

# **Case Study: IRS Business System Modernization Process Improvement**

Lloyd Anderson  
Matt Fisher  
Jon Gross

*March 2004*

TECHNICAL REPORT  
CMU/SEI-2004-TR-002  
ESC-TR-2004-002





**Carnegie Mellon  
Software Engineering Institute**

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**Acquisition Support Program**

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# Table of Contents

<b>Abstract.....</b>	<b>vii</b>
<b>1 Introduction.....</b>	<b>1</b>
<b>2 Background.....</b>	<b>3</b>
<b>3 Process Improvement Approach.....</b>	<b>5</b>
3.1 Process Improvement Principles .....	5
3.1.1 Stabilize the Environment Before Attempting Process Improvement .....	5
3.1.2 Leadership .....	6
3.1.3 Employ Demonstrated Expertise in Process Improvement.....	6
3.1.4 Avoid “Big Bangs”—Start Small .....	6
3.1.5 Use the SA-CMM as a Starting Point (Applying the Reference Model to the Organization).....	6
3.1.6 Treat Process Improvement as a Project.....	8
3.1.7 Generating Policies, Process Descriptions, and Procedures.....	8
3.2 Applying the Principles .....	8
3.2.1 Stabilize the Environment before Attempting Process Improvement .....	9
3.2.2 Leadership .....	10
3.2.3 Engaging Experts to Help .....	10
3.2.4 Avoid “Big Bangs”—Starting Small .....	11
3.2.5 Use the SA-CMM as a Starting Point (Applying the Reference Model to the Organization).....	11
3.2.6 Treat Process Improvement as a Project.....	12
3.2.7 Generating Policies, Process Descriptions, and Procedures.....	15
3.2.8 Deployment.....	16
<b>4 Results .....</b>	<b>19</b>
<b>5 Summary.....</b>	<b>25</b>
5.1 Lessons Learned .....	25
5.2 In the End .....	27

<b>Appendix A: The Software Acquisition Capability Maturity Model (SA-CMM)</b>	
<b>Version 1.03 .....</b>	<b>29</b>
<b>References.....</b>	<b>31</b>

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# List of Figures

Figure 1: Managing Organizational Change.....	9
Figure 2: BSMO PI Planning .....	14
Figure A-1: SA-CMM Architecture Version 1.03.....	30





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# List of Tables

Table 1:	BSMO Mapping to SA-CMM Terms.....	12
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# Abstract

Recognizing the limitations of its decades-old legacy information technology systems, the U.S. Internal Revenue Service began an effort to modernize. In 1998, after two initial efforts to modernize achieved limited results, the IRS established a partnership with the private sector and awarded a contract to the PRIME Alliance which was designed to assume the development and integration role. At that time, the IRS Business Systems Modernization Office (BSMO) was established to manage the program.

However, as with past modernization efforts, the BSMO had difficulties in developing the discipline to efficiently and effectively manage the acquisition aspects of this modernization effort. The General Accounting Office suggested that the BSM program instill this discipline by improving a number of management process areas, including its acquisition processes. This suggestion included application of the Software Acquisition Capability Maturity Model (SA-CMM) as guidance on how to improve.

This paper provides an overview of applying the SA-CMM to the IRS modernization effort to establish and implement more effective acquisition management processes and practices. The experience includes the process improvement planning stages of first selecting the SA-CMM as a framework for process improvement, through to completion of the final assessment where a maturity level 2 rating was achieved against the SA-CMM.



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# 1 Introduction

Increasingly, many federal organizations are reevaluating the way they do business. There are numerous reasons for this revamping, but the driving force is the need to comply with congressional direction. Such revamping has been referred to as business modernization or enterprise modernization. Based on such congressional direction, the U.S. Internal Revenue Service (IRS) has undertaken, over the last decade, business modernization of its legacy systems and the way it does business for the U.S. taxpayer.

The U.S. federal tax system collects more than \$2 trillion in gross revenue each year, or over 95% of the government's revenue. The tax system is dependent on a collection of computer systems and resident software that evolved over 35 years. Nearly all IRS employees depend on these computer systems to do their daily jobs, including more than 70,000 who use these systems to deliver direct service to taxpayers. Maintaining these systems year after year takes skilled and dedicated people. But there are problems they could and cannot fix.

Recognizing these problems, the IRS embarked on a modernization effort over a decade ago, with limited success. Difficulties in this effort have been attributed to poor management of the acquisitions involved [Glass 98]. The General Accounting Office (GAO) suggested that the IRS modernization effort be contracted to an integration contractor responsible for controlling the acquisition and development efforts on behalf of the IRS to put a new tax system in place [GAO 96]. In this referenced report, the GAO stated:

*"It is clear that unless IRS has mature, disciplined processes for acquiring software systems through contractors, it will be no more successful in buying software than it has in building software."*

In 1998, the IRS Business Systems Modernization (BSM) program awarded a contract to the PRIME Alliance, led by Computer Sciences Corporation, to assume this development and integration role. At the same time, the IRS Business Systems Modernization Office (BSMO) was established to manage the program.

Subsequently, the IRS and GAO recognized that the BSMO itself needed the discipline to efficiently and effectively manage the acquisition aspects of managing the PRIME Alliance contract. The GAO suggested that the BSM program instill this discipline and improve a number of management process areas, including its acquisition processes. This suggestion included the application of the Software Acquisition Capability Maturity Model (SA-CMM)

stewarded by the Carnegie Mellon<sup>®</sup> Software Engineering Institute (SEI) as guidance on how to improve. BSMO management understood the importance of having sound acquisition management practices in place, and the BSMO embarked on a process improvement mission using the SA-CMM as the foundation model. (Appendix A contains a brief overview of the SA-CMM.)

This paper provides an overview of the approach and experiences of applying the SA-CMM to the IRS modernization effort to establish more effective acquisition management processes and practices. Chapter 2 discusses the context behind the BSMO process improvement effort and the motivation to use the SA-CMM. Chapter 3 provides a brief description of the process improvement approach taken, relying on the typical principles of process improvement. Chapter 4 gives the reader an overview of the results. In Chapter 5 we summarize the process improvement effort and provide lessons learned.

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## 2 Background

Modernization projects approved by IRS executive leadership use the PRIME Alliance contract to acquire the products and services constituting the modernization program. The BSMO develops and issues task orders under this contract to engage the Alliance to develop and integrate the modernization solutions.

The BSMO's own realization that it needed to improve its internal discipline to efficiently and effectively manage the PRIME Alliance contract was reinforced by findings of oversight organizations such as the General Accounting Office. In a GAO report [GAO 00] to the U.S. Congress, the IRS was reported to be

*“an agency fraught with long-standing and significant management problems and a history of ineffective attempts to correct them.”*

*“However, IRS must overcome several serious management challenges in its current systems modernization effort before it will be ready to build modernized systems. In particular, IRS must (1) complete, enforce, and maintain an enterprise systems architecture, (2) establish and implement sound investment management processes to ensure only incremental, cost-effective system investments are made, and (3) impose software acquisition and life cycle management discipline on each system investment it undertakes.”*

More emphasis was placed on BSMO instilling its acquisition management and process discipline in December of 2001 when the GAO recommended delaying or reducing IRS modernization funding unless something was done quickly to assess and improve current multi-million dollar modernization projects. The GAO also recognized that federal acquisition agencies, such as the BSMO, needed an approach to instill discipline and take responsibility for managing their acquisitions. The following excerpt from a GAO briefing reflects the finding:

*“Some federal agencies have been using innovative ‘partnership’ arrangements with the contractor for IT development, assuming that the contractor is responsible for any failures or missed schedules. This is usually caused by the federal agency using contractors in the role of employees, and even putting contractors in a position of approving their own products. The agencies assume that a partnership arrangement absolves them of all acquisition management responsibili-*

*ties. These agencies have problems above those that can be pinpointed by the CMMs. However, a strict application of SA-CMM can provide a way out of the confusion caused by poorly defined roles and responsibilities that are typical in agency-contractor partnership arrangements. Once the agency identifies the 'acquiring organization' and that acquiring organization is deemed responsible for the SA-CMM KPAs, the situation can be brought under control. ”<sup>1</sup>*

In keeping with the GAO’s findings, the BSMO decided to improve its acquisition processes using the SA-CMM as the process improvement model of choice. Executive management attention on this process improvement effort intensified.

This was an important step for the already established BSMO Process Improvement Team. There was now a compelling business reason to go forward that everyone clearly understood, namely, “If we don’t do SA-CMM-based process improvement soon, our funds are in jeopardy!”

Here are some other reasons the BSMO decided to follow the GAO suggestion of applying the SA-CMM. The SA-CMM

- is based on “best” processes and practices and is recommended by oversight entities (e.g., the GAO) to enhance acquisition management accountability. (The GAO is responsible for auditing and ensuring that the IRS has implemented and is following the SA-CMM for process improvement.)
- sets a framework for incremental process improvement
- enables efficient and effective project life cycle management of solution acquisitions, from pre-award to transition to operations and maintenance
- supports a congressional mandate to set up a “world class” acquisition organization by following SEI<sup>SM</sup> CMM<sup>®</sup> methodologies [GAO 00]

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<sup>1</sup> Madhav Panwar, Naba Barkakati, & Suzanne Burns, “Using the SA-CMM to Improve Acquisition Processes,” SEI Symposium 2000.

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## 3 Process Improvement Approach

Early in the process improvement effort, the overall business objective of the process improvement project was articulated by the chief information officer to make the BSMO more “accountable, predictable, and timely” in the performance of its mission. This chapter sets out some general principles for process improvement. Many of the principles can be found in a 2002 article by Fisher, Goethert, and Jones [Fisher 02]. This discussion on principles is followed by brief descriptions of how the BSMO applied these and other principles through the process improvement project.

### 3.1 Process Improvement Principles

These principles were used to guide the BSMO process improvement effort. These principles are inextricably linked. It requires a concerted effort on each to ensure that the principles are applied correctly, especially in light of the organization’s business practices.

#### 3.1.1 Stabilize the Environment Before Attempting Process Improvement

Process improvement, whether using the SA-CMM or not, is best done within the context of a stable environment. Some organizations do not understand their acquisition mission, do not have an organizational structure or skills to support this mission, or are evolving their acquisition processes as they learn how to accomplish mission requirements. For example, organizations that treat acquisition as simply managing the contractor or just being a coordinator between affected groups significantly underestimate the challenges of program acquisition.

In addition, employment of the SA-CMM could help stabilize the management and leadership through the institutionalization features. Of course, there is no guarantee this will occur if the management is constantly changing and new managers have to be indoctrinated or trained to rethink their previous experience in terms of process improvement and the use of processes that are in effect.

Management at all levels must understand, buy into, articulate, and reinforce the organization’s vision and strategic goals if it hopes to bring some level of stability that allows not only process improvement but, more critically, accomplishment of the mission. Additionally, the organization’s management must be deeply involved in resolving issues with interactions and

interfaces with groups external to the organization (e.g., political and turf battles) to ensure this stabilization.

### **3.1.2 Leadership**

Successful process improvement depends on “good” leadership. Good leadership provides elements such as vision, sponsorship, planning, managing change of culture, commitment throughout the organization, and ensuring awareness of process improvement throughout the organization.

### **3.1.3 Employ Demonstrated Expertise in Process Improvement**

In many cases, the acquisition organization has little knowledge or experience with the SA-CMM and process improvement in general. This means the organization may have to contract externally for acquisition process improvement services. If that is the acquisition organization’s approach, it needs to obtain expertise in SA-CMM-based process improvement that can be verified and demonstrated. (Saying one is an expert is not proving one is an expert.) This expertise is especially critical in the interpretation of the SA-CMM in the context of the acquisition organization’s environment and business paradigm.

### **3.1.4 Avoid “Big Bangs”—Start Small**

Process improvement takes time. Attempting to execute a process improvement project (especially if starting from scratch) that is all encompassing and will be completed in six months is typically unsuccessful and results in eliminating the effort. Do not try to improve everything at once; obtain long-term sponsorship and commitments; devote sufficient resources to the effort; remember to plan deployment of process improvement efforts to the users; use process improvement planning as an example to other teams as the right way to run a project.

### **3.1.5 Use the SA-CMM as a Starting Point (Applying the Reference Model to the Organization)**

Acquisition organizations that buy software-intensive systems tend to believe the SA-CMM is not applicable to their acquisition processes, since they buy systems, not software. One reason the SA-CMM was developed was to ensure that acquiring organizations realize the criticality of software in their acquisition. However, in general, the SA-CMM can be successfully applied to most acquisition organizations and their unique processes in buying solutions and systems, whether these involve software or not.

## **Terminology**

Terminology is critical to the success of not only applying any process improvement reference model like the SA-CMM, but also more significantly operating consistently across the organization. Terminology contains the concepts and sets the context for how the organization wants to do business and, it follows, how the organization may apply process improvement. Terminology provides the bridge among the organization's way of doing business, the process improvement work, appraisals, etc. In this light, having a glossary of terms is considered critical to the success of the organization. But having a glossary and ensuring that personnel know and try to use the terms correctly and consistently is always a challenge.

## **Interpret the Model in Light of Business or Mission Needs**

The SA-CMM should be interpreted in the context of the business or mission needs of the organization. Effective and efficient acquisition processes are critical to successful acquisitions, but the quality of their output can be determined only in the context of the business needs of the organization. The SA-CMM should be and is typically tailored or adapted to fit the organization; the organization should not be restructured to reflect the SA-CMM. Organizations have to interpret the SA-CMM for themselves, not adopt what others have done without modification of how the organization performs its mission; i.e., the way it does business. Applying the SA-CMM to help process improvement requires professional judgment, intelligence, and common sense. Critically, organizations that successfully employed the SA-CMM in their process improvement efforts learned that use of the model should help how they do or want to do business, not as an all-encompassing mandate.

## **Prematurely Mandating Achievement of a Specific CMM Level Leads to Failure**

Some acquisition managers have little knowledge of CMMs and their use in process improvement. Many have no problem imposing CMM levels from the Capability Maturity Model for Software (SW-CMM) or other models upon their contractors, but do not know what imposition of CMM levels on their internal efforts would entail, i.e., how long it takes, what it takes, needed cultural changes, and resources required. Instead, managers may “draw a line in the sand” and announce that their organization will achieve SA-CMM level 2 or 3 in six months. This arbitrary imposition of a CMM timeline encourages organizational shortcuts in process documentation and implementation, thereby undermining the intended purpose of the CMM.

Managers must understand the SA-CMM and what it requires in resources and time to achieve a certain maturity level. Understanding what their suppliers have gone through to achieve certain maturity levels of the SW-CMM might shed some light on this. Data is certainly available.

Another misunderstanding is using the model only to achieve a maturity level rating rather than to instill discipline into the acquisition processes. This attitude may reflect a quest for

status rather than a legitimate attempt to examine business needs and instill process discipline to support those needs. Managers must realize that CMMs were originally developed to improve processes, not to achieve maturity levels. The SA-CMM should be a means to an end, not an end in itself.

### **3.1.6 Treat Process Improvement as a Project**

Process improvement experts agree, treat the process improvement effort as a well-run project. As a project, develop reasonable plans with achievable goals based on business needs; do not try to improve everything at once; obtain long-term sponsorship and commitments; devote sufficient resources to the effort; remember to plan deployment of process improvement efforts to the users; use process improvement planning as an example to other teams as the right way to run a project.

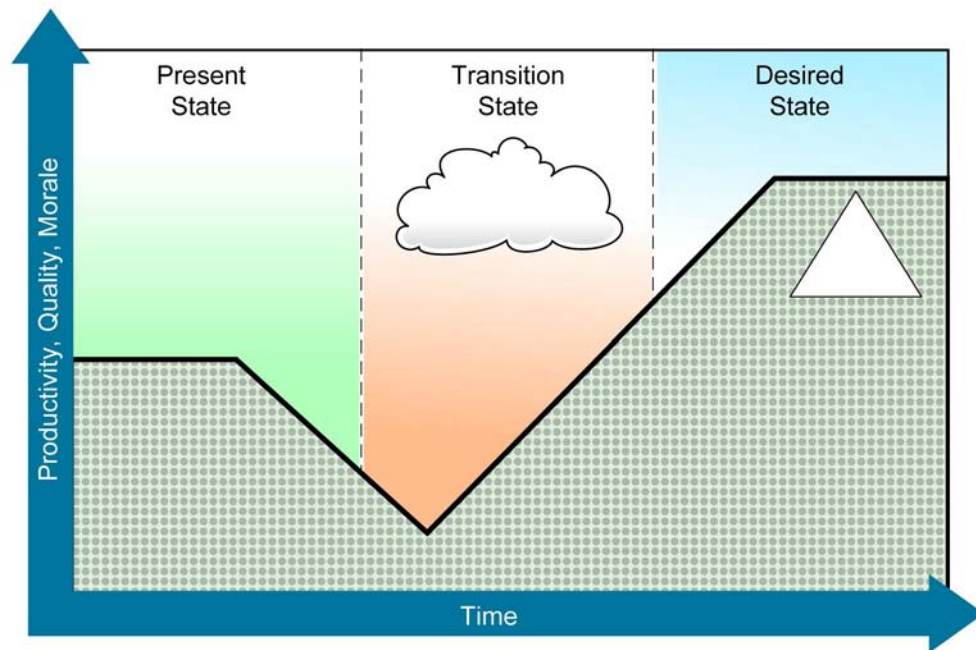
### **3.1.7 Generating Policies, Process Descriptions, and Procedures**

A separate process organization dedicated to the development and deployment of key processes will greatly enhance the chances of success. The use of such a dedicated resource will help minimize the problem of process improvement competing with “real work.” However, it is important that project staffs be involved in the development of organization-level processes early on. This greatly improves communications between the process group and project staffs, making the process documentation “real,” and thereby improves the chance of having and deploying consistent processes across projects.

## **3.2 Applying the Principles**

There were a number of important elements in applying the above principles and implementing BSMO process improvement. In general, however, in the BSMO’s process improvement effort, as with any change imposed on an organization, it was expected that there would be an initial decline in productivity prior to achieving the desired state due to the learning curve, culture, organizational barriers, etc. This well-known concept is illustrated in Figure 1. The idea is that imposing a change in the way an organization operates typically results in a decrease in productivity. After a transition phase, the productivity and quality of work product would improve to a desired state. During the transition phase, barriers for improvement are overcome by such approaches as training, shift of cultural perspectives by mandate, and better application of technology. In the BSMO, the decline could be traced to deep rooted cultural issues, conflicting priorities, unstable management hierarchy, and conflicting government-contractor roles. In addition, BSMO was a new organization that engaged people from internal and external organizations who came with their own way of doing business, their own unique terms, management styles, and ideas. Eventually, these issues were ameliorated by the establishment of a process improvement infrastructure, serious executive-level com-

mitment to process improvement, and constant emphasis on training in project management and acquisition, as well as in the SA-CMM.



*Figure 1: Managing Organizational Change*

Other components related to the application of process improvement principles are described below, categorized according to how the principles were presented in Section 3.1.

### **3.2.1 Stabilize the Environment before Attempting Process Improvement**

Process improvement, whether using SA-CMM or not, is best done within the context of a stable environment. The SA-CMM was used to help the BSMO define its mission and resultant responsibilities. This helped stabilize the environment for improvement.

Initially, BSMO personnel were confused about the organization's vision, strategic goals, mission and functions, and concept of operations. Interfaces among the organization's elements and suppliers and government organizations external to but supporting the BSMO were not documented and were often personality driven.

Instability within the BSMO environment relative to the accomplishment of its acquisition mission resulted in numerous starts and stops and redirection not only of the process improvement efforts but also in the accomplishment of its mission. Acquisitions were not proceeding well. This instability can be attributed to many causes, but stemmed primarily from

an ever-changing senior executive group and the difficulty in settling on a concept of operations, i.e., how modernization would be managed. This situation was exacerbated by the lack of articulated vision, strategic goals, and documented mission and functions. The struggle in codifying these critical areas demonstrated the difficulty in understanding the organization's vision and strategic goals, the difficulty in translating the goals and objectives into a viable organization, and the subsequent difficulty in creating the associated documentation, sometimes with conflicting results that did not clearly articulate the BSMO's true mission. As one example, BSMO's initial emphasis was to use the "preferred" contractor to do virtually everything, resulting in Government personnel abdicating their responsibility to manage modernization effort. Obviously, this shift of responsibility and workload from BSMO personnel to the contractor diluted the normal Government to contractor relationship and introduced risk into the modernization effort. In midst of this, the BSMO was attempting to codify and improve its acquisition management processes.

The use of the SA-CMM provided a framework and a way out of the confusion caused by the poorly understood roles and responsibilities (Government to contractor relationship). Developing and employing SA-CMM-consistent organizational directives (policy statements), process descriptions, and associated procedures helped stabilize the perturbations due to management and leadership turnover through the institutionalization features. While there was no guarantee this institutionalization would solve the problem, it did solidify and align the roles and responsibilities of the IRS modernization effort with the true mission of an acquisition organization. It also promoted the indoctrination of new managers, causing them to rethink their previous experience in terms of the standard processes and terminology of BSMO.

### **3.2.2 Leadership**

Earlier BSMO attempts at process improvement did not have the necessary management support to become firmly entrenched. Directives (policy statements), process descriptions, and procedures were developed previously in 1999 but used only sporadically by the projects. Since the fall of 2001, increased management commitment and oversight provided the necessary focus on process improvement, resulting in much-needed traction. This management commitment was particularly evident when BSMO came under increased scrutiny by oversight organizations (GAO, Office of Management and Budget, and Treasury Inspector General for Tax Administration).

### **3.2.3 Engaging Experts to Help**

The importance of engaging experienced process improvement and acquisition experts to help the effort cannot be over-emphasized. The BSMO engaged the SEI and the MITRE Corporation, both federally funded research and development centers (FFRDCs) throughout this effort. Typical government agencies do not have the insight or broad experience that the

FFRDCs have in planning process improvements and applying model-based process improvements, in this case the SA-CMM model. In the case of the BSMO, these experts came with credentials that the senior IRS executives appreciated and listened to. The guidance the FFRDCs provided worked! Many of the recommendations suggested were typical of most process improvement efforts but now applied to acquisition process.

### **3.2.4 Avoid “Big Bangs”—Starting Small**

The BSMO learned from the failure of previous process improvement attempts to not try to change the entire organization at once. This is a typical problem, especially when managers do not understand the “reality” of process improvement, including its cost and duration. Initially, the BSMO attempted to implement a set of standard processes across every project in the modernization effort simultaneously. The processes were not sufficiently matured and the Solutions Acquisition Process Group (SAPG) did not have the capacity to support so many projects all at once.

After the baseline review in January 2001, the review team recommended that the BSMO target a much smaller subset of projects to work with initially. Such a subset would be more manageable, changes to process assets could be better controlled, and the SAPG could provide the necessary support to the earlier adopters. In late 2001, five pilot projects were identified and the SAPG began the deployment of updated processes and procedures to the participating projects. The SAPG also provided direct assistance to them in their process improvement efforts.

### **3.2.5 Use the SA-CMM as a Starting Point (Applying the Reference Model to the Organization)**

The SA-CMM is designed to be sufficiently generic for use by any government or industry organization, regardless of its size, that acquires products. When applying the SA-CMM to a particular organization, translations or tailoring may be needed to adapt the model to fit the specific organization. These translations involve mapping the model’s generic organization, language, and intent to how the organization carries out its business.

In addition, the model terminology has been made as generic as possible. Model terminology must be mapped to the organization’s terms. Several terms, including “partnership” (with the contractors), “integrated product team,” and “matrix management,” had been inconsistently and, in some cases, incorrectly applied by BSMO personnel. Mapping the SA-CMM terminology to the BSMO way of doing business stabilized terminology and its concepts of operations. Table 1 shows an example set of SA-CMM terms mapped to BSMO concepts.

*Table 1: BSMO Mapping to SA-CMM Terms*

<b>SA-CMM Term</b>	<b>IRS BSMO Term</b>
Software Acquisition Planning	Solution Acquisition Planning
Acquisition Organization	BSMO
Contract	Task Order
Project Manager	Acquisition Project Manager (APM)
Solicitation	Task Order Development And Issuance
Contract Tracking and Oversight	Task Order Monitoring
Policy	Directive

The BSMO, in fact, used the SA-CMM to mean “solution acquisition” CMM, because the BSMO acquires solutions, not just software. By using the SA-CMM as a tool to examine the more general acquisition processes such as for systems and services, BSMO has stabilized its processes and has corrected or resolved long-standing management issues.

For example, the term “Solicitation” in the SA-CMM refers to a process for the preparation of a solicitation package such as a request for proposal (RFP), soliciting proposals from a number of contractors, and selecting a contractor best capable of satisfying the needs of the acquisition organization. In BSMO modernization, the selection of a PRIME contract was accomplished prior to the process improvement effort. Therefore, in the current BSMO operation, they apply the SA-CMM concepts at the task order level, considering task orders as “mini-contracts.” For the area of solicitation, they develop and issue a task order, receive the contractor’s proposal, review and negotiate the task order terms and cost, and then issue.

Start this mapping before starting to document organizational processes. Otherwise, individuals involved in documenting the organizational processes and procedures will have different ideas about the target of each process and the meaning of terms and concepts. The importance of solidifying the application of the model and the organizational terminology cannot be over-emphasized. The BSMO terminology, with definitions, is now documented in the BSMO acquisition directives.

### **3.2.6 Treat Process Improvement as a Project**

There are five cornerstones of the BSMO process improvement project: sponsorship, the Management Steering Group, the Solutions Acquisition Process Group, Process Action Teams, and BSMO Process Improvement Planning.

#### **Sponsorship**

Sponsorship is shown by actions. Senior executives not only stated their commitment to the SA-CMM-based process improvement effort, but also demonstrated this commitment and leadership by their ongoing and public actions. Management made it clear by their words, organizational expectations, and commitment that process improvement was a critical element in making the IRS modernization program successful. The BSMO staff saw senior ex-



ecutives using every tool at their command to ensure that SA-CMM-based process improvement took hold and was successful. Resources such as the budget for direct project support, regular training, and familiarization sessions were provided. The senior leadership created, funded, and gave responsibility and ample authority to a major staff element—the Solutions Acquisition Process Group—devoted to process improvement. Sponsorship was especially important in managing the expectation and scrutiny of the congressional oversight organizations. By demonstrating a visible and tangible commitment, including well thought out and executed process improvement plans and timely appraisals, BSMO was able to demonstrate to the oversight organizations that the IRS had a serious and continuing commitment to acquisition process improvement.

### **Management Steering Group (MSG)**

After numerous process improvement “marketing” briefings to senior IRS officials, it was agreed that a BSMO Management Steering Group (MSG) would be created to lead the process improvement effort. The MSG was formally chartered in September 2001 and remains the executive-level driving force behind process improvement today. The MSG is led by the senior BSMO executive and includes all IRS senior directors responsible for the various components of the IRS modernization program. These directors also are in charge of the acquisition projects that are the target groups for the process improvement program. Senior executives realized that oversight organizations were expecting process improvement and that without such an effort modernization funding could potentially be reduced or eliminated. This became the initial “business case” for BSMO process improvement.

### **Solutions Acquisition Process Group**

The Solutions Acquisition Process Group (SAPG) was formally chartered by the MSG in September 2001. The SAPG leads the day to day process improvement effort and is the agent of change for the organization. The SAPG leads the effort in documenting BSMO standard processes and procedures, deploying these assets to the modernization project teams and supporting their implementation through training sessions and direct project support. The SAPG reports regularly to the MSG and also arranges for formal appraisals and reviews.

### **Process Action Teams**

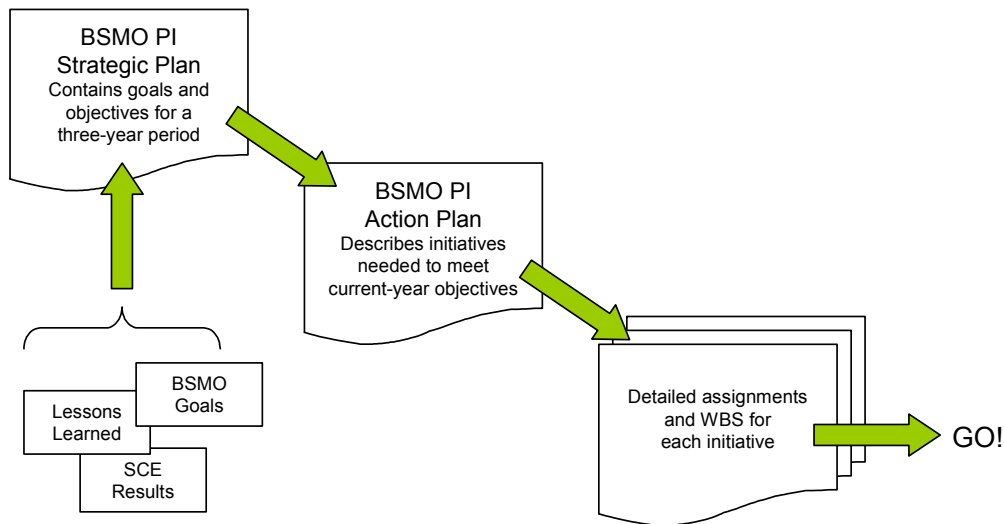
The SAPG charts each process action team (PAT), assigns a team lead, and expects a documented plan and schedule for the PAT efforts in process improvement. In BSMO, PATs typically implement short-term efforts that have a specific goal and vision. The SAPG supports the PATs by providing guidance, examples, and in many cases resources to staff and lead the PATs.

### **BSMO Process Improvement Planning**

Formal planning of process improvement activities and appropriate executive review is essential for success. Early in the process improvement effort, the MSG and SAPG established realistic goals and defined and documented meaningful and actionable process improvement

activities. This served to demonstrate to the modernization project participants the importance and value of planning activities and measuring performance against the plan and schedule—just the behavior the SA-CMM model requires.

The leading tenet of the effort is to treat process improvement as a project and to approach and manage it in a disciplined way. A three-year BSMO Process Improvement Strategic Plan was developed and approved by the MSG. Specific initiatives associated with each goal were documented in the Strategic Plan. Once the plan was approved, the SAPG developed a detailed Process Improvement Action Plan (PIAP) for the current year. At the end of each year, the Strategic Plan is “rolled” forward one year and the PIAP developed for the new year. Figure 2 shows the interrelationships of the components to this planning process. (Note that the appraisal results feed the planning process. See the discussion on appraisals below.)



**Figure 2: BSMO PI Planning**

The planning process is iterative and continuous. The BSMO SAPG has developed plans in consultation with practitioners on the teams, using the SA-CMM and the SEI IDEAL<sup>2</sup> approach as a framework. Planning is used as part of an active feedback mechanism, generating specific activities and steps that can be assigned, executed, and measured.

Adding the planning component forced IRS personnel to have realistic expectations about productivity and schedule. When developing schedules, they engaged and listened to the experts, both within the IRS and the PRIME Alliance. As a result, their process improvement schedules were based on realistic estimates and enabled the organization to accept the schedules.

<sup>2</sup> Initiating, Diagnosing, Establishing, Acting, & Learning. See <<http://www.sei.cmu.edu/ideal/>>.

## **BSMO Process Improvement Strategic Plan**

The Strategic Plan was developed by the SAPG for MSG approval. The plan lays out process improvement goals, objectives, and initiatives for the next three years and is updated on a yearly basis. It ties the process improvement goals to organizational goals; defines the process improvement strategy, yearly goals, and initiatives; and addresses resources, risks, roles, and responsibilities. The plan was built on the SEI IDEAL approach. It is the cornerstone planning document for the process improvement effort and also serves as a communication vehicle to senior management and oversight organizations.

All members of the MSG signed the initial BSMO Process Improvement Strategic Plan in March 2002, which set a course for increased attention, definitive goals, and necessary activities to improve the acquisition capability of the IRS.

### **Process Improvement Action Plans**

Based on the approved Process Improvement Strategic Plan, a Process Improvement Action Plan (PIAP) was written by the SAPG for the upcoming year's activities. The PIAP is the tactical plan and is more specific. A set of well thought out initiatives were developed that all mapped back to the strategic goals for the year. For example, the PIAP for 2003 included the definition of 13 initiatives. The plan specified each initiative's title, description, effort, schedule, priority, and responsible office or individual. The PIAP was also approved by the MSG and assigned back to the SAPG for implementation.

### **Detailed Work Plans**

For each approved initiative, the responsible person or office developed a detailed work plan that described the work breakdown structure (WBS) for everything involved in completing the initiative. These work plans were approved and tracked by the SAPG chairman and "statused" at each SAPG meeting. These work plans served two purposes. First, they were a way for the individuals assigned to organize their work to communicate to the organization the who, what, why, when, and benefit of the initiative. But more importantly, they demonstrated to BSMO as a whole the benefit of "planning your work, and then working your plan."

### **3.2.7 Generating Policies, Process Descriptions, and Procedures**

The BSMO Acquisition Management policies, processes, and descriptions lay out the tasks, activities, and steps associated with developing, issuing, monitoring, and closing out task orders.

Initial thinking was that a large group split up into smaller groups could generate the required policies, process descriptions, and procedures concurrently. Each group would work on a key

process area (KPA) from the SA-CMM, writing the necessary policy, processes, and procedures, and then the groups would come together and integrate the pieces—all without engaging the practitioners who actually manage the acquisition contract. This approach failed. The processes were not written with the same voice, they did not have the benefit of reality, and, when published, no one followed them nor, in some cases, knew about them. And the terminology was not consistent throughout the first set of assets.

The BSMO set up a system of teams to work on the different processes thought to be the future way the BSMO would operate. The teams consisted of subject matter experts (SMEs) from various disciplines and with differing skills and experiences. With these various backgrounds and no clear direction on the BSMO's vision and goals and concept of operations (CONOPS), a "I've always done it this way" mentality was noticeable in many of the process improvement artifacts. The basic intent was good, that is, bringing in the SMEs who could describe what processes had to be created and installed. However, the loyalty of those individuals typically was to their home office and the way they did business and not in establishing processes for a new organization. This initial set of process assets were not well balanced, nor were they integrated vertically or horizontally. This situation was exacerbated by the managers of these external offices being rivals of the BSMO organization itself.

After the process improvement began in earnest, the BSMO SAPG established a key PAT as a "core writing group" that included representatives from the acquisition projects. This core writing group settled on the fundamental concepts of how to apply the model to BSMO, settled on terminology, and documented what each acquisition project team did for process areas described by the model. When they were done documenting each process, the core writing team compared the documented process with the SA-CMM model and made adjustments. Additional activities were engineered into the processes and deployed to the acquisition teams. Because the core writing group did one KPA at a time, this method of documenting took approximately 15 calendar months for all required KPAs, but the result was a solid set of processes and procedures that BSMO acquisition teams could understand and follow.

### **3.2.8 Deployment**

Initially, the BSMO attempted to deploy a set of standard processes across every project in modernization simultaneously. This approach did not work—there were too many projects. Furthermore, the SAPG did not have the capacity to support, communicate, and "socialize" these processes to the entire organization. Here we discuss the role of training, communications, and appraisals in support of the deployment processes.

#### **Training**

The BSMO process improvement team learned not to assume that everyone has the same understanding of how the organization works. Particularly in a relatively new organization, people use different terms and different unwritten processes and have different ideas as to

who does what. It was realized that a significant amount of training would be needed to ensure that individuals understood what the process improvement effort was about.

The BSMO developed training modules (one-to-two-hour briefings) for each of the BSMO process areas. Sets of these briefings are spread over a period of four to five weeks and are repeated approximately three times per year. In addition, a two-and-a-half-day SA-CMM class is offered approximately three times per year. As in any organization, IRS acquisition processes touch other processes that are not directly tied to acquisition, such as configuration management, program control, and system testing. The BSMO has tried to ensure that a complete picture of these interrelationships is presented to the attendees so they are well understood.

## **Communication is at the Heart of Process Improvement**

The January 2001 baseline review identified communication as a problematic area for the BSMO. Even though the processes documented by the core writing group were placed on the process asset library, few if any of the BSMO project teams at that time knew what they were and what management expectations were regarding them. In order to improve communications, the BSMO SAPG implemented a communications plan that is based on the goals and objectives of the BSMO Process Improvement Strategic Plan and the current year's PIAP. BSMO personnel also hold biweekly meetings with professional communications staff. Current plans have specific goals based on the following parameters: audience, stage of communication, triggering mechanism, "messages," the vehicle, and the delivery method. Voice mails, flyers, presentations, e-mails, weekly "snippets," posters, and key messages for program executives are developed and deployed throughout the year.

## **Appraisals are Important**

Periodic assessments and appraisals of the project, both internal and external, are absolutely essential to baseline the current state of the organization's process capability and to keep the necessary focus on process improvement, especially the acquisition projects' perspectives.

The BSMO conducted a "baseline review" of the BSMO process capability in January 2001 using the SA-CMM as the reference model. This review was considered an informal assessment led by the SEI, with the bulk of the review team being IRS and MITRE. The team interviewed the modernization project managers, the program directors, and other functional area personnel (e.g., procurement, program control). Although not a full formal assessment, this review was critical in establishing the foundation for process improvement. It provided BSMO senior management a first glimpse at where they were in having a disciplined approach to acquisition.

Since the January 2001 baseline review, the BSMO has undergone three additional reviews/appraisals in its process improvement journey.

The group of five pilot projects selected for process improvement underwent an assessment (CBA-IP<sup>3</sup>) led by the SEI in June 2002. Most model goals (SA-CMM level 2 KPA goals) were satisfied, but there were a number of improvement opportunities identified. There were enough positive activities being performed in the BSMO that the improvement opportunities seemed very doable to the group, and they felt that they were on the right track.

After significant effort and focus on the identified improvement opportunities, the same project group underwent a formal Software Capability Evaluation (SCE) in December 2002. In the final briefing on December 6, 2002, the SCE team reported that this group was operating at maturity level 2 of the SA-CMM. This was the first civilian government group of multisystem projects ever to achieve this recognition. The BSMO had committed to their oversight organizations to undergo an evaluation, with the goal of achieving level 2. They did it on time and according to plan.

After the SCE, the Strategic Plan and Process Improvement Action Plan were updated, adding other modernization projects to the process improvement activities for fiscal year 2003.

After many training sessions and direct project support, the BMSO underwent a baseline review in October 2003. Ten projects participated. This review was important because the organization needed to determine where it stood in the full-scale rollout, as well as when the next formal appraisal should be planned. The review presented a number of improvement opportunities for all these projects and recommended that the next formal evaluation should take place in September 2004.

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<sup>3</sup> CMM-Based Appraisal for Internal Process Improvement

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## 4 Results

Since the first baseline review in January 2001, process improvement in the BSMO has gained significant traction, and the motivation for process improvement has now shifted to business benefit. The BSMO is now realizing the benefit of documenting and improving organizational processes and using them in daily work. The BSMO now knows it makes good business sense that

- When leadership changes there is an underlying documented acquisition process to guide the organization.
- Internal project “thrashing,” i.e., constant questions, false starts, and rework, is minimized because the project is organized better, has a documented plan and schedule, and the communication is free flowing and accessible.
- Training can actually be based on the organizational processes, because they are documented. The BSMO no longer has to depend on generic training that has little applicability to the work being done.
- Planning ahead allows foresight and predictability of issues that can be dealt with early, when they are easier and less costly to address.
- New-hires now have documented organizational processes and project plans to go to.
- No longer is 90% of the work done by 10% of the work force. Planning ahead helps distribute the work load to all team members, making everyone feel a part of the team.
- Contractor and government roles are well understood and documented up front.

Activities are now planned in advance in the acquisition management plan for each task order. Planning ahead and having a systematic method based on documented processes allows acquisition project managers to manage more methodologically; risks are anticipated, rework is minimized, meetings are more on target, progress is made.

### Result 1: Stabilization of Terminology

The terms that have been solidified and documented in the organizational processes are now in common use, such as acquisition project manager, acquisition management plan, artifacts, and repository (document management system). The terms used for the process areas are also now in the daily BSMO vocabulary: Task Order Development and Issuance, Task Order Monitoring, Transition to Support, etc.

## **Result 2: Silver Bullet?**

Even with the application of SA-CMM concepts, the IRS modernization program continues to face significant challenges, as is typical with large, complex modernization efforts. While the SA-CMM as a management model was necessary to improve the BSMO's management capability, it is not a silver bullet. It does not guarantee program performance; rather, it sets the foundation for improving acquisition management performance.

It should be noted that, like other process improvement models, the SA-CMM does not prescribe "how" to establish true executive sponsorship and commitment. This is something the BSMO had to develop itself. In the end, both the acquiring organization (the BSMO) and the providing organization (CSC PRIME Alliance) have had to adopt cultures of communication, cooperation, and collaboration and be open to understanding and evolving their processes.

## **Result 3: Training**

Based on the standard organizational processes and procedures, there are now training sessions that are available to assigned acquisition project managers, staff, and new-hires. These have helped to flatten the organizational learning curve.

## **Result 4: Executive Expectations**

Senior leadership has embraced the CMM concepts that are embodied in the organizational processes and expect their acquisition project managers and staff to adhere to them. As such, fundamental project management activities are beginning to be woven into the organizational culture and day to day activities.

## **Result 5: Measuring and Improving Processes**

The standard documented BSMO processes have helped the IRS procurement organization in performing root-cause analyses of the part of the acquisition process they are responsible for. These analyses helped to characterize the pre-award timeline of the solicitation process and to define the measures needed improve this process, as well as form the basis for future acquisitions.

## **Results 6: Repository and Its Implications**

The BSMO has overseen the establishment and growth of a program repository (document management system) in which people can submit, update, check out, and control their acquisition assets. Currently there are over 18,000 files stored in the repository. This repository has improved communication and coordination among teammates and has enabled easier retrieval of artifacts for assessment purposes. No longer do team members need to seek out the acquisition project manager or even the contractor for important documentation. There are



areas set aside in the repository for every project on the modernization effort, and everyone with the requisite permission has access to it.

## **Result 7: Alignment with Contractors**

The BSMO staff learned that the acquiring organization's team and its activities is a project itself and should be planned, managed, and run as such. They also expect their contractor team to plan and manage itself. By working in a collaborative learning environment that fosters mutual trust and dispenses as much as possible with gratuitous recriminations, both parties have found fruitful common ground for success. Using the SA-CMM as the basis for organizational process improvement has provided them a common foundation that has promoted better understanding of roles, responsibilities, and alignment of processes. BSMO's PRIME contractor is also in effect a solutions acquisition organization (in addition to being a systems integrator), which further illustrates the need for both organizations to adopt the same framework, such as SA-CMM.

## **Result 8: Policies, Processes, and Procedures**

Processes, procedures, policies, and other work rules were clearly thought out and documented to enable each party to the contract between providing and acquiring organizations to understand what is expected of their project teams *and* to make sure that necessary resources are in place.

## **Result 9: Planning and Use of Plans**

Acquisition team members now plan out activities for each task order in advance in the acquisition management plan. Roles, responsibilities, and expectations are more clearly understood and team members feel more involved in the program—it's not just "the contractor's problem" any more.

Organizations (procurement, the BSMO, and the business owners) are better aligned and have a common foundation for understanding and process improvement.

The BSMO has realized a better working relationship with its procurement organization by having standard acquisition processes and procedures. They don't have to start with a blank piece of paper in their process discussions. They can focus on a documented step or series of procedures and get to the heart of the issue for resolution much faster.

## **Result 10: Transition from IT Culture**

The culture of the IRS went from that of being a developer to being an acquisition organization. The IRS realized that they did not have the capacity or capability to develop and deploy

modernized systems themselves. They had to transition and let a large set of expert companies do the development and integration for them.

## **Result 11: Better Management Skills**

The BSMO developed and institutionalized better management skills. They did this through

- the use of more disciplined approaches, assessments, techniques, and acquisition management planning
- the use of tools such as earned value, management information center, integrated master schedule, and performance measurement
- the “simmering” value of time and experience

As a result, their managers on the program have a better handle on modernization. They find they can spend their time managing and not micromanaging. They are doing the work they need to do and leaving the work of development, testing, and integration where it belongs—with the providing organization.

## **Result 12: Empowerment**

People in the BSMO feel empowered because the organization is now clear on who’s responsible for what. The SA-CMM has helped them determine this. The BSMO provides each acquisition project manager (APM) with a certificate that clearly specifies the responsibilities of the role they fill. The APMs are held to this standard by the BSMO. The BSMO has a governance structure that describes the cost, schedule, and commitment thresholds that guide each APM in their decision-making processes. Also, roles and responsibilities for everyone on each project team are defined in their project’s acquisition management plan.

## **Result 13: Appraisal Results**

An appraisal in December 2002 rated the BSMO Core Modernization Group of the five core modernization projects as operating with a process capability of SA-CMM maturity level 2. The BSMO is the first federal civilian agency group to be evaluated at this level.

## **Result 14: Resources**

One of the benefits of CMM appraisals is that they formally bring up issues that may otherwise fall on deaf ears. One of these for BSMO was the lack of sufficient resources to manage modernization. Since this issue was raised with no attribution of source, many additional personnel have been hired, with skills more in line with the role of the acquisition organization.

## **Result 15: Organizational Pride**

The successes the BSMO has had in process improvement have been a source of great pride for their organization. Because they were the first federal civilian agency group to achieve SA-CMM level 2, other government agencies have come to them to find out how they did it. Senior IRS officials presented the participating projects and groups with awards, ceremonies, and a recognition luncheon for this accomplishment.

## **Result 16: Oversight Scrutiny**

The BSMO's oversight groups (GAO and Department of Treasury Inspector General's office) have gained confidence in the BSMO's organizational maturity because the BSMO has been recognized as having successfully applied CMM level 2 concepts on modernization. Quoting a June 2003 GAO report: "IRS made significant progress in improving its modernization management controls...Significant among these efforts were IRS' achievements in improving its software acquisition practices."



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## 5 Summary

### 5.1 Lessons Learned

The following discussions reflect some of the lessons learned during the process improvement effort. Many of these are focused not explicitly on process improvement but more on the underlying problems surfaced during the process improvement work, and specifically with the organization itself, e.g., vision, mission, and management. Many of the lessons learned are inextricably linked, each affecting others.

#### **Senior Management Must Lead the Organization's Cultural Shift to Meet Vision and Strategic Goals**

It isn't enough that executives hand down pronouncements or write memos to the staff. It takes leadership.

The following paraphrasing from *Software Runaways* [Glass 98] originally fit the situation at the BSMO:

*"The serious delays in the [BSMO process improvement effort] were rooted in deep cultural, political, and organizational problems within that agency, many observers agree."*

The recommendation may be translated into establishing and articulating at least a tentative organization, mission and function, and CONOPS prior to starting process improvements efforts. This would set the foundation and needed stability for process improvement. Further, the group responsible for coordinating process improvement efforts must be sponsored, empowered, chartered, and supported by management to help management lead the cultural shift.

#### **Leadership**

Without the leadership at the highest levels of management, this effort would not have been successful. Considering the path of deploying results to other BSMO projects, this strong leadership must be maintained.

Initially, BSMO managers making strategic decisions were challenged in most aspects of acquisition project management, such as “setting up” an organization, codifying its mission and functions, and resolving external interface and political battles.

*Assign skilled and experienced managers and staff at all levels that are committed to and expected to follow organizational processes.*

## **Interpret the Model in Light of Business or Mission Needs**

Effective and efficient acquisition processes are critical to successful process improvement, but the quality of their output can only be determined in the context of the business needs of the organization. The SA-CMM should be interpreted in the context of the business or mission needs of the organization. Key concepts as to how the SA-CMM must be tailored or applied to the organization must be clearly understood and agreed to up front.

Working with experts, the BSMO successfully interpreted the SA-CMM in terms of its business needs to make the BSMO efforts responsible, accountable, and predictable. Note that demonstrated expertise in the SA-CMM and process improvement is needed—not self-proclaimed expertise.

## **Prematurely Mandating Achievement of a Specific CMM Level Leads to Failure**

Arbitrary imposition of a CMM timeline encourages organizational shortcuts in process documentation and implementation, thereby undermining the intended purpose of the CMMs. Managers must understand the SA-CMM and what it takes in resources and time to achieve a certain maturity level.

Another indication of a similar misunderstanding is using the model only to achieve a maturity level rating, rather than instilling discipline into the process. This attitude may reflect a quest for status rather than a legitimate attempt to examine business needs and instill process discipline to support these needs. The SA-CMM should be a means to an end, not an end in itself.

Initially BSMO management took the “we will be level 2 in six months” approach. This doomed the effort from the beginning. It was not until the management realized all the factors that lead to process improvement and set out a “reasonable” plan and managed to the plan that the process improvement effort was successful.

## SAPG and Process Descriptions

Early involvement of project staff in the development of the organization-level processes greatly improves communications between the process improvement teams and the acquisition projects, and improves the chances of having consistent processes across projects. This involvement with project staff was and is one of the cornerstones of the BSMO process improvement approach. The approach involved

- establishing a core SAPG and using quick-hitting PATs to tackle documenting the processes, i.e., having a core set of people write the artifacts, then having subject matter experts or stakeholders from the affected areas review the documents. In this way all the artifacts can have a consistent thread.
- working with practitioners on their high-priority process needs and satisfying them quickly
- ensuring that it's clear who is in charge of the process artifacts

## Roles and Responsibilities

The SA-CMM was used in creating opportunities for sharing and collaboration. It provides an excellent framework to improve chances of success in a large and complex program. It provides formal terms that can be used (or translated, as the BSMO has done) to align the understandings and communications between the acquiring and providing organizations. And it provides an excellent model to assist in developing program management and planning best practices.

## 5.2 In the End

As of early 2004, the IRS modernization effort has delivered a number of modernization capabilities that provide tangible benefits to taxpayers and improve the efficiency and effectiveness of the tax administration systems, such as *Where's My Refund?*, *Where's My Advance Child Tax Credit?*, Internet EIN, Modernized Electronic Filing, and a new internal Human Resources management system. Throughout the journey, the BSMO Process Improvement Program has been a significant contributor in these successes and will continue to execute its process improvement role as modernization moves forward.

In the end, the BSMO found that, while process improvement is not a silver bullet and it is not the only arrow needed in management's quiver, they needed stable and institutionalized processes to begin to impact improved organizational performance. The institutionalization of process and process improvement into the culture of their team was vital to the overall success they were striving for.

However, the “real” benefits are realized in the journey, rather than in the end result of a maturity level. Along the way more discipline, awareness, and skilled/trained people helped identify resource needs, got task orders more timely, and identified supplier problems more easily. Morale is high, people are proud, and they see the light at the end of the tunnel.

This entire process (and BSMO is not stopping here) basically allowed the IRS to see where the problems were in a systemic way instead of “groping” and putting out fires. Planning ahead and having systematic methods and associated tools allows acquisition project managers to manage more methodologically. Meetings are more on target, progress is made, and there is less unproductive activity.

Having succeeded in attaining SA-CMM maturity level 2 on the initial five projects, the BSMO is currently working to sustain their maturity with those five projects and also to deploy processes to the remaining modernization projects.

Not everything they have done applies to every other program involved in acquisition. Their general approach to understanding, developing, and implementing a real working program that is continually monitoring and improving its processes, however, can be useful to other programs, whether in the U.S. Government or other organizations.



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## **Appendix A: The Software Acquisition Capability Maturity Model (SA-CMM) Version 1.03**

The Software Acquisition Capability Maturity Model (SA-CMM) was developed to help improve an acquirer's ability to manage acquisitions by providing a mechanism to discipline the acquirer's acquisition processes. The SA-CMM focuses on how the acquisition organization manages its internal business, not on how the supplier manages his development project. The SA-CMM describes the acquirer's role in the acquisition process. Organizations have used the SA-CMM to instill discipline not only in their acquisition processes, but also in their processes in general. This is possible because of the flexibility and adaptability of the SA-CMM to apply to each organization's unique business needs [Fisher 02].

If applied correctly, the SA-CMM results in an introspective view of an organization's ability to accomplish its acquisition mission. Typically, such introspection reveals areas for improvement that include the following: the organization's acquisition processes are not institutionalized and are inefficient and sometimes ineffective; organizational overlaps exist; responsibilities are not well defined; and visibility into projects is poor. Application of SA-CMM helps an organization understand the existence of these conditions. This realization provides the basis for developing process improvement plans.

The architecture of the SA-CMM is shown in Figure A-1. The architecture is structured into five levels of increasing process capability/maturity. Each maturity level (except level 1) contains key process areas (KPA's), which are clusters of important, related acquisition practices. Note that the primary focus of level 2 is basic project management within a single project.

Level	Focus	Key Process Areas	Higher Quality Productivity Lower Risk
5 Optimizing	<i>Continuous process improvement</i>	Acquisition Innovation Management Continuous Process Improvement	
4 Quantitative	<i>Quantitative management</i>	Quantitative Acquisition Management Quantitative Process Management	
3 Defined	<i>Process standardization</i>	Training Program Management Acquisition Risk Management Contract Performance Management Project Performance Management User requirements Process Definition and Maintenance	
2 Repeatable	<i>Basic project management</i>	Transition to Support Evaluation Contract Tracking and Oversight Project Management Requirements Development and Mgt. Solicitation Software Acquisition Planning	
1 Initial	<i>Competent people and heroics</i>		Higher Risk Rework

Figure A-1: SA-CMM Architecture Version 1.03

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