

# Best Practices for Realizing Value from Enterprise Architecture in the Federal Government

White Paper  
ARCHITECTURE PROFILE SERIES

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## Abstract

Information and technology management is a key enabler of management reform efforts that can dramatically reshape agency mission performance and cost. Agencies seeking to strengthen information technology (IT) responsiveness to missions, enhance the value of strategic planning, enterprise architecture, and capital planning and investment control (CPIC) to programs, and elevate IT investment oversight should seek to leverage criteria and guidance from the President's Management Agenda (PMA) Expanded Electronic Government (E-Gov) initiative.

The disciplines scored as part of E-Gov — enterprise architecture (EA), IT security remediation, adoption of E-Gov lines of business (LoB) and SmartBuy initiatives, business case development, and IT investment/portfolio management — provide a bridge between agency strategic goals and implementation programs. By understanding the interdependencies between E-Gov disciplines, agencies can develop a roadmap for addressing specific IT management needs and realize improvements within manageable timeframes.

## Problem

The President's Management Agenda (PMA) was announced in August 2001 with objectives to improve the management and performance of the federal government. The PMA identifies five interrelated government-wide initiatives: (1) improved financial performance, (2) strategic management of human capital, (3) budget and performance integration, (4) expanded electronic government, and (5) competitive sourcing. (The PMA also includes program initiatives on eliminating improper payments and real property asset management.)<sup>1</sup>

For federal agencies, implementation of the PMA has raised the visibility of key management challenges, increased attention to achieving outcome-based results, and reinforced the need for agencies to focus on making sustained improvements in addressing long-standing management problems. Employing a simple grading system — green for success, yellow for mixed results, and red for unsatisfactory — the Executive Branch Management Scorecard provides a recognized and visible measure of agency effectiveness in addressing PMA initiatives.

Of special interest to federal chief information officers (CIOs), scores for the expanded E-Gov initiative provide a measure of agency success in managing IT to address mission priorities. The E-Gov score is based on demonstrated agency maturity and accomplishments across a range of IT planning, decision-making, and management disciplines. Specifically, these disciplines include:

1. Enterprise architecture
  - a. IT security remediation
  - b. Adoption of appropriate E-Gov/LoB/SmartBuy initiatives
2. Business case development
3. IT investment/portfolio management

Although Federal Information Security Management Act (FISMA) compliance and E-Gov are typically not implemented within an EA organization, in practice they address functional EA issues of information systems architecture and reuse. For this reason, these topics will be addressed in conjunction with EA in this paper.

Importantly, information and technology management is a key enabler of management reform efforts that can dramatically reshape agency performance and cost. Agencies with E-Gov scores of red and yellow lack critical mechanisms for ensuring IT investments are allocated and managed in a manner best suited to achieving existing and emerging mission needs.

Still, implementing E-Gov disciplines is only part of the challenge. Sustaining them is required to realize benefits. For the period ending 31 March 2006, 9 agencies received lower scores than in the preceding period. In total, only 3 agencies received green and 14 agencies received yellow. The last time E-Gov scores were this low was March 2004, when 2 agencies received green, 13 agencies received yellow, and 11 agencies received red scores (see figure 1).

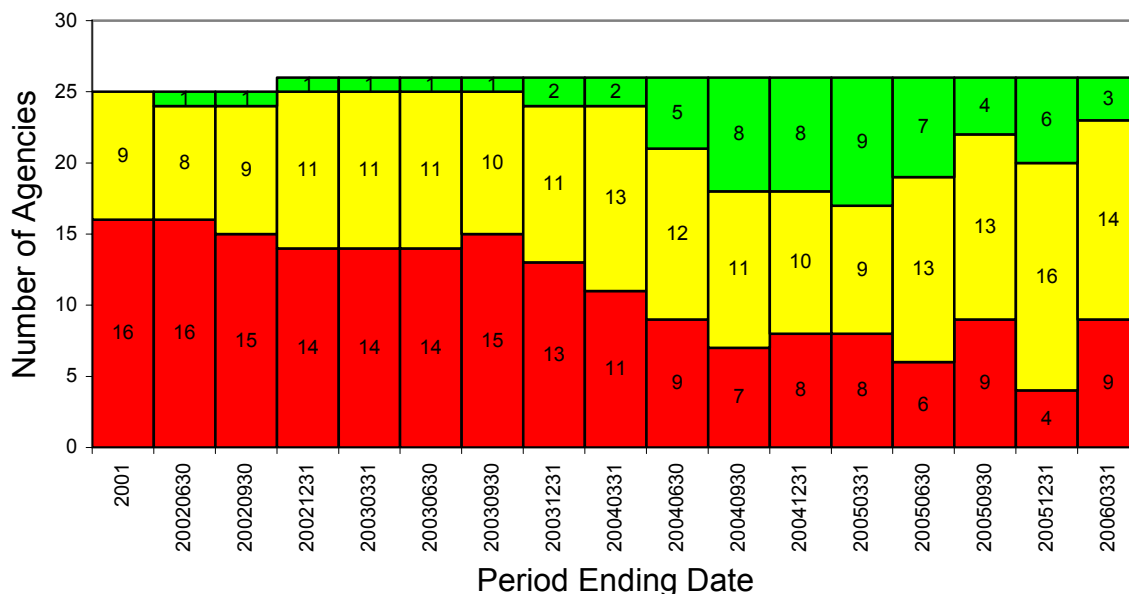


Figure 1. President’s Management Agenda E-Gov Progress 2001–March 2006.<sup>2</sup>

While overall agency E-Gov performance is still positive relative to the program baseline in 2001, there is significant unevenness in progress for this initiative as a whole and for the majority of agencies. For the period ending 31 March 2006 only the Department of Labor, with 7 consecutive green quarters, and National Science Foundation, with 16 consecutive green quarters, are demonstrating consistent E-Gov performance. Eight other agencies have achieved a green E-Gov score for one or more quarters in the past but have not maintained that level of performance. Sixteen agencies (more than 60 percent of those evaluated) have not yet achieved a green E-Gov score in any quarter through 31 March 2006.

## Solution

To address IT management challenges and improve IT contribution to agency mission performance, agencies need to integrate their enterprise strategic planning, enterprise architecture, IT investment management, and enterprise program management— those change disciplines measured by E-Gov criteria—into a common set of IT management processes (see figure 2).

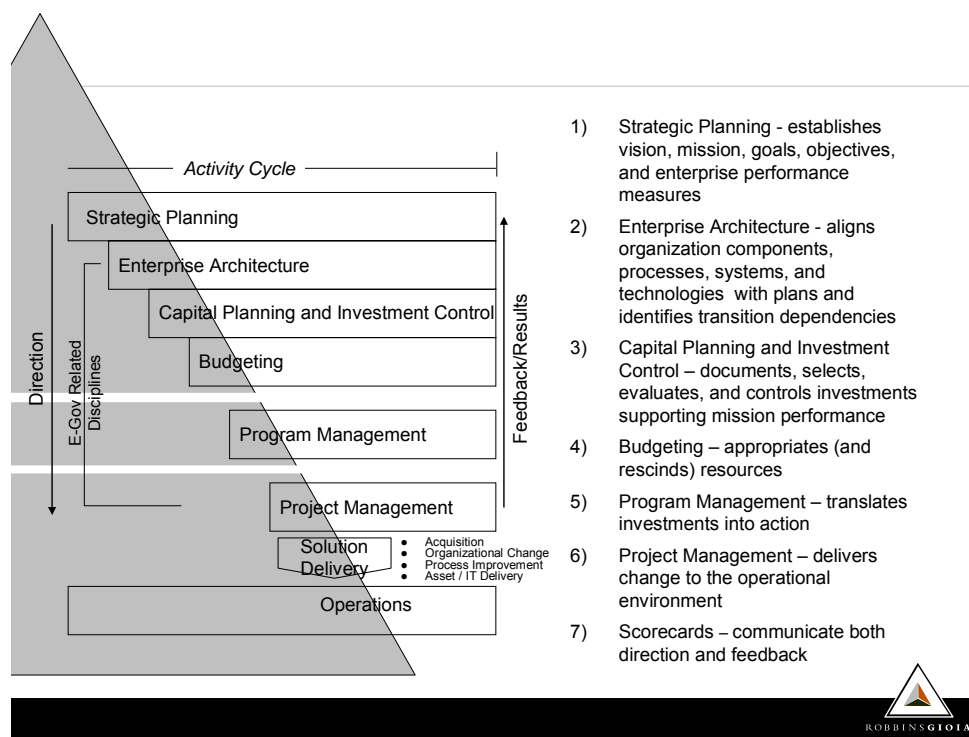


Figure 2. E-Gov disciplines bridge strategic planning and action.

Specific challenges to accomplishing this integration will vary by agency, but opportunities and best practices applicable to a broad number of federal agencies are summarized below.

**Strategic Planning.** While not explicitly an E-Gov discipline, strategic planning is a prerequisite for all downstream change disciplines. The strategic priorities, goals, and performance measures are required input to enterprise architecture, business cases, investment management, and program/project management. Without strong strategic planning, it is less likely that IT will be used to maximize improvement in mission performance. The Government Performance and Results Act (GPRA) requires agencies to submit an annual performance budget. In addition, the Government Accountability Office (GAO) has documented the need for agencies to:<sup>3</sup>

- Link strategic goals to specific performance measures that are tracked. Without enterprise-wide performance measures that are tracked against actual results, agencies lack critical information about whether their overall activities are achieving expected goals, i.e., there is no effective feedback on plan execution.
- Track the performance measures that are specified in information resource management (IRM) plans. While some agencies track actual-versus-expected outcomes for the IT performance measures in their performance plans or accountability reports and/or for specific IT projects, they generally do not track the performance measures that are specified in their IRM plans.
- Document IT strategic planning processes, and develop IRM plans. Although agencies often have these practices or elements of them in place, effort is required to keep them updated and relevant.

**Enterprise Architecture.** Randy Hite, director of IT Architecture and Systems, U.S. GAO, said that each agency's EA must be tailored to meet the needs of that agency, and suit the size and complexity of the organization.<sup>4</sup> As of third-quarter fiscal 2005, the Office of Management and Budget (OMB) determined 24 of 25 agency enterprise architectures are "effective," i.e., sufficiently mature to be used to guide and inform the agency's investment processes. The overall agency EA assessment average was 3.19 (out of 5)—a 36 percent increase from FY04.<sup>5</sup> Agency scores have remained at this level even through a new EA Assessment Framework (version 2.0)—with new criteria—was released in December 2005. For second-quarter fiscal 2006, OMB reported agencies averaged 3.3 out of 5 for completion; 3.2 for use; and 2.9 for results.<sup>6</sup> OMB Chief Architect Richard Burk stated, "Now that they [agencies] have architectures in place, they need to use them to show results."<sup>7</sup>

In January 2005, the Industry Advisory Council Enterprise Architecture Shared Interest Group (IAC EA SIG) issued a white paper to address specific issues identified by the GAO arising from results of an EA Management Maturity Framework (EAMMF) survey. Selected recommendations are summarized below:<sup>8</sup>

- Frame the purpose and scope of EA for the agency. Define the EA to address a specific management need or void. Too often there is little or no real identification of integrated goals for the EA beyond that it is required by law and required to comply with the Clinger-Cohen Act. The EA is more likely to be



viewed as grounded and useful if it is demonstrably aligned with strategic goals and performance measures and is part of the IT planning/IRM planning process.

- Run EA like a program. Apply Program Management Body of Knowledge (PMBOK) principles and practices for scope, cost, schedule, quality, program structure and resources, communication, risk, procurement, and integration. OMB Circular A-130 provides specific guidance on how to set up an EA Program and create each of the EA deliverables over time.
- Develop a modular EA that allows choice or substitution of products. This may mean allowing the use of competing products, provided that they use common, compatible, or interoperable technical standards. Organizational units are unlikely to buy into an architecture that does not allow them freedom to choose the components that they feel they legitimately need to satisfy business/mission needs or capabilities.
- Offer support and assistance for implementing EA. This includes, but is not limited to: facilitating business, application, information, and technical forums to develop common solutions; providing training in EA processes, tools, and products; and providing guidance for developing business cases and project management plans.
- Tie the EA transition/sequencing plan to business case development and IT portfolio management. Develop and communicate EA user guides that describe key concepts of the target architecture and provide distilled, concrete guidance on important issues such as technical standards and opportunities for component reuse.
- Ensure the EA deliverables support operational decision making. Successful EAs represent trusted inventories of IT assets that provide useful insight to a variety of operational decisions including, but not limited to, facility/data center consolidation, outsourcing, information system retirement, technology product refresh, and vendor management.
- Maintain EA deliverables to continue and enhance their value to the agency and its organizational units.

The OMB continues to take steps to improve the value and repeatability of EA-related initiatives by announcing forthcoming publications and tools including:

- Concept of operations for LoB identifying activities and deliverables for three phases—analysis, definitional, and operational—aligned with the federal budget cycle
- Line of business toolkit (i.e., templates and other materials for guiding deliverable creation)



- Federal Transition Framework—a mechanism for providing more consistent, complete, and timely information about cross-agency initiatives to inform agency enterprise architecture, capital planning, and implementation activities
- LoB Assessment Maturity Model (i.e., EA Assessment Framework for a LoB)

*IT Security Remediation.* Federal agencies have not yet fully and consistently implemented effective information security policies and practices. Pervasive weaknesses exist in almost all areas of information security controls at 24 major agencies, threatening the confidentiality, integrity, and availability of information and information systems. GAO categorizes the needs for remediation into four areas:<sup>9</sup>

- Effective implementation of access controls
- Consistent implementation of software change controls
- Consistent segregation of duties
- Adequacy of continuity of operations planning (COOP)

While responsibility for addressing these deficiencies typically rests with individual organizational units within agencies, establishing a FISMA compliance program office has proven to be an effective practice for tracking progress, escalating issues, and sharing lessons learned.

*E-Gov, LoB and SmartBuy Initiatives.* Primary goals of these initiatives are to eliminate redundant systems and significantly improve the government's quality of customer service for citizens and businesses. The GAO reports mixed progress has been made in achieving them.<sup>10</sup>

Among the hurdles that Forrester Research reports in the implementation of e-government initiatives are constrained budgets and change-resistant cultures, which may become exacerbated when federal IT spending begins to decrease. Other obstacles include bureaucracy, extremely long project cycles and unmet deadlines.<sup>11</sup>

A first step in determining the suitability of E-Gov solutions for specific agency needs involves creating an authoritative inventory of agency IT applications and systems. This inventory is typically addressed by the EA effort. (FISMA compliance also requires an authoritative inventory of IT assets.) Once they have been assessed, agency adoption plans are negotiated with the OMB. To facilitate comparison with other investments and oversight, each E-Gov and LoB initiative should be documented in its own business case.

**Capital Planning and Investment Control.** CPIC isn't just about getting money during budget season; it's an opportunity for maximizing fiscal responsibility and accountability for performance and outcomes that directly impact agency missions. Primary goals for exhibit 300s and 53s are to ensure that funding requests are aligned with agency



mission and goals, and that funding is dependent on the strength of investment business cases. Specific sections of exhibit 300 require discussion of investment support for the agency's strategic plan and enterprise architecture, Federal Enterprise Architecture, E-Gov applicability, and compliance with security and privacy guidance.

GAO was asked to determine the extent to which selected agencies have underlying support for the information in their fiscal year 2006 exhibit 300s. From five major departments listing more than \$1 billion in IT expenditures in that year, GAO chose for analysis 29 exhibits for projects that supported a cross section of federal activities. The weaknesses they discovered raise questions regarding the sufficiency of business cases in supporting investment decision making and the quality of project management:<sup>12</sup>

- At every agency, cost information was derived from ad hoc processes rather than from cost-accounting systems with adequate controls to ensure accountability.
- Only 6 in 29 documented how they determined the baseline from which they measured progress.
- 72 percent lacked information supporting how costs were determined or available information was not consistent with that reported in the 300s.
- 75 percent did not demonstrate how they addressed risk elements or determined elements "not applicable."
- Investments reported cost figures based on earned value management (EVM) processes that did not follow ANSI-748 as required—or investments had ANSI-compliant EVM processes in place for the contractor component of the investment costs, but the government cost component was derived from ad hoc systems.
- 90 percent of 300s failed to include 1 or more elements of EA or security.
- 86 percent could demonstrate that security awareness training had been conducted, but 77 percent did not demonstrate how incident handling could be performed at the system level.

Minimum steps for successful business case development include:

- Providing effective guidance and training related to business case development
- Consistent project follow-up for all projects
- Specific tracking and follow-up for agency projects on the OMB project watch list
- Formal reporting on action items and remediation activities
- Formal recordkeeping that enables monitoring trends related to business case scoring and remediation



- Implementation of an appropriate tool (or tools) to streamline the collection, use, and submission of budget data

A strong business case alone is not sufficient justification for funding. Agencies typically have more investment opportunities (and more strong business cases) than they have resources. IT investment management establishes the disciplines for (1) selecting those investments that best support strategic goals within resource limitations, (2) tracking investment performance, and (3) adjusting the IT investment portfolio when selected investments do not meet performance expectations. Even so, the GAO reports agency use of important investment management practices is mixed:<sup>13</sup>

- Collectively agencies have less than 50 percent of IT investment management (ITIM) practices fully in place.
- While most agencies have ITIM boards, no agency has the practices associated with oversight of IT investments fully in place.

Efforts to improve IT portfolio management capability should include:

- Assessing gaps in existing capabilities relative to ITIM criteria (GAO-04-394G) and ITIM select, control, and evaluate phases
- Leveraging strategic goals, performance measures, and EA transition plans to establish criteria for investment selection and portfolio creation
- Leveraging CPIC tools to automate portfolio reporting and evaluation
- Leveraging the enterprise program management office (EPMO) to promote awareness and education regarding project stage reviews and earned value management to provide input to portfolio control activities

**Budgeting.** Implementing any change initiative in a timeframe that addresses agency priorities and needs requires a practical understanding of the federal budget cycle (see figure 3.) A typical federal budget cycle is 18 months. Eighteen months prior to budget appropriation and authorization, projects (investments) typically draft an exhibit 300 (see figure 3). Prior to this activity, projects need to receive the following agency guidance relevant to the budget year (BY):

- Strategic planning goals, performance measures, and planning guidance
- IT planning goals, performance measures, and EA transition plans and planning guidance
- Investment and portfolio selection criteria and processes



Month	Formulation Phase (BY-2)	Congressional Phase (BY-1)	Execution Phase (BY)
Oct		<ul style="list-style-type: none"> <li>▲ OMB reviews proposals</li> <li>▲ OMB briefs President</li> <li>▲ Passback</li> </ul>	<ul style="list-style-type: none"> <li>▲ Agencies submit apportionment requests within 10 days of appropriation</li> <li>▲ OMB approves/modifies apportionment</li> <li>▲ Agencies incur obligations and make outlays to carry out the funded programs</li> <li>▲ Agencies record obligations and outlays pursuant to administrative control of funds procedures, report to Treasury, and prepare financial statements</li> </ul>
Nov			
Dec		▲ Agencies may appeal passback	
Jan		▲ Agencies prepare and OMB reviews congressional budget justifications	
Feb		▲ President transmits budget to Congress	
Mar		▲ Committees submit "views and estimates" to House & Senate Budget Committee.	
Apr		▲ Congress passes budget resolution	
May	▲ OMB issues spring planning guidance		
Jun			
Jul	▲ OMB issues A-11		
Aug			
Sep	▲ Agencies submit budget proposals	▲ Appropriation or continuing resolution	



Figure 3. Federal budget cycle.<sup>14</sup>

Twelve months prior to budget appropriation and authorization, the agency needs to evaluate and respond to congressional questions and passback impacts on strategic and IT planning goals and EA transition plans.

After an investment budget is appropriated and authorized, effective processes are required to review investments at predictable intervals as well as at key decision points and milestones. Data requirements for these review points must be communicated as early as possible to ensure data collection.

**Program Management.** Justifying an initiative is only the beginning of the challenge. Success depends on effectively standing up and managing the program or project office and delivering results. The Program Assessment Rating Tool (PART) is a diagnostic tool used to assess the performance of federal programs and to drive improvements in program performance. PART consists of a number of questions organized into four categories: (1) program purpose and design, (2) strategic planning, (3) program management, and (4) program results. Once completed, PART reviews help inform budget decisions and identify actions to improve results. Agencies are held accountable for implementing PART follow-up actions, also known as improvement plans, for each of their programs.<sup>15</sup> While PART is most often applied to public-facing federal programs, its outcomes or benefits are just as applicable to the effective execution of back-office change initiatives. Select benefits include:

- Articulation of a clear program purpose that addresses a specific and existing problem, interest, or need
- Ensuring program design is not redundant with any other federal, state, local, or private effort
- Establishing a limited number of specific long-term and annual performance measures with corresponding baselines and targets
- Tying budget requests to long-term and annual program performance goals
- Collecting, on a regular basis, timely and credible performance information that is used to manage the program and improve performance
- Obligating funds in a timely manner and ensuring spending is for intended purposes
- Employing strong financial management
- Coordinating and collaborating effectively with related programs
- Holding program managers and partners accountable for cost, schedule and performance results
- Demonstrating progress toward long-term and annual performance goals and comparing favorably with other government and private programs with similar purpose and goals

**Project Management.** Effectively introducing change to an operational business and/or technology environment requires project management. Adoption of recognized project management practices -- such as those associated with the Project Management Institute's key processes (i.e., initiating, planning, executing, monitoring and controlling, and closing) -- facilitate predictable and repeatable project performance. Specific practices such as earned value management (defined in ANSI 748-A) are designed to identify material variances in cost or schedule in a sufficiently timely manner to permit corrective action and keep a project on track.

Establishing and enforcing appropriate criteria for project managers is also a best practice. In 2003, the Office of Personnel Management (OPM) issued guidance for project manager positions. Recommended project manager knowledge, skills, abilities, and competencies were identified in three areas: (1) project management; (2) information technology; and (3) general. Figure 4 presents OPM's criteria in the context of the change disciplines summarized in figure 2 of this document.

In addition, OPM recognized that project manager experience, training, and education should be commensurate with the size and nature of the project to be managed.



<p><b>Strategic Planning</b></p> <p>a. Organizational awareness</p> <p><b>Enterprise Architecture</b></p> <p>a. Information resources strategy and planning</p> <p>b. Technology Awareness</p> <p><b>Capital Planning and Investment Control</b></p> <p>a. Capital planning and investment assessment</p> <p>b. Cost-benefit analysis</p> <p><b>Budgeting</b></p> <p>a. Financial management</p> <p><b>Program Management</b></p> <p>a. Planning and evaluating</p> <p><b>Project Management</b></p> <p>a. Project management</p> <p>b. Requirements</p> <p>c. Risk management</p> <p>d. Quality assurance</p>	<p><b>Solution Delivery</b></p> <p>a. Contracting/procurement</p> <p>b. Business process reengineering</p> <p>c. Systems life cycle</p> <p>d. System Integration</p> <p>e. IT architecture</p> <p>f. Infrastructure design</p> <p>g. IT performance assessment</p> <p>h. Data management</p> <p>i. Information systems/network security</p> <p>j. Configuration management</p> <p><b>Operations</b></p> <p>a. Customer service</p> <p><b>General Knowledge, Skills, Abilities, &amp; Competencies</b></p> <p>a. Legal, government and jurisprudence</p> <p>b. Oral communication</p> <p>c. Writing</p> <p>d. Team building</p> <p>e. Leadership</p> <p>f. Interpersonal skills</p> <p>g. Flexibility</p> <p>h. Reasoning</p> <p>i. Problem solving</p> <p>j. Decision making</p>
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Figure 4. PM knowledge, skills, abilities, and competencies.<sup>16</sup>

**Solution Delivery.** Independent of the specific solution methodology (e.g., business process reengineering, IT development) best practice includes an acquisition or delivery cycle that incorporates reviews at key decision points. Such “gate reviews” ensure the project is proceeding in accord with its purpose and objectives and the solution being delivered continues to be aligned with stakeholder needs and expectations.

## Barriers to Success

The single best practice for realizing value from enterprise architecture in the federal government is to coordinate it with the major change disciplines. Agency size, culture, ability to change, a multitude of priorities competing for limited resources, and a tendency to attempt more than can practically be accomplished for a given budget and schedule can be significant barriers. Agencies have encountered challenges in implementing and coordinating the change disciplines described above.

Solutions to the variety of potential obstacles will vary by agency, but four practices are applicable in most situations:

- Aligning governance bodies and processes for planning, enterprise architecture, and investment management.

- Scoping efforts to address specific agency and organizational unit needs – not just focusing on achieving compliance.
- Establishing and/or leveraging an EPMO. An EPMO can be instrumental in coordinating communications among projects and aligning (and minimizing) paperwork and reporting requirements while leveraging established planning, budget, and project life cycle processes and checkpoints.
- Documenting and communicating an integrated view of the phases and key milestones for these major change disciplines in the context of a fiscal calendar. This will serve the dual purpose of managing expectations and facilitating planning for both federal managers and supporting service providers.

Figure 5 illustrates a start-up initiative in the context of the multi-year federal budget cycle. The milestones and phases are notional and adapted from the guidance cited in previous paragraphs.

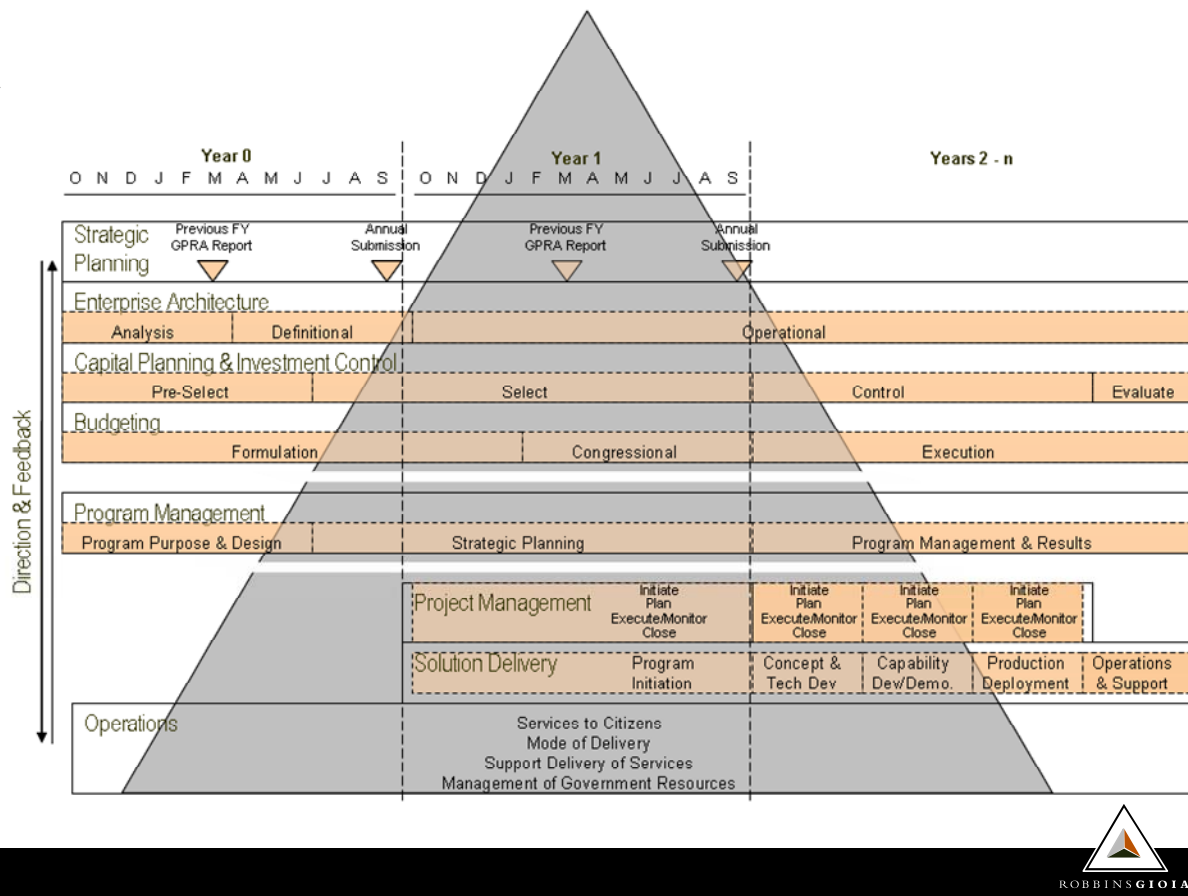


Figure 5. Time-phased view of change disciplines.

Starting with strategic planning, and moving from top-to-bottom respectively, the references include: (1) GPRA; (2) Concept of Operations for LoB; (3) ITIM) (4) OMB Circular A-11; (5) PART; (6) the Project Management Institute's PMBOK process groups; and (7) generalized decision phases for an acquisition life cycle.

## Results

Successful agencies will realize outcomes reflected on the Executive Branch Management Scorecard including:

1. Achieving **enterprise architecture** scores of 3 or higher in both the "Completion" and "Use" sections or at least 3 in the "Results" section of the Federal Enterprise Architecture Assessment
2. Developing acceptable **business cases** for all major systems investments
3. Demonstrating appropriate planning, execution, and **management of major IT investments** using earned-value or operational analysis and realizing portfolio performance within 10 percent of cost, schedule, and performance goals
4. Receiving Inspector General Verification of the effectiveness of the **department-wide IT security remediation** process with a rating of "satisfactory" or better for the certification and accreditation process, and completing certification and accreditation for 90 percent of all IT systems
5. Establishing an OMB-approved process and plan for implementing all of the appropriate **E-Gov/LoB/SmartBuy initiatives** rather than creating redundant or agency-unique IT projects.

Of far more importance than achieving status on a scorecard, these agencies will realize improved project visibility, efficiency of decision-making processes that deliver technology to support missions, material reduction in redundant investments, and establishment of information security prerequisites critical to secure and reliable information sharing. In turn, these agency accomplishments contribute to goals articulated in the President's Management Agenda for the government to provide greater value through becoming more citizen-centric, results-oriented, and market-based.



## Glossary of Terms

BY – Budget year  
EA – Enterprise architecture  
EAAF – Enterprise Architecture Assessment Framework  
CFO – Chief financial officer  
ConOps – Concept of operations  
CPIC – Capital planning and investment control  
CY – Current year  
E-Gov – Electronic Government or expanded Electronic Government  
EPMO – Enterprise program management office  
FEA – Federal Enterprise Architecture  
FISMA – Federal Information Security Management Act  
FY – Fiscal year  
GAO – Government Accountability Office  
GPRA – Government Performance and Results Act  
IAC – Industry Advisory Council  
IRM – Information resource management  
ITIM – Information technology investment management  
LoB – Line of business or lines of business  
PfM – Portfolio management  
PMA – President’s Management Agenda  
PMO – Program or project management office  
OMB – Office of Management And Budget  
SIG – Shared interest group



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