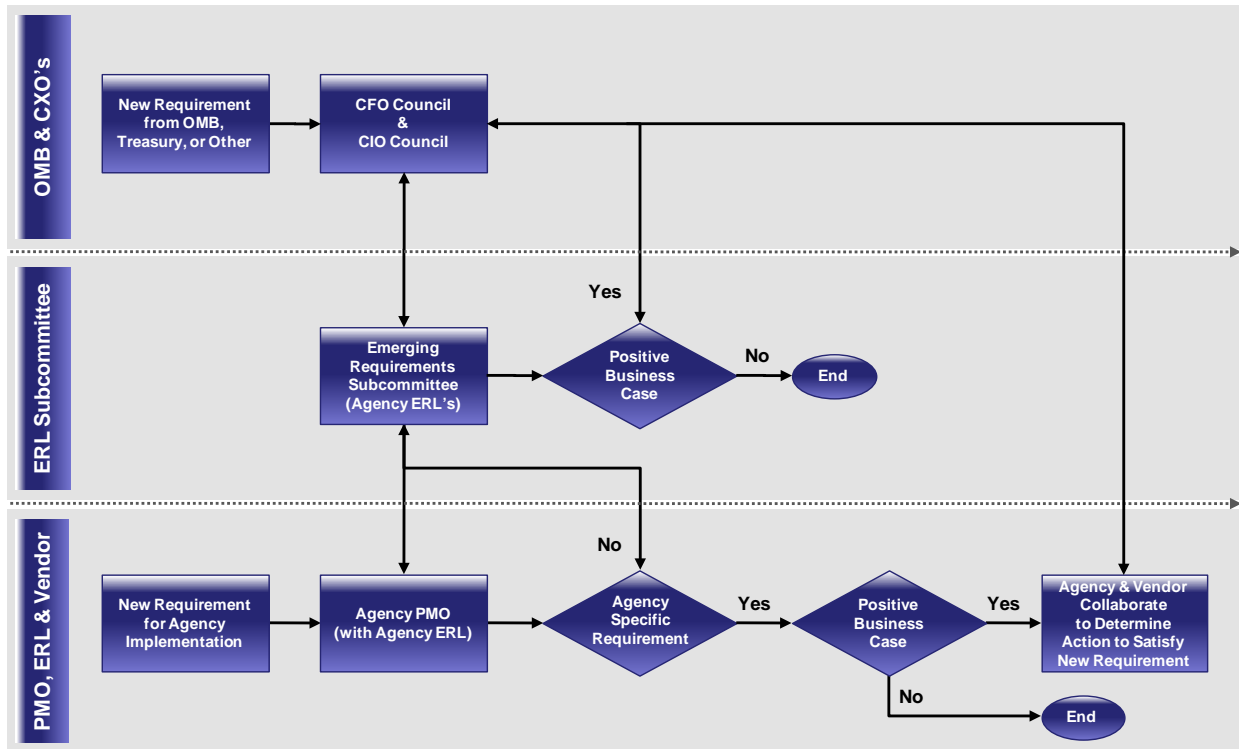


Figure 6: Emerging Requirements Identification and Validation Process

Vendor Community

The vendor community should consider implementing the following recommendations:

- ▶ Help develop strategy to reduce cost and frequency of upgrades. Look at how we can make upgrades easier on an agency
- ▶ Continue to be open to communication that will facilitate a sustainability strategy that supports regular and streamlined upgrades
- ▶ Develop software to be more configurable with limited mandatory functionality required
- ▶ Develop a more efficient, phased data conversion/migration approach for releases (e.g., maintain existing data structure and enhance gradually over time)
- ▶ Automate testing wherever possible
- ▶ Improve installation procedures to be more consistent and predictable
- ▶ Promote operational test and evaluation to determine realized benefits and ROI since upgrade
- ▶ Develop service level agreement (SLA) models that provide government with alternative upgrade paths
- ▶ Introduce production support models that provide government with options of extended service beyond the sunset of system versions

Impact Statement

OMB, agency leadership, CFO and CIO Councils can streamline software upgrades by defining a standard sustainment strategy including upgrade paths and how to maintain systems under current budget constraints and within hybrid environments. In addition, the team recommends that OMB and the CFO

Council discuss adding an emerging requirements lead responsibility and review process to their regular agenda.

These measures can help the federal government streamline the software upgrade process, improve agencies' overall system sustainment strategy and portfolio management, and in turn, reduce costs to the taxpayer.

Taking Advantage of New Technology and Processes

Purpose

Are there new technologies or new business processes that will fundamentally change the paradigm for financial management systems?

Background

The vision was to identify existing or emerging paradigms that government might leverage to improve the operational effectiveness and total cost of ownership of their financial management systems.

A wide variety of thoughts and insights were sought. This included discussions with federal government shared services providers, current federal financial management software vendors, and vendors who offer only a Software-as-a-Service (SaaS) model. Common themes were identified in three areas: new tools/technologies, deployment models, and business models.

Specifically, the following entities were engaged:

- ▶ Federal Government shared services providers
 - Department of the Interior – National Business Center
 - Department of Transportation – Enterprise Service Center
- ▶ Current federal financial management software vendors
 - CGI
 - Microsoft
 - Oracle
 - SAP
 - Savantage Solutions
- ▶ Vendors who offer only a SaaS model
 - RightNow
 - Salesforce.com
 - Workday

New Tools/Technologies

Nine types of tools or technologies were identified that could improve operational effectiveness and/or reduce total cost of ownership of federal financial management systems.

1. Data Management Tools
2. Business Intelligence

3. In-Memory Computing
4. Visualization
5. Business Process Management
6. Mobile Technology
7. Social Media
8. Optimized Systems
9. Accelerators/Templates

Targeted investment in one or more of these tools can provide significant value to the government. These tools and technologies can have strong impact on the sustainment strategy. They can improve hybrid legacy/modern operations, sustain legacy systems longer, and potentially reduce some of the barriers and costs of upgrades.

Data Management Tools

Data management is a broad category of tools that, with targeted investment, can have a significant impact in the implementation and operation of federal financial management systems. These tools provide the biggest return on investment when properly targeted. Data management tools can improve operations in the hybrid environment, significantly speed up and improve data migration activities from legacy to modern environments, and improve integration between systems. Subcategories of tools include: data fusion tools, data integration and data quality tools, and master data management.

Data fusion engines synthesize data from a variety of systems, standardize the data sets, and provide the “fused” information to end users. This makes it significantly easier and less costly to operate in the hybrid environment because end users are able to see a total agency or department level view of all their data in a single place. Historically, users would have to pull reports from multiple systems and manually combine them to see this information which resulted in higher costs, lower data fidelity, and information that was often out of date. Data fusion tools are in use today in government by several organizations, including the Recovery Accountability and Transparency Board (RATB). RATB has used these tools to fuse both structured and unstructured data from a variety of sources to provide user-friendly comprehensive view of Recovery Act spending. RATB has also deployed using a cloud-based Infrastructure-as-a-Service (IaaS) model.

Data integration and data quality tools have the capability to substantially increase the return on investment for federal financial management systems. These tools can enable integration between modern and legacy systems without heavy customization reducing one of the largest “costs” of an incremental approach (“throwaway” interfaces). These tools also enable improved integration between core financial management systems and the myriad feeder systems that have financial impact. They can automate error correction while notifying the source system of the error, and providing an audit trail of the change. This reduces the need to invest in large modernization efforts that cover the entire enterprise. Additionally, this approach eliminates the need for custom hard-coded interfaces, one of the

largest impediments to regular upgrades. Finally, these tools can radically speed up the data conversion and migration activities of implementation by quickly identifying problem data sets. Navy ERP is one federal financial management system implementation that has seen a significant improvement in their data conversion activities using these tools. They were able to focus on the data sets and their readiness due to reduced time spent on the process of mock loads. The data became cleaner, faster.

Master data management (MDM) tools can assist Government organizations operating in the hybrid environment or sustain their legacy systems longer (see Figure 7: Master Data Management). MDM tools allow organizations to control their master data creation and develop defined metadata that links the master data between systems. This approach enables an organization to unify their view across systems by relating the different master data values for the same object in those systems. It also helps organizations comply with reporting mandates while limiting the cost of compliance. Organizations don't need to customize a legacy environments, or modern environments for that matter, to comply with the emerging requirements. In short, MDM tools drive down the cost of data translation by making master data inherent in the metadata, not built into hard coded interfaces. This approach enables government to sustain their legacy environments for a longer time, and removes a significant barrier to upgrade through reduced customization.



Figure 7: Master Data Management

Business Intelligence

Business Intelligence (BI) tools have been deployed in Government agencies for quite some time. There are emerging trends for BI that can have an impact on the operational effectiveness and cost of ownership for federal financial management systems.

The trend with the largest potential impact to federal financial management systems is “Insight to Action.” Insight to Action refers to a closed loop cycle connection data from BI directly to Service

Oriented Architecture (SOA) and Business Process Execution Language (BPEL) to initiate business processes directly from analysis. Users will be able to view information in BI tools and initiate transactions and corrective actions directly in their financial management systems. Done with a SOA or BPEL construct, users will be able to use the unified data discussed above and initiate action in multiple systems improving operations in the hybrid environment. This approach will also enable organizations to reduce customization of their financial management systems as the user interface for many users will now be their BI tool, which will reduce the barriers and cost to upgrade.

In-Process Analytics is another trend in BI. Software vendors are embedding BI directly into the business processes delivered with their core transactional applications. The process can be more efficient and accessible to the end user, reducing the need for customization.

Modeling, forecasting, and optimization have long been the promise of BI that hasn't quite been met. Executives have been craving these capabilities to take a proactive approach to operating their organizations. To date, in government, BI has been limited to tools providing standard reporting, dashboards, & ad-hoc query. Capabilities within BI are considerably improving, and now can provide predictive analysis. In-memory computing, discussed in the next section has been a significant enabler of improved modeling, simulation, and forecasting capabilities.

“Big Data” is an emerging trend in BI to provide access to multiple enterprise data sources with enterprise wide semantic layer ensuring conformance, single version of the truth and federation. This concept is how an organization unifies all of its data to make decisions, which improves hybrid operations. Big data also enables opportunities for analyzing behavioral and attitudinal data to improve performance. Typically, unstructured data has historically been challenging to operationalize. The intelligence community has been using these capabilities for several years with very good results. They were able to do this earlier than other government agencies, because they had the extensive computing resources previously required.

In-Memory Computing

In-memory computing is an emerging trend that has the potential to revolutionize operations at many organizations. There are three main areas that directly impact federal financial management systems. These are increased performance and speed of analysis, cost of ownership, and ability to customize with limited impact on ability to upgrade. Significant research on this has been done by the Hasso Plattner Institute. The majority of this section has been adapted or quoted directly from *In-Memory Data Management: An Inflection Point for Enterprise Applications* by Hasso Plattner and Alexander Zeier.

The first area is increased performance. Historically, according to Plattner and Zeier “enterprise data is split into separate databases for performance reasons. Analytical data resides in warehouses, synchronized periodically with transactional systems. This separation makes flexible, real-time reporting on current data impossible.” Research has shown that in-memory computing can provide a 10-100 X improvement for business intelligence through by-passing the disk input/output overhead enabling users to scale across blades to achieve single system for transactions and analytics.

This results in improved decision-making timeframes. Traditional processing can take hours or even days to produce an answer to a query. In-memory can make that happen in seconds. Hermann-Josef Lamberti, the COO of Deutsche Bank, AG has said “Deutsche Bank has run a prototype with an early version of the in-memory technology described in the book by Hasso Plattner and Alexander Zeier. In particular, we were able to speed up the data analysis process to detect cross-selling opportunities in our customer database, from previously 45 minutes to 5 seconds. In-memory is a powerful new dimension of applied compute power.” Plattner and Zeier believe this technology has a significant impact on financial management systems and state the following:

“Consider financial accounting, where data needs to be frequently aggregated for reporting on a daily, weekly, monthly, or annual basis. With in-memory data management, the necessary filtering and aggregation can happen in real time. Accounting can be done anytime and in an ad-hoc manner. Financial applications will not only be significantly faster, they will also be less complex and easier to use. Every user of the system will be able to directly analyze massive amounts of data. New data is available for analysis as soon as it is entered into the operational system. Simulations, forecasts, and what-if scenarios can be done on demand, anytime and anywhere. What took days or weeks in traditional disk-based systems can now happen in the blink of an eye. Users of in-memory enterprise systems will be more productive and responsive.”

The next area in-memory computing can impact federal financial management systems is total cost of ownership. As described above, there are currently separate systems for transactional and analytical information. This results in redundant hardware, software, maintenance, management and energy costs. Moving to in-memory computing will reduce the redundant infrastructure costs inherent in the traditional disk-based model.

A very promising capability of the emerging in-memory paradigm is the shift to column-based databases. Historically data in relational database management systems (RDBMS) data has been stored in rows for performance reasons. In-memory enables data to be stored in columns. This will improve both transactional and analytical system performance due to reduce locking requirements. You are only locking the direct information being accessed. The real value comes in the ability to customize with minimal impact on upgrades. Adding or changing fields has caused considerable upgrade costs because of the limitations of the traditional RDBMS to handle the custom fields. Software vendors supporting a column-based in-memory technology will be able to perform their upgrade directly without impacting any custom fields created by the customer, drastically reducing upgrade costs for government customers who historically have to modify COTS software to meet existing and emerging mandates.

Visualization

Visualization tools can improve the adoption rate and help reduce change management costs associated with federal financial management systems. Users are able to visualize and understand the entire process, and how their part fits into the overall business of their organization. Some of the visualization tools can be used to directly navigate to transactions so users don't have to learn complex menus to do their daily work. Any improvement in adoption can reduce the time and cost of implementation, as well

as reduce customization. This reduces the barriers and costs to upgrade and sustain the system for longer periods of time.

Business Process Management

Business process management (BPM) tools take visualization further by fully modeling the end-to-end processes and enabling execution directly from within the tools. These tools also provide monitoring and process optimization and can be integrated with continuous process improvement methodologies such as lean six-sigma.

BPM can be a game changer for organizations that have particularly complex processes and need to integrate specialized applications to their business process. BPM tools enable an organization to build their process maps and integrate the specialized application for parts of the process. For example, the Naval Sea Systems Command has both general and highly specialized acquisition requirements. Many of their acquisitions are for commercial goods and services that COTS software can support with little or no customization. They also have very specialized contracting requirements, as they procure all ships and boats for the Department of the Navy. Shipbuilding contracts are highly specialized and manage an acquisition that can take 10-15 years from contract award to delivery. BPM tools can allow them to build process maps using a COTS framework, and integrate the custom code necessitated by their specialized shipbuilding acquisition requirements.

An additional game-changing example is creating custom user interfaces without changing underlying source code. COTS software is often rejected because it is “too hard” and has “too many screens to enter in the information I need to do my job.” Those are relevant complaints. BPM tools allow you to simplify the user interface by creating easier-to-use screens, in the vernacular of the user, and integrate with the underlying application without changing source code. This is done using a SOA construct where the user received their look-up values directly from the underlying system and saves the data directly in the underlying system with all of the edits and validations of transactions entered using the delivered COTS screens. You can also use this capability to integrate an existing form into your process. The user is presented with the electronic Adobe form, that looks just like the form the user fills out today, from within the process, and uses that form as their user interface to the application. This significantly improves adoption and reduces change management and training costs. BPM tools make it easier for users, and reduce customizations and sustainment costs.

Mobile Technology

Mobile technology is rapidly changing the way organizations and their employees are working. This shift has the capability to improve performance and sustainment of federal financial management systems. Not only are organizations able to deliver information anywhere on any device, but they are able to maintain control over the enterprise applications. Modern devices, such as smartphones and tablets, can deliver key functionality to executives, managers, knowledge workers, and mobile or tactile workers that allow accelerated decisions and transaction entry.

Mobile devices can also be used as an incentive to accept changes to existing processes to implement COTS software. Users may accept process change on mobile devices more readily than they accept them on PCs. Mobile device users have historically understood that the form factor brings changes, and are willing to accept process change trade-offs for the ability to use their mobile device.

The use of scanners to read 2D barcodes is another way mobile devices can be game changing. By tagging documents, data entry errors are reduced and documents can be read or accessed more easily in the field and with mobile devices.

Social Media

Social media is an emerging trend that may help facilitate the acquisition, implementation and adoption of federal financial management systems. GSA has piloted the use of social media with their Better Buy project. This enables Government and Industry to collaborate early in the process to help refine requirements prior to acquisition resulting in enforceable contracts that deliver the intended capability at the agreed upon costs.

Additional uses of social media include DoD’s Milsuite and the Defense Information Systems Agency’s (DISA) Defense Connect Online (DCO). Milsuite is a closed social media site similar to the ones available on the open internet (see Figure 8: Social Media).



Figure 8: Social Media

DISA customers can use DCO to enhance collaboration on federal financial management systems implementations and roll-outs across geographic areas. This capability is also great for help-desk where the agent can directly see the user’s problem on the user’s system. Similar capabilities exist within the Microsoft Office/Exchange suites (see Figure 9: Collaborate and Share Information). Users can collaborate quickly and solve problems. Your power users can be available on instant messaging to help newer users with their transaction while never leaving their desks. These capabilities have the potential to reduce the infrastructure, helpdesk, and other sustainment costs of these systems.



Figure 9: Collaborate and Share Information

Optimized Systems

Optimized systems are an emerging trend that may have impact on the total cost of ownership for federal financial management systems. All major hardware and software vendors are in the process of delivering optimized systems that are pre-configured to “optimize” performance based on the hardware/software combination. There are single vendor and multiple vendor optimized systems configurations coming to market. These systems may help reduce the sustainment costs of federal financial management systems by reducing the infrastructure costs of the systems.

Accelerators/Templates

Many vendors are now also offering template implementations of their software. The customer provides master data, and the vendor delivers a configured system with the key master data. This can appreciably speed up implementations by conducting design sessions within the system using data that is familiar to the users. This approach can be very useful in gaining adoption and reducing the stress of new implementations.

Deployment Options

OMB’s “cloud first” initiative has raised attention to alternative deployment models that are applicable to federal financial management systems. This team analyzed benefits and considerations for three different deployment model options, given that one option will not meet the needs of all agencies.

1. In-House
2. Share Service Center/Hosting
3. Software-as-a-Service (SaaS)

In-House

In-house is a very common deployment model for federal financial management systems. The initiatives over the last decade to leverage existing or emerging shared service centers, such as the Department of

the Interior's National Business Center (DOI-NBC) or the Department of the Transportation's Enterprise Service Center (DOT-ESC) have resulted in a considerable transition from in-house deployments to shared services deployments as agencies have modernized.

Some agencies will still benefit from an in-house model and the total control over the application that comes with the in-house deployment. Examples include if they have notably different security requirements (e.g., DOD's Defense Information Assurance Certification and Accreditation Process) or requirements to support other secure networks such as the Secure Internet Protocol Router Network (SIPRNet) or the Joint Worldwide Intelligence Communications Systems. Similarly, agencies that have a need to write a large amount of interfaces to agency-specific systems may benefit from an in-house deployment model.

However, agencies that use this deployment model must have the funding, staff, and facilities to manage all of the infrastructure and operations and maintenance (O&M) costs of their system with limited economies of scale.

Shared Service Center/Hosting

Shared services deployments, whether in a federal or commercial shared services center, can provide numerous benefits to many agencies. While agencies don't have total control over their system, there is still some flexibility based on the Service Level Agreement (SLA) negotiated with the shared services provider. Agencies also tend to have budget stability as the cost of technical refreshes, O&M, and IT support are built into the service price. This means that these agencies no longer have to manage the budget peaks and valleys, including dealing with multiple appropriations, just to sustain their systems. They are able to pay a stable, predictable cost for the provision of their applications. Also, federal shared services centers may be able to absorb the effects of funding constraints, such as those caused by Continuing Resolutions, because they can accept planned procurement letters if they still have a positive Cumulative Net Results of Operations.

Agencies considering shared service centers also need to understand that savings they receive may be limited if they have stringent requirements such as single tenancy, specific hardware or complimentary software, and customizations. The more prescriptive their requirements to the shared services center, the less they will save by migrating there. Likewise, even though shared services centers offer flexibility, customization to the software can increase the time and cost of upgrades and will be borne by the agency regardless of the deployment model.

Software-as-a-Service (SaaS)

The terms cloud computing and SaaS are debated frequently. For purposes of our discussion, presenting the definition we are using for this document is important before discussing the benefits, consideration and availability of the SaaS deployment model. We are using the National Institute of Science and Technology's (NIST) definition of cloud computing and SaaS from the draft of Special Publication 800-145 dated January 2011. For the convenience of the reader, the following is excerpted from NIST SP 800-145:

“Cloud computing is a model for enabling convenient, on-demand network access to a shared pool of configurable computing resources (e.g., networks, servers, storage, applications, and services) that can be rapidly provisioned and released with minimal management effort or service provider interaction. This cloud model promotes availability and is composed of five essential characteristics, three service models, and four deployment models.”

The five essential characteristics of cloud computing, as defined by NIST, are: on-demand self-service, broad network access, resource pooling, rapid elasticity, and measured service.

The SaaS deployment model as defined by NIST is

“the capability provided to the consumer is to use the provider’s applications running on a cloud infrastructure. The applications are accessible from various client devices through a thin client interface such as a Web browser (e.g., Web-based email). The consumer does not manage or control the underlying cloud infrastructure including network, servers, operating systems, storage, or even individual application capabilities, with the possible exception of limited user-specific application configuration settings.”

Some substantial benefits exist to the SaaS deployment model for agencies that can work within the limitations. The SaaS model provides a single subscription based cost for use of the applications. The agency is not responsible for purchasing a perpetual license to the software, paying annual software maintenance fees, managing the infrastructure, upgrading the software, or dealing with emerging technologies. For a single, relatively stable, fee per user, per year, the agency uses the SaaS provider’s software. Typically fees are negotiated on a multi-year basis with price increases limited to inflation.

Additionally, the SaaS offering of many vendors provide configurability that mirrors customizations in traditional software without impacting the SaaS update process, and are protected during the update process. SaaS typically is deployed by the software vendor on their infrastructure, and a single code line is maintained to keep costs low. New features are typically shipped turned off so customers can manage how they are rolled-out to their users.

Based on interviews with RightNow, Salesforce.com, and Workday, the primary impact of SaaS on the other questions relates to how upgrades are managed. Typical SaaS offerings have frequent, period updates (3-4 per year). Upgrades are typically done in 1-2 hour windows on the weekend for every customer on the server being upgraded. To accept an upgrade, little or no customer effort is required. Workday states that "the typical amount of customer time to accept an update is 40-80 person hours to test new features."

Emerging technologies are also managed and leveraged by the SaaS vendor. For example, some SaaS vendors use object-oriented based applications, which tend to be more flexible than traditional software. Also in-memory repositories used by many SaaS vendors are changing performance characteristics and application capabilities. The key is that the SaaS vendor is responsible for figuring out how to leverage these new capabilities. They have an imperative to keep up, or they will lose their customers to those providers who can deliver these technologies in their offerings.

Before agencies procure a SaaS deployment model for federal financial management systems, several things should be considered. Among these are security, information assurance, loss of control, and the availability of a SaaS deployment model for federal financial management systems.

The first consideration with a SaaS deployment model is security. While SaaS is predicated on strong security because a data breach will bring the model down, agencies should request copies of all prospective SaaS vendor's SAS-70/SSAE-16 reports. These reports will help identify potential security risks that should be negotiated before signing a contract with the vendor.

The second consideration with a SaaS deployment model is information assurance (IA). SaaS is typically deployed in a multi-tenant model so agencies must work with their IA staff and prospective vendors to ensure IA requirements are met. Larger implementations often have their own instance, but this must be negotiated with the SaaS vendor. Also some vendors already have FISMA and DIACAP certification for their offerings. Agencies should make sure to ask prospective vendors if they have achieved such certifications. All SaaS-only vendors we spoke with are willing to place their technology stacks in a federal shared services center (e.g., DOI-NBC or DISA), but there will have to be some commitments for user counts/fees from the Government.

The third consideration with a SaaS model is to require vendors to disclose an exit strategy. SaaS offerings are suitable in certain scenarios but given the long-term nature of financial systems, it is important that agencies have flexibility in future transition out of SaaS to on-premise or to another SaaS provider. Any adoption of a SaaS offering must at a minimum have the following:

- a) A data exit strategy to allow the customer to retrieve all their data in a standardized format in situations where the customer may want to change their service provider; and

The capability to move the application from one infrastructure to another, and potentially bring it in house if the need arose.

Agencies considering a SaaS model must be aware that some customizations are not possible with SaaS. You must operate within the SaaS vendor's framework, with their tools, and on their code line. SaaS can significantly reduce implementation and upgrade costs, but will require more change management than typically is done in federal implementations.

Finally, availability of federal financial management systems in a SaaS model must be considered by agencies. Currently, none of the SaaS-only vendors (e.g., Workday, NetSuite, Salesforce.com, and RightNow) offer a federal financial management solution. Also, the current federal financial management software vendors do not directly offer a SaaS deployment model at this time. That may change in the future depending on demand from the government. There is one third party who currently offers what they call a SaaS model for federal financial management software. They provide a subscription pricing model to the government; however, it is unknown if there are limitations to this model as it is not provided directly by the software company. If the government is interested in pursuing SaaS deployment models for federal financial management systems, it is imperative to discuss these

requirements with the software vendors well ahead of the desired deployment timeframes to ensure availability.

Business Models

We identified three business models government might leverage to improve the operational effectiveness and total cost of ownership of their financial management systems:

1. Portfolio Management
2. Subscription Licensing
3. Enterprise Licensing

Portfolio Management

One of the key business models relevant to the federal financial management systems sustainment strategy is portfolio management. It is referenced as a tool or process in each of the responses to the questions from the government. In this case, while the traditional portfolio management tools are adequate to manage, the focus should be on capabilities, not on the systems. Too often organizations, commercial and government, are focused on their IT systems rather than the business capabilities the systems deliver.

This concept isn't new to Government. In 2007, GAO recommended that the Department of Defense apply portfolio management to weapons system investments. GAO found that successful companies take an integrated portfolio management approach to product development. This includes frequent reviews of investment decisions, and making tough go/no-go decisions. The GAO report states:

“The companies GAO reviewed have found that effective portfolio management requires a governance structure with committed leadership, clearly aligned roles and responsibilities, portfolio managers who are empowered to make investment decisions, and accountability at all levels of the organization”

What is new in this report is the application of portfolio management – with a focus on business capabilities, not individual systems – specifically to the capabilities a federal agency requires in its financial management system. As stated, this business model requires strong governance and commitment. The Office of Federal Financial Management's (OFFM) process of federal financial management system reviews and the control of quarterly allotments can provide powerful existing governance tools. If OFFM is able to base those reviews on an agency's capability portfolio management process, and all of federal financial management systems as whole, significant improvements in outcomes could result as agencies will be asking OFFM for funding of capabilities important for their operations.

Additional details on portfolio management are also available in the [Managing in a Hybrid Environment](#) section of this paper.

Subscription Licensing

Subscription licensing models are often used in the commercial sector, but rarely used in government. Historically, government has purchased perpetual software licenses, and driven savings through the discounts. The subscription model would provide a fixed cost per user for the term of the agreement. Agencies are able to manage steady budgets, with fluctuations due only to the number of staff. This avoids the peak and valley budget cycles that tend to come with traditional software license models.

Agencies should be aware that the best pricing for subscription models come with multi-year agreements. Care will have to be taken to work with the software vendors to manage the annual appropriations cycle that applies to O&M funding lines.

Enterprise Licensing

Enterprise licensing is another model to consider. As many of the agencies are in process, or even have completed a system modernization recently, each agency has negotiated their own licensing and pricing. Negotiating an enterprise licensing agreement across the federal government could produce significant savings for all who will be purchasing additional licenses, and even those who have completed their license buys. Software maintenance, in most cases in the federal government market, is based on the net price paid. It may be possible for the Government to consolidate all of the existing and near-term demand to negotiate a new license that will reduce the cost of new licenses, and significantly reduce the maintenance cost for the existing licenses. This is especially true for smaller agencies, which often don't have strong pricing power with the software vendors.

The key consideration is fully understanding the demand model for licenses, so that the government buys licenses at the right scale and avoids having un-used licenses.

Recommendations

- ▶ **Consider Security** – Security and information assurance problems can derail any project. Agencies should have robust security plans in place and agreement from their IA organizations on acceptable practices. These should be built into the service level agreement and the contract/memorandum of understanding before work begins.
- ▶ **Consider Security Risk Models** – When formulating cloud computing implementation plans and security assessments, agencies should consider the Federal Risk and Authorization Management Program (FedRAMP). The FedRAMP program has proposed a standard approach for security assessment and authorization and continuous monitoring of cloud computing services from both commercial and federal providers. The program also outlines a cloud computing security requirements baseline that agencies can use to develop security plans and service level agreements that ensure the proper security control requirements are met by a potential cloud computing service provider.
- ▶ **Make Targeted Tool Investments** – Many tools and technologies are available to assist federal agencies. Determining which tools, if any, are the best for a given agency can be difficult.

Agencies should focus on tools that will enable them to accelerate decision and provide them with a deeper understanding of their data and operational situation. This approach will help them make better decisions on when or how to modernize an environment. The amount saved due to that insight may be hard to calculate, but it will generally be many times the cost of the initial investment.

- ▶ **Consider Return on Investment (ROI) and Timing** – Most agencies tend to use commercial models to calculate ROI. These models are appropriate for the federal government for a variety of reasons. One of the largest is timing. Commercial ROI models assume full go-lives in 18-36 months, which has been unrealistic for federal customers. Commercial models don't tend to include mid-phase legacy investments to keep the legacy systems alive. The commercial sector doesn't have the same heavy compliance burden as federal agencies. Federal agencies need to make sure they have funds to make targeted investments in either tools or effort to maintain compliance with laws and regulations, which change quite often. Also, most commercial models assume certain amounts of head count reduction to calculate the returns. Federal government implementations don't typically result in a reduction in staff, but rather a re-assigning of them, making calculation of ROI challenging. In short, be conservative but realistic.
- ▶ **Coordinate with Emerging Technologies Shared Interest Group (SIG) of IAC** – IAC's Emerging Technologies SIG is focused on identifying and understanding the next wave of tools and technologies that are coming to market. Quarterly or semi-annual coordination with the SIG can pay off for agencies that don't have the time or budgets to stay ahead of curve. It is important for the functional financial management community to engage, not just IT. Emerging technologies can deliver new capabilities that make a big impact on financial management, but financial managers need to know something exists to ask for it.
- ▶ **Communicate with Software Vendors** – Agencies can benefit from ongoing communication with the software vendors (current and potential) to understand what capabilities are on the horizon. Agencies should communicate with their current vendors to know what their plans are, and what features they are going to bring to market and when. Agencies should communicate with the vendors who didn't win the procurement to know what capabilities they are bringing to market. Also, agencies should communicate with the SaaS-only vendors to understand timelines and commitments required to deliver a SaaS deployment model for federal financial management systems, and what an agency will give up in a cloud model in exchange for savings and other service improvements. The more an agency communicates with the entire community, the more knowledge and leverage they will have to maximize their returns.

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Appendix A: Decision Matrix

Description: The Decision Matrix Template beginning on page 56 offers agencies tools to help analyze their legacy systems and decide future investment paths. An Excel version of the Decision Matrix Template is available at www.actgov.org.

The Decision Matrix Template spreadsheet consists of five worksheets as follows:

1. Compliance & Internal Controls
2. Functional Quality Factors
3. Technical Quality Factors
4. Other Risk Considerations
5. Rating Scale Meanings

The tabs at the bottom can be clicked to view each worksheet. The four worksheets in the decision framework matrices all have the same structure; rows that represent elements of the specific matrix being viewed, and the same set of columns.

As described, the Compliance and Internal Controls worksheet has rows for each of the eight areas of compliance and control:

1. Information Assurance (FISMA)
2. Federal Systems Requirements (FFMIA, JFMIP, FSIO)
3. Federal Accounting Standards (FASB)
4. United States Standard General Ledger (USSGL) at the transaction level
5. Internal Control over Financial Reporting (FFMIA ICOFR)
6. Financial Improvement and Audit Readiness (FIAR)

7. GAO Financial Audit Compliance Testing (GAO financial audit manual)
8. Standard Financial Information Structure Reporting (DoD's SFIS)

And, the Functional Quality Factors worksheet has rows for each of the 12 areas of functional quality:

1. Functional Coverage (Business Process Coverage)
2. Data Accuracy and Completeness
3. Data Currency
4. Ease of integration (data sharing, data exchange, and business system/process integration)
5. Timeliness of Outputs (system response time)
6. System Availability and Reliability
7. Output content and quality
8. Special reports
9. User support
10. Ease of use
11. Documentation
12. Data Security

All the decision framework worksheets have the same set of columns, but the column titles are adjusted to reflect the specific worksheet (one of the four decision matrix worksheets). For example, the second column heading is a name for the characteristic. In the Compliance and Internal Controls worksheet, the second column is titled “Compliance Characteristic or Quality of Internal Control (CC-QIC).” In the Functional Quality Factors worksheet, the second column is titled “Functional Quality Characteristic (FQC).” Other column headings follow that same pattern across workbooks. The column positions (column A, B, C, D...) are designed to be identical from workbook to workbook. The column titles are specific to the workbook it is in, but the type of information the column will hold is the same across worksheets. For example, the Functional Quality Factor Headings and a description of the column content are as follows:

1. **#** – This is simply a unique number (there is no significance to the meaning or use, e.g., it is not intended to represent priority or importance).
2. **Functional Quality Characteristic (FQC)** – These are the characteristics (factors or components) that we are going to evaluate the system by. The items in this list can be added to, modified, or deleted. The intent with the initial set of characteristics is to provide a list from the best practices in industry today, but can be adjusted as the agency adapts the decision matrix to their specific needs.
3. **Description of Functional Quality Characteristic** – This is a description of the Functional Quality Characteristic.

4. **Weighting Factor** – This is intended to represent the relative importance of a characteristic in quantifying the overall Functional Quality of the system. The values in this column should sum to 100%. Any values in the default version of this worksheet are only illustrative. Every agency/system will have different weighting factors specific to their environment and situation. Please update the values for your agency, system, and situation. This technique of using a Weighting Factor and a Functional Quality Rating (numerical value of 1 to 7) when multiplied together and summed for a system/application is typically used to compare multiple systems using the same set of criteria. This technique is used in Enterprise Architecture activities to evaluate all systems in an agency (or within an organization) using the same criteria and to compare and report on the state of many/all applications. Since this decision matrix is being applied to one system – the FMS System – the weighting factor should be used to simply represent the relative importance of a characteristic in quantifying the overall Functional Quality of the system. The weighting factor will be useful in the analysis of comparing competing objectives and in making the “where to invest finite resources” decision.
5. **Functional Quality Rating of Legacy System** – This is intended to quantify on a scale of 1 to 7, the quality of that characteristic of the system. This is a subjective rating for this characteristic. See "Rating Scale Meaning" worksheet for a description of the values.
6. **Description of Deficiency or Functional Quality shortcoming** – This is a description of the deficiency or functional quality shortcoming. There may be more than one item of deficiency that the assessment team wants to document for each functional quality characteristic. Add rows below each functional quality characteristic for each/all the items of deficiency. It is critical to have a good description of the deficiency or Functional Quality Shortcoming. It should be described in both business and technical terms. Business terms would describe the business organization, business process, business activity (and even down to the business task level) this deficiency impacts. The technical terms should describe the technical issue(s) creating/causing the functional quality shortcoming. For example, the technical issue could be the agency did not purchase the BI module for the system which could provide many/most of the reporting and business data mining functional needs.
7. **Impact to Business Process because of a less than perfect (deficient) Functional Quality Characteristic (description)** – This is a textual description of the impact to the business process caused by the deficiency or functional quality shortcoming. Each item of deficiency included should have a good description of the business impact it causes. If the business incurs additional cost to make up for, compensate for, or uses a workaround to mitigate the impact of the deficient functional quality characteristic, that should be described in this cell also. That description of the workaround provides an understanding of the cost (dollar amount) indicated in the next column.
8. **Additional Cost incurred to augment the Legacy system to make up/compensate for a less than perfect Functional Quality Characteristic** – This is the annual cost (in dollars) that the business incurs to make up for, compensate for, or uses a workaround for to mitigate the impact

of the deficient functional quality characteristic. Rough order magnitude (ROM) estimates are appropriate as long as described as an estimate.

9. **Cost (range of estimates) to fix/correct the less than perfect Functional Quality Characteristic** – This is best estimate of the cost to fix or correct the less than perfect Functional Quality Characteristic. The previous column (Column H) describes the annual additional cost the business is incurring to compensate for a deficient functional quality characteristic. This column is an estimate of the total cost to permanently fix/correct the deficiency. This estimate is a range (lowest cost estimate; highest cost estimate), and expected (most likely) cost estimate to fix the legacy system's deficiency in this area (fix to the point where the costs in column H would go away - no longer be needed because the legacy system was fixed, and now delivering on this FQC). This dollar value estimate should be stated as a range with some level of confidence in the values. For example, we are 90% confident that the cost to correct item xyz is between \$700,000 and 1,200,000 with the most likely cost to be \$900,000. The intent is not to develop a statement of work, get three quotes and, use them as the range and average values. Rather the intent is for the assessment team to develop a good ROM estimate, based on good sources (SME's, vendor), and good estimating techniques. There are excellent techniques for estimating and calibrating confidence levels. See "How To Measure Anything; Finding the Value of Intangibles in Business" by Douglas W. Hubbard.

10. **Time (range of estimates) to fix/correct the less than perfect Functional Quality Characteristic** – This is a time range in months to fix the system's deficiency in this characteristic. The time range should be developed and defined similar to the way the cost range is developed and stated; (lowest time estimate; highest time estimate), and expected (most likely) time estimate to fix the legacy system's deficiency in this area. For example, we are 90% confident that the time to correct item xyz is between 7 months and 11 months, with the most likely time to complete to be 8 months.

Decision Matrix Template

Compliance and Internal Controls

#	Source	Compliance Characteristic or Quality of Internal Control (CC-QIC)	Short Name	Description of Compliance Characteristic or Quality of Internal Control	Weighting Factor	CC-QIC Rating of Legacy System	Description of Deficiency or CC-QIC shortcoming	Impact to Business Process because of a less than perfect (deficient) CC-QIC(description)	Additional Cost incurred to augment the Legacy system to make up/compensate for a less than perfect CC-QIC	Cost (range of estimates) to fix/correct the less than perfect CC-QIC	Time (range of estimates) to fix/correct the less than perfect CC-QIC
1	OMB Circular A-130	Information Assurance	FISMA DIACAP	Federal Information Security Management Act (FISMA) of 2002, per OMB Circular A-130, and Defense Information Assurance Certification and Accreditation Process (DIACAP), following NIST Publication 800-53.	20.0%						
2	OMB Circular A-127	Federal Systems Requirements	JFMIP FSIO	Federal Financial Management Improvement Act of 1996 (FFMIA) - Joint Financial Management Improvement Program (JFMIP)/Federal Systems Integration Office (FSIO) per OMB Circular A-127 and using OFFM 0106 criteria. FSIO/JFMIP define mandatory and value added federal financial management system requirements based on functionality/application purpose. DFAS 7900.4-G (the "Blue Book") consolidates federal financial management system and DoD system requirements.	20.0%						
3	FFMIA	Federal Accounting Standards	FASB	Federal Accounting Standards Board (FASB) requirements.	20.0%						

#	Source	Compliance Characteristic or Quality of Internal Control (CC-QIC)	Short Name	Description of Compliance Characteristic or Quality of Internal Control	Weighting Factor	CC-QIC Rating of Legacy System	Description of Deficiency or CC-QIC shortcoming	Impact to Business Process because of a less than perfect (deficient) CC-QIC (description)	Additional Cost incurred to augment the Legacy system to make up/compensate for a less than perfect CC-QIC	Cost (range of estimates) to fix/correct the less than perfect CC-QIC	Time (range of estimates) to fix/correct the less than perfect CC-QIC
4	FFMIA	USSGL	USSGL	The financial management system will be consistent and compliant with the United States Standard General Ledger (USSGL) at the transaction level. Application of the SGL at the transaction level means that financial management systems will process transactions following the definitions and defined uses of the general ledger accounts as described in the SGL. Compliance with this standard requires: (1) Data in Financial Reports Consistent with the SGL. Reports produced by the systems that provide financial information, whether used internally or externally, shall provide financial data that can be traced directly to the SGL accounts. (2) Transactions Recorded Consistent with SGL Rules. The criteria (e.g., timing, processing rules/conditions) for recording financial events in all financial management systems shall be consistent with accounting transaction definitions and processing rules defined in the SGL. (3) Supporting Transaction Detail for SGL Accounts Readily Available. Transaction detail supporting SGL accounts shall be available in the financial management systems and directly traceable to specific SGL account codes.	20.0%						
5	FMFIA FFMIA	Reporting	ICOFR	Internal Control over Financial Reporting (ICOFR). Requires auditors to report on agency compliance with the three stated requirements as part of financial statement audit reports. Requires agency heads to determine, based on the audit report and other information, whether their financial management systems comply with FMFIA. If not, agencies are required to develop remediation plans and submit them to OMB. The Federal Managers Financial Integrity Act (FMFIA) of 1982 provides the framework for Internal Controls Over Financial Systems (ICOFS) process.	20.0%						
6		Audit	FIAR	Financial Improvement and Audit Readiness (FIAR). DoD's program to provide a comprehensive approach to achieve auditability and financial management improvement through systems, process, and control improvements. OMB Circular A-123, Appendix A is used for discovery, correction, and sustainment.							

#	Source	Compliance Characteristic or Quality of Internal Control (CC-QIC)	Short Name	Description of Compliance Characteristic or Quality of Internal Control	Weighting Factor	CC-QIC Rating of Legacy System	Description of Deficiency or CC-QIC shortcoming	Impact to Business Process because of a less than perfect (deficient) CC-QIC (description)	Additional Cost incurred to augment the Legacy system to make up/compensate for a less than perfect CC-QIC	Cost (range of estimates) to fix/correct the less than perfect CC-QIC	Time (range of estimates) to fix/correct the less than perfect CC-QIC
7		Compliance Testing		Test compliance of federal financial system using GAO financial audit manual (Section 300 of Volume 1, and Section 700 of Volume 2 which includes Federal Financial System Requirements). FFMA compliance test results should be retained for no less than 3 years.							
8		Standard Reporting	SFIS	Standard Financial Information Structure (SFIS). SFIS standardizes financial reporting across DoD, reducing the cost of auditability, allowing revenues and expenses to be reported by programs that align with major goals versus by appropriation categories, and enabling decision-makers to efficiently compare programs and their associated activities and costs across DoD. And, it provides a basis for common valuation of DoD programs, assets, and liabilities.							
12											
					100.0%						

Functional Quality Factors

#	Functional Quality Characteristic (FQC)	Description of Functional Quality Characteristic	Weighting Factor	Functional Quality Rating of Legacy System	Description of Deficiency or Functional Quality shortcoming	Impact to Business Process because of a less than perfect (deficient) Functional Quality Characteristic (description)	Additional Cost incurred to augment the Legacy system to make up/compensate for a less than perfect Functional Quality Characteristic	Cost (range of estimates) to fix/correct the less than perfect Functional Quality Characteristic	Time (range of estimates) to fix/correct the less than perfect Functional Quality Characteristic
1	Functional Coverage (Business Process Coverage)	The completeness of the legacy system in covering (providing support/automation for) the required business processes	35.0%						
2	Data Accuracy and Completeness	The degree of accuracy and completeness of the data provided by the system.	15.0%						
3	Data Currency	The degree to which the information is timely. Is it up-to-date, or is it too old to be of any use to you?	7.5%						
4	Ease of integration (data sharing, data exchange, and business system/process integration)	This is all about the ease with which the legacy data can be shared and/or legacy system processes can be integrated with other business systems and processes.	10.0%						
5	Timeliness of Outputs (system response time)	The appropriateness of the system's response time for standard [normal] transactions and inquiries.	5.0%						

#	Functional Quality Characteristic (FQC)	Description of Functional Quality Characteristic	Weighting Factor	Functional Quality Rating of Legacy System	Description of Deficiency or Functional Quality shortcoming	Impact to Business Process because of a less than perfect (deficient) Functional Quality Characteristic (description)	Additional Cost incurred to augment the Legacy system to make up/compensate for a less than perfect Functional Quality Characteristic	Cost (range of estimates) to fix/correct the less than perfect Functional Quality Characteristic	Time (range of estimates) to fix/correct the less than perfect Functional Quality Characteristic
6	System Availability and Reliability	The level of confidence that the system output(s) will not be late as a result of application system outages, that the system is available when needed, and that the response time is predictable.	5.0%						
7	Output content and quality	The adequacy of content and format of the data, and any related detail and summary reports generated by this system. Do they provide the required information, and are they easily understood?	5.0%						
8	Special reports	The ease with which special reports can be generated through this application system. (If, the organization has alternative business intelligence (BI) tools, this question might need to be re-framed to "the ease with which application data can be accessed and used for business intelligence.")	5.0%						
9	User support	The effectiveness of on-going operational support; the appropriateness of education (training) on this system's capabilities.	5.0%						
10	Ease of use	The ease of data preparation and user interaction for normal use of this application.	5.0%						

#	Functional Quality Characteristic (FQC)	Description of Functional Quality Characteristic	Weighting Factor	Functional Quality Rating of Legacy System	Description of Deficiency or Functional Quality shortcoming	Impact to Business Process because of a less than perfect (deficient) Functional Quality Characteristic (description)	Additional Cost incurred to augment the Legacy system to make up/compensate for a less than perfect Functional Quality Characteristic	Cost (range of estimates) to fix/correct the less than perfect Functional Quality Characteristic	Time (range of estimates) to fix/correct the less than perfect Functional Quality Characteristic
11	Documentation	The availability of usable documentation that describes this system's functions, data set-up requirements and output results.	2.5%						
12	Data Security	Based on the sensitivity of the information produced by this system, what is the effectiveness of the security controls that are provided with this application.	0.0%						
			100.0%						

Technical Quality Factors

#	System Technical Quality Characteristic	Description of Technical Quality Characteristic	Weighting Factor	Technical Quality Rating of Legacy System	Description of Deficiency or Technical Quality shortcoming	Impact to Business Process because of a less than optimal (inefficient) Technical Quality Characteristic (description)	Additional Cost incurred to augment the Legacy system to make up/compensate for a less than optimal Technical Quality Characteristic	Cost (range of estimates) to improve/correct the less than optimal Technical Quality Characteristic	Time (range of estimates) to improve/correct the less than optimal Technical Quality Characteristic
	System Design	The system design category is assessing if the system is architected for scalability, flexibility, and maintainability. Does the system design easily accommodate changes to functionality, business process, data structures, and underlying infrastructure technologies (e.g. server, storage, and network)							
1	Logical Processing Flow	The application mirrors the business environment; the application supports the business processes and enables the desired / required business workflow within the agency (and perhaps even extending to the broader environment e.g. intra- and inter-agency workflows. For example, to easily pass appropriate reporting data to OMB).	10.0%						
2	Logical File Structures	Data managed by this application is clearly defined, well understood, and meta data is readily available (meta data that includes data dictionary like definitions, data source information, data transformations applied, and who the consumers of the data are). Processing checks and balances are in place to ensure data integrity and system auditability	10.0%						

#	System Technical Quality Characteristic	Description of Technical Quality Characteristic	Weighting Factor	Technical Quality Rating of Legacy System	Description of Deficiency or Technical Quality shortcoming	Impact to Business Process because of a less than optimal (inefficient) Technical Quality Characteristic (description)	Additional Cost incurred to augment the Legacy system to make up/compensate for a less than optimal Technical Quality Characteristic	Cost (range of estimates) to improve/correct the less than optimal Technical Quality Characteristic	Time (range of estimates) to improve/correct the less than optimal Technical Quality Characteristic
3	Ability to Interface; Ease of Access to this systems data and API's	<p>The degree of support for open interchange standards and other industry standard access techniques (API, SOAP, XML, SQL, etc.) with the ability to import and export data while retaining relevant semantics.</p> <p>The linkages between this application and other applications are clearly defined</p> <p>When changes are made to this application, it is easy to determine which other applications will be affected and how</p>	15.0%						
4	Quality Controls	<p>The system provides / supports quality control mechanisms and enables quality control efforts in testing the system to uncover defects and report on them.</p> <p>Minimal processing errors are encountered when changes are released into production</p>	5.0%						

#	System Technical Quality Characteristic	Description of Technical Quality Characteristic	Weighting Factor	Technical Quality Rating of Legacy System	Description of Deficiency or Technical Quality shortcoming	Impact to Business Process because of a less than optimal (inefficient) Technical Quality Characteristic (description)	Additional Cost incurred to augment the Legacy system to make up/compensate for a less than optimal Technical Quality Characteristic	Cost (range of estimates) to improve/correct the less than optimal Technical Quality Characteristic	Time (range of estimates) to improve/correct the less than optimal Technical Quality Characteristic
5	Hardware/Software Usage	Use of existing technology does not limit systems capability or performance System can easily be ported to run on multiple different hardware and software platforms allowing the agency to easily take advantage of price / performance benefits available in newer technologies or different vendor technologies (e.g. no technology or vendor platform lock-in)	10.0%						
7	Data Entry	Adding data to the system is straight-forward and easy. The system supports multiple methods for adding data to the system (e.g. manual, forms based, CSV import, XML import, etc.)	2.0%						

#	System Technical Quality Characteristic	Description of Technical Quality Characteristic	Weighting Factor	Technical Quality Rating of Legacy System	Description of Deficiency or Technical Quality shortcoming	Impact to Business Process because of a less than optimal (inefficient) Technical Quality Characteristic (description)	Additional Cost incurred to augment the Legacy system to make up/compensate for a less than optimal Technical Quality Characteristic	Cost (range of estimates) to improve/correct the less than optimal Technical Quality Characteristic	Time (range of estimates) to improve/correct the less than optimal Technical Quality Characteristic
8	Adherence to Technical Standards	The degree of support for current technical standards; server hardware, operating systems, DBMS, storage, web server, application server, integration (ESB, JMS, MQ), business process orchestration (BPEL, BizTalk, SOA/Web, WSDL/Web Services), browser, authentication, IDM...	10.0%						
	System Maintainability	This category is essentially assessing the easy of maintaining the system including areas like Health Status and Monitoring, Built-in Test capabilities, ability to make changes to the system configuration or system modules without taking the system down and restarting it. Includes considerations like Mean Time to Repair, built-in problem analysis tools, and other problem detection, isolation, and remediation capabilities for O&M							
9	Documentation Quality	User and System Documentation is comprehensive and effective. User training is available.	3.0%						

#	System Technical Quality Characteristic	Description of Technical Quality Characteristic	Weighting Factor	Technical Quality Rating of Legacy System	Description of Deficiency or Technical Quality shortcoming	Impact to Business Process because of a less than optimal (inefficient) Technical Quality Characteristic (description)	Additional Cost incurred to augment the Legacy system to make up/compensate for a less than optimal Technical Quality Characteristic	Cost (range of estimates) to improve/correct the less than optimal Technical Quality Characteristic	Time (range of estimates) to improve/correct the less than optimal Technical Quality Characteristic
10	Problem Determination Information	Production problems are easily resolved	3.0%						
11	Ease of Maintenance	The application design allows for easy maintenance. Application improvement reviews are conducted periodically	5.0%						
12	Availability of Test Data	A comprehensive set of quality test data is available to test the application	2.0%						
	System Operability	write description...							
13	Ease of Operation (Invocation, Parameters, Commands)	Initiation, and backup and recovery procedures are reliable and easy to perform. System loads and scheduled outages are executed and completed according to schedule	5.0%						

#	System Technical Quality Characteristic	Description of Technical Quality Characteristic	Weighting Factor	Technical Quality Rating of Legacy System	Description of Deficiency or Technical Quality shortcoming	Impact to Business Process because of a less than optimal (inefficient) Technical Quality Characteristic (description)	Additional Cost incurred to augment the Legacy system to make up/compensate for a less than optimal Technical Quality Characteristic	Cost (range of estimates) to improve/correct the less than optimal Technical Quality Characteristic	Time (range of estimates) to improve/correct the less than optimal Technical Quality Characteristic
14	Quick and Easy Recovery from Outages	Easy Restart/Rerun, with quick automated recovery of transactions / data up to the point of outage.	10.0%						
15	Run-time Environment	The application runs with little or no recurring problems. Run-time improvement reviews are conducted regularly.	5.0%						
16	Operational Support Tools/Products	(are Constrained to Specific Technology (for Operations)	5.0%						
			100.0%						

Other Risk Considerations

#	Other Risk Categories, Areas, Considerations	Description of Risk Areas	Description of Risk Item, Issue, Deficiency or shortcoming	Probability / Likelihood of Occurrence	Cost Impact to Business	Expected Monetary Value of Risk (Additional Cost to continue with Legacy system a.k.a. Contingency Reserve)	Cost (range of estimates) to fix/correct the Risk Item	Time (range of estimates) to fix/correct the Risk Item
	Environment Risks							
	Business Continuity							
	Political risk							
	Regulatory/legislative		<p>Cause - Because of recently passed legislation, related to Financial Market oversight, with general objectives but unspecified to be determined regulations,</p> <p>Risk - New and additional regulation might be imposed on Financial Management Systems, and corresponding internal controls and reporting</p> <p>Effect - Which could lead to additional additional expense for us to maintain compliance and to implement appropriate controls and reporting capabilities.</p>					

#	Other Risk Categories, Areas, Considerations	Description of Risk Areas	Description of Risk Item, Issue, Deficiency or shortcoming	Probability / Likelihood of Occurrence	Cost Impact to Business	Expected Monetary Value of Risk (Additional Cost to continue with Legacy system a.k.a. Contingency Reserve)	Cost (range of estimates) to fix/correct the Risk Item	Time (range of estimates) to fix/correct the Risk Item
	Supply/Supplier Risks							
	Independent Software Vendor (ISV) viability							
	Independent Software Vendor (ISV) R&D Investment		<p>Cause - Because the vendor of this company has been purchased by a larger competitor (a provider of competing financial management system)</p> <p>Risk - The FMS software we have might have a shorter life span than we have planned</p> <p>Effect - Which could lead to End of Life for our FMS product in 3 years</p>					
	Independent Software Vendor (ISV) Support		<p>Cause - Because this product/version is moving closer to the end of vendor support</p> <p>Risk - The ISV will have fewer capable resources supporting the product, and higher resource costs</p> <p>Effect - Which could lead to higher annual maintenance fees for software support service.</p>					

#	Other Risk Categories, Areas, Considerations	Description of Risk Areas	Description of Risk Item, Issue, Deficiency or shortcoming	Probability / Likelihood of Occurrence	Cost Impact to Business	Expected Monetary Value of Risk (Additional Cost to continue with Legacy system a.k.a. Contingency Reserve)	Cost (range of estimates) to fix/correct the Risk Item	Time (range of estimates) to fix/correct the Risk Item
	Third Party support (availability, cost, quality)		<p>Cause - Because our FMS system is dependent on Cold Fusion for dynamic web content</p> <p>Risk - Third party support with Cold Fusion expertise is less available and those who have Cold Fusion expertise are less capable</p> <p>Effect - Which could lead to higher support costs</p>					
	Information Technology Risks							
	Hardware		<p>Cause - As a result of technological advancement (cloud)</p> <p>Risk - The equipment or software currently used may be outdated</p> <p>Effect - resulting in new training requirements for our IT Operations staff.</p>					
	Software (availability, cost, obsolescence)							
	Dependencies on IT specific components							

#	Other Risk Categories, Areas, Considerations	Description of Risk Areas	Description of Risk Item, Issue, Deficiency or shortcoming	Probability / Likelihood of Occurrence	Cost Impact to Business	Expected Monetary Value of Risk (Additional Cost to continue with Legacy system a.k.a. Contingency Reserve)	Cost (range of estimates) to fix/correct the Risk Item	Time (range of estimates) to fix/correct the Risk Item
	Software Reliability		<p>Cause - Because previous releases have had a high number of bugs and misimplemented features</p> <p>Risk - The supplier may conclude that this is acceptable to the customer</p> <p>Effect - Which could lead to additional expense in testing and debugging activities with the vendor to resolve issues and get stable functioning software release.</p>	65.0%	(\$325,000)	(\$211,250)		
	Financial Risks							
	US Economy							
	Federal Budget							
	Agency Budget		<p>Cause - Due to extraordinary budget reductions</p> <p>Risk - The sponsor/source may run out of money to continue funding (all parts of the planned remedial actions)</p> <p>Effect - Which could lead to additional costs (to continue manual processes, implement alternative work-around), or worse (inability to meet compliance requirements)</p>					
	Agency IT IRB							

#	Other Risk Categories, Areas, Considerations	Description of Risk Areas	Description of Risk Item, Issue, Deficiency or shortcoming	Probability / Likelihood of Occurrence	Cost Impact to Business	Expected Monetary Value of Risk (Additional Cost to continue with Legacy system a.k.a. Contingency Reserve)	Cost (range of estimates) to fix/correct the Risk Item	Time (range of estimates) to fix/correct the Risk Item
	Management Risks							
	Governance							
	Data Security		<p>Cause - Because of the exponentially increasing number of threats, and the almost daily announcement of previously undiscovered vulnerabilities</p> <p>Risk - The security controls we have implemented become insufficient or ineffective</p> <p>Effect - Which could require significant cost to protect our system and data; costs in terms of people, process or technology. People (training, skills), Process (changes to business processes or support processes, Technology (changes like a change to all of our Identity Management Systems to include digital certificates for all users of the system)</p>					
	Human Resource Capacity/Skills (Aging workforce)							
	Risk Management Culture / Maturity							
	Labor Disputes							
	Managing complexity							
	Outsourcing problems							
	Liability / Reputation							
	Management Buy-in							
	Program/Project Management Risks (skills, leaderships, availability of PM resources)							
	Conflicting or competing requirements							
	Organizational Issues (egos, turf battles, hidden objectives, unaligned personal motivations)							

Rating Scale Meaning

No Basis for Assessment	Very Poor Quality	Poor Quality	Slightly Less Than Acceptable Quality	Acceptable Quality	Good Quality	High Quality	Exceptional Quality
0	1	2	3	4	5	6	7
No Basis	Low			Medium			High