United States General Accounting Office

GAO

Report to the Ranking Minority Member, Subcommittee on Housing, and Transportation, Committee on Banking, Housing and Urban Affairs, U.S. Senate

September 2001

HUD INFORMATION SYSTEMS

Immature Software Acquisition Capability Increases Project Risks

G A O

Accountability * Integrity * Reliability

GAO-01-962

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Abbreviations

CIO	Chief Information Officer
EIS	Empowerment Information System
GAO	General Accounting Office
HUD	Department of Housing and Urban Development
HUDCAPS	HUD Central Accounting and Program System
PIC	Public and Indian Housing Information Center system
RASS	Resident Assessment Subsystem
REMS	Real Estate Management System
SA-CMM	Software Acquisition Capability Maturity Model
SEI	Software Engineering Institute

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United States General Accounting Office
Washington, DC 20548

September 14, 2001

The Honorable Wayne Allard
Ranking Minority Member
Subcommittee on Housing and Transportation
Committee on Banking, Housing, and Urban Affairs
United States Senate

Dear Senator Allard:

The accompanying report is the first in a series of reports responding to your February 2001 request that we examine a range of management issues at the Department of Housing and Urban Development. This report discusses our assessment of the department's capability to acquire software. We are making recommendations to the Secretary of Housing and Urban Development to assist the department in improving this capability.

We are sending copies of this report to the Secretary of Housing and Urban Development, the Director of the Office of Management and Budget, and other congressional committees. We will also make copies available to other interested parties upon request.

If you have questions or wish to discuss the issues in this report, please contact me at (202) 512-6240 or by email at koontzl@gao.gov. An additional GAO contact and staff acknowledgements are listed in appendix II.

Sincerely yours,

Linda D. Koontz

Linda D. Koontz
Director, Information Management Issues

Executive Summary

Purpose

The Department of Housing and Urban Development (HUD) routinely acquires new information systems and enhancements to manage and support its various programs and operations. GAO has designated HUD's major program areas as high risk, in part because the department's information and financial management systems were poorly integrated, ineffective, and generally unreliable.[1] HUD has been endeavoring to improve its systems to better support its missions and management reforms.

Because of the importance of information and financial management systems and related improvement efforts to meeting HUD's mission, the Ranking Minority Member, Subcommittee on Housing and Transportation, Senate Committee on Banking, Housing, and Urban Affairs, requested that GAO review the maturity of HUD's software acquisition processes. More mature processes increase the likelihood that the software acquired will meet an organization's needs.

Background

HUD is the principal federal agency responsible for housing and community development programs. HUD's mission includes making housing affordable (through mortgage insurance for multifamily housing and through rental assistance), helping to revitalize localities, and encouraging home ownership. In fiscal year 2001, the department's budget was about $32 billion, including $360 million for information technology investments.

High-quality software is essential for HUD's information systems to provide reliable management, financial, and administrative information and support the department's many programs. The quality of software is governed largely by the quality of the processes involved in developing or acquiring it and in maintaining it. Carnegie Mellon University's Software Engineering Institute (SEI), recognized for its expertise in software processes, has developed models and methods that define and determine organizations' software process maturity. Together, these models and

[1] *GAO High-Risk Program* (GAO/AIMD-94-72R, January 27, 1994); *High-Risk Series: Department of Housing and Urban Development* (GAO/HR-95-11, February 1995); *High-Risk Series: Department of Housing and Urban Development* (GAO/HR-97-12, February 1997); *Major Management Challenges and Program Risks: Department of Housing and Urban Development* (GAO/OCG-99-8, January 1999); *Major Management Challenges and Program Risks: Department of Housing and Urban Development* (GAO-01-248, January 2001).

methods provide a logical framework for baselining an organization's current process capabilities (i.e., determining what practices are effectively implemented (strengths), not effectively implemented (weaknesses), or contain mixed or inconclusive evidence (observations)) and providing a structured plan for incremental process improvement.

Using SEI's software acquisition capability maturity model[SM] and SEI's software capability evaluation method,[2] GAO analysts trained at SEI evaluated HUD's software acquisition maturity in four of seven key process areas[3] that are necessary to attain a "repeatable" level of process maturity. The "repeatable" level of process maturity is the second level on SEI's five-level scale. An organization at the repeatable level of process maturity has the necessary process discipline in place to repeat earlier successes on similar projects. Organizations that do not satisfy the requirements for the repeatable level are by default judged to be at the "initial" level of maturity. This means that their processes are immature, ad hoc, and sometimes even chaotic, with few of the processes defined and success dependent mainly on the heroic efforts of individuals.

In this evaluation, GAO examined five ongoing projects selected by HUD as being representative of the department's current software acquisition practices.[4] These were the Public and Indian Housing Information Center system, the Real Estate Management System, the Resident Assessment Subsystem, HUD's Central Accounting and Program System, and the Empowerment Information System.

Results in Brief

HUD did not fully satisfy the requirements for any of the "repeatable" key process areas we reviewed. While HUD has several software acquisition

[2] Capability Maturity Model[SM] is the service mark of Carnegie Mellon University, and CMM is registered in the U.S. Patent and Trademark Office. GAO used *Software Acquisition Capability Maturity Model (SA-CMM) Version 1.2* (CMU/SEI-99-TR-002, April 1999), the latest version of the model.

[3] The four key process areas GAO evaluated are requirements development and management, project management, contract tracking and oversight, and software evaluation. GAO did not evaluate the remaining three key process areas—software acquisition planning, solicitation, and transition to support—because HUD's project teams had not recently performed activities in these areas.

[4] GAO also asked that the five projects be (1) major efforts with large software acquisition components, (2) managed by integrated project teams, (3) at different stages of the life cycle, and (4) among HUD's best managed projects.

process strengths, GAO found a large number of software process weaknesses in all key process areas evaluated: requirements development and management, project management, contract tracking and oversight, and software evaluation. As a result, its processes for acquiring software are immature and can be characterized as ad hoc, sometimes chaotic, and not repeatable across projects. These weaknesses can lead to systems that do not meet the information needs of management and staff, do not provide support for needed programs and operations, and cost more and take longer than expected to complete. HUD is aware that it has software acquisition weaknesses, has stated its commitment to improving its software and system acquisition processes, and will begin a process improvement effort in the near future.

Principal Finding: HUD's Software Acquisition Processes Are Immature

HUD did not meet the requirements for the repeatable level of maturity in the four key process areas we reviewed. Of the 310 key practices GAO evaluated, 50 percent constituted strengths (i.e., key practice was effectively implemented), 39 percent were weaknesses (i.e., key practice was not effectively implemented), 10 percent were rated as observations, and 1 percent were not rated.

Certain weaknesses were systemic, recurring in most or all of the key process areas. For example, HUD has no overall policy for the acquisition of software; the majority of project teams did not develop plans to conduct various activities; none of the teams measured the status of activities; the majority of the teams did not report regularly to management on progress and problems; and most project managers did not require regular reports on progress and problems. These weaknesses can lead to systems that do not meet HUD's information needs, do not effectively support HUD's programs and services, and cost more and take longer to complete.

To reach the repeatable level of maturity, HUD must overcome the key practice weaknesses identified in this report. Table 1 summarizes the strengths and weaknesses for the five projects.

Table 1: Total Number of Key Process Area Strengths, Weaknesses, and Observations for the Five Projects

	Key practice ratings			
Key process area	**Strengths**	**Weaknesses**	**Observations**	**Not rated**
Requirements development and management	27	31	12	0
Project management	45	25	10	0
Contract tracking and oversight	45	33	4	3
Evaluation	37	33	5	0
Total	**154**	**122**	**31**	**3**

HUD acknowledged that it has software acquisition weaknesses and stated its commitment to improving its software and system acquisition processes. The department has prepared a statement of work to obtain contractor support to begin a software process improvement effort. One of the tasks the contract will include is development of a software process improvement plan.

To successfully complete such an effort, HUD's plan must address several important issues. To be comprehensive, this plan should include the results of this review, measurable goals and time frames, estimates of resource requirements, and time frames to reach the repeatable level. In addition, it should address the systemic weaknesses that GAO found. Finally, the plan should include steps to address the key process areas GAO did not review, as well as steps to ensure that all ongoing and new software acquisition projects adopt processes that meet the requirements for the repeatable level.

Recommendations for Executive Action

To improve HUD's software acquisition capabilities, GAO recommends that the Secretary of Housing and Urban Development direct the HUD Chief Information Officer to develop and implement a comprehensive plan for software acquisition process improvement that is based on the software capability results in this report and specifies measurable goals and time frames, sets priorities for initiatives, estimates resource requirements (for trained staff and funding), and defines a process improvement management structure.

Also, to address the systemic weaknesses mentioned above, the plan should contain steps to

- develop a comprehensive policy for the acquisition of software,
- require plans for specific acquisition activities,
- measure and track the status of activities performed by the software acquisition teams, and
- report regularly to management on progress and problems.

In addition, to ensure that all aspects of software acquisition are addressed, we recommend that the Secretary direct the CIO to

- assess HUD's maturity in the three key process areas that could not be evaluated by GAO and include any needed improvement actions in the comprehensive plan for software acquisition process improvement;
- ensure that all new software acquisition projects in HUD adopt processes that satisfy at least SA-CMM level 2 requirements; and
- ensure that process improvement activities are initiated for all ongoing software acquisition projects.

Agency Comments

In providing written comments on a draft of our report, HUD agreed with our assessment of its software acquisition processes and our recommendations for strengthening them, and stated that our assessment and recommendations will be addressed as part of its process improvement effort. This effort should help the department improve its ability to acquire systems that meet management and staff information needs and efficiently support programs and operations.

Chapter 1: Introduction

The Department of Housing and Urban Development (HUD), established in 1965, has as its primary mission ensuring a decent, safe, and sanitary home and suitable living environment for every American. HUD's mission includes making housing affordable for about 4 million low-income households by insuring loans for multifamily rental housing and by providing rental assistance. Its mission also includes helping to revitalize over 4,000 localities through community development programs. The department encourages homeownership by providing, through its Federal Housing Administration, mortgage insurance for about 7 million homeowners who otherwise might not have qualified for loans. HUD is one of the nation's largest financial institutions, responsible for managing about $508 billion in insured mortgages and $570 billion in guarantees of mortgage-backed securities. HUD's budget in fiscal year 2001 was about $32 billion, including $360 million for information technology investments.

HUD Relies on Information Systems

Like many federal agencies, HUD relies on its information and financial management systems to help carry out its missions. However, past reports by us and others showed that HUD was plagued by poorly integrated, ineffective, and generally unreliable information systems that did not satisfy management needs or provide adequate controls.[1] We designated HUD's program areas as high risk in part because of widespread problems with information and financial management systems. In 1997, HUD began a management reform effort designed to transform its culture, manage its programs and staff more effectively, ultimately restore public trust in the department, and modernize it for the 21st century.

In January 2001, we reported that HUD had been making credible progress towards addressing its management reform goals.[2] However, we also reported that information and financial systems remained an area of management challenge because of unresolved issues. In addition, in its March 1, 2001, financial statement audit report, the Office of the HUD Inspector General listed two material internal control weaknesses related to systems. The report stated that HUD needs to (1) complete improvements to its financial management systems to meet its program and financial management needs and (2) enhance the Federal Housing

[1] GAO-01-248, January 2001; GAO/OCG-99-8, January 1999; GAO/HR-97-12, February 1997; GAO/HR-95-11, February 1995; GAO/AIMD-94-72R, January 27, 1994.

[2] GAO-01-248, January 2001.

Administration's information systems to more effectively support its business practices.

HUD is aware that information systems remain an area of challenge. To help address some of the challenges, HUD plans to (1) institute more disciplined processes in its information technology capital investment planning reviews (quarterly reviews that assess how well projects are functioning and attempt to alert management to potential problems), (2) continue training its project managers in new project management techniques, (3) complete efforts to bring all software products under standard change control and configuration management[3] and designate a separate organization to address configuration management issues, (4) improve HUD's end-to-end testing[4] capabilities, and (5) obtain and deploy new software for project-level status reporting.

To manage specific software acquisitions, HUD uses integrated project teams. These teams include representatives from the business organization(s) that will use the acquired software to do their work; information technology staff to oversee the contractor and review contractor work products; and contract and procurement staff to assist the team in contract management. Policy and procedures for software acquisition are the responsibility of HUD's Chief Information Officer.

[3] Configuration management is a discipline applying technical and administrative direction and surveillance to identify and document the functional and physical characteristics of hardware or software, control changes to these characteristics, record and report change processing, and verify compliance of hardware or software with specified requirements.

[4] End-to-end testing is done to verify that a defined set of interrelated systems, which collectively support an organizational core business area or function, interoperate as intended in an operational environment. This includes not only those systems owned and managed by the organization but also those external systems with which they interface.

The Software Acquisition Capability Maturity Model Provides a Means of Assessing an Organization's Ability to Manage Software Acquisitions

The software acquisition capability maturity model (SA-CMM),[5] developed by Carnegie Mellon's Software Engineering Institute (SEI), is used to measure an organization's capability to manage the acquisition of software. SEI's expertise in and methods for software process assessment are recognized and accepted worldwide throughout the industry. The model defines five levels of software acquisition maturity. Each level of maturity (except level 1) indicates process capability and identifies key process areas. For a maturity level to be achieved, all key process areas related to that level must be implemented effectively.

The first level of process capability is level 2 (referred to as the repeatable level), where basic management processes are established to track performance, cost, and schedule, and the necessary discipline is in place to repeat earlier successes on similar projects. Organizations that do not effectively implement all key process areas for the repeatable level are, by default, at level 1 or the initial level of maturity. Level 1 processes can be described as immature, ad hoc, and sometimes chaotic; success in software acquisition for these organizations is usually dependent upon the ability and commitment of the staff involved. Figure 1 explains further the five-level software acquisition model.

[5] *Software Acquisition Capability Maturity Model (SA-CMM)*, *Version 1.2*, Software Engineering Institute, CMU/SEI-99-TR-002 (April 1999).

Figure 1: SA-CMM Levels and Descriptions

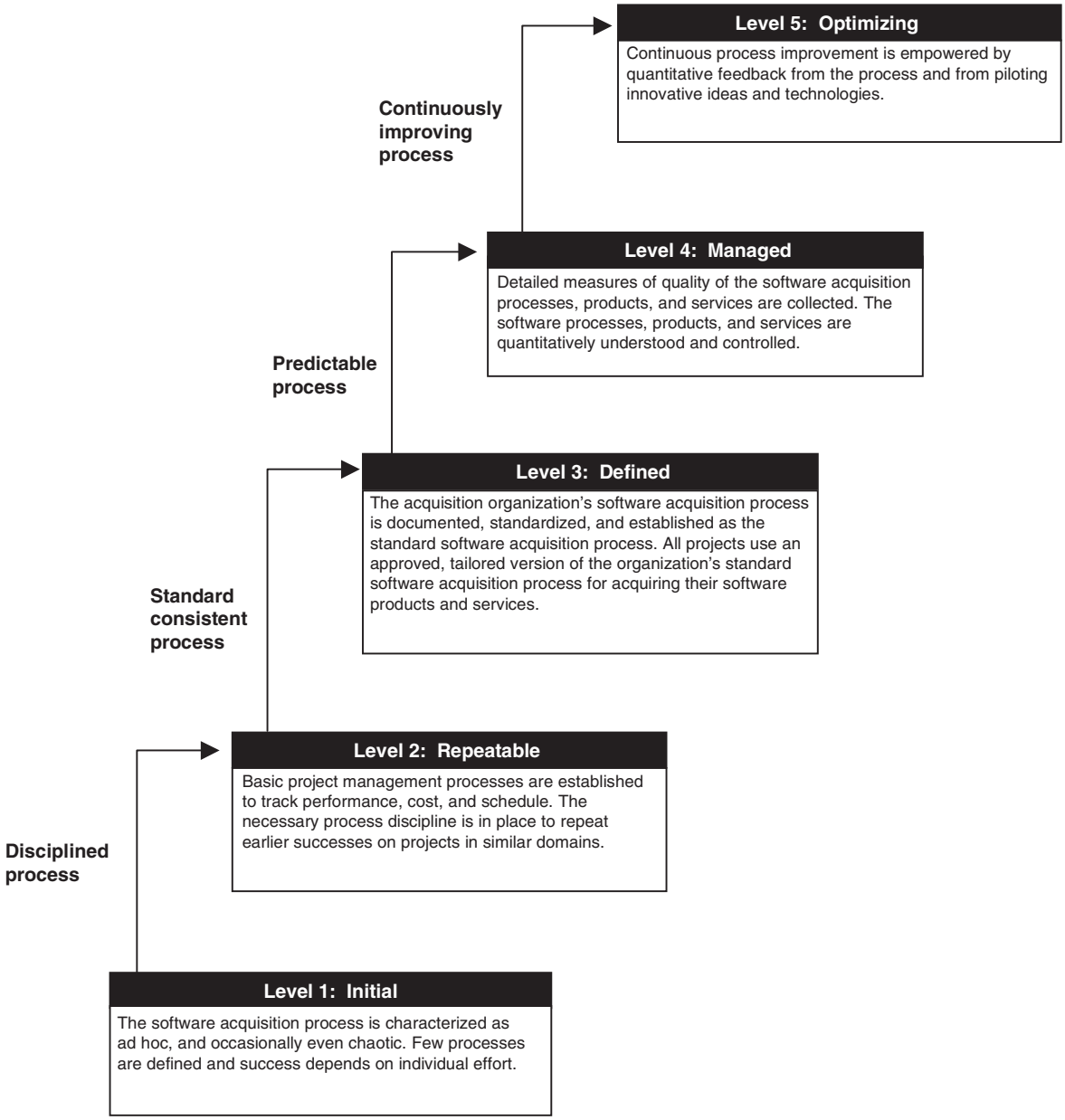

Table 2 identifies each of the seven key process areas associated with the repeatable level of maturity.

Table 2: Key Process Areas for SA-CMM Level 2

SA-CMM level 2 key process areas	Description
Software acquisition planning	Ensuring that reasonable planning for the software acquisition is conducted and that all elements of the project are included.
Solicitation	Ensuring that award is made to the contractor most capable of satisfying the specified requirements.
Requirements development and management	Establishing a common and unambiguous definition of software acquisition requirements that is understood by the acquisition team, system users, and contractor(s).
Project management	Managing the activities of the project office and supporting contractor(s) to ensure a timely, efficient, and effective software acquisition.
Contract tracking and oversight	Ensuring that the software activities under contract are being performed in accordance with contract requirements and that products and services will satisfy contract requirements.
Evaluation	Determining that the acquired software products and services satisfy contract requirements before acceptance.
Transition to support	Providing for the transition of the software products being acquired to their eventual support organization.

As established by the model, each key process area contains five common features—commitment to perform, ability to perform, activities performed, measurement and analysis, and verifying implementation—that indicate whether the implementation and institutionalization of the key process area can be effective, repeatable, and lasting. The common feature definitions are as follows:

- *Commitment to perform*: This feature describes the actions that the organization takes to establish the process and ensure that it can endure. Key practices typically involve establishing organizational policies and sponsorship.
- *Ability to perform*: This feature describes the preconditions that must exist in the project or organization to competently implement the software acquisition process. Key practices typically include assigning responsibility and providing training.
- *Activities performed*: This feature describes the roles and procedures necessary to implement a key process area. Key practices typically involve establishing plans and procedures, performing the work, tracking it, and taking appropriate management actions.
- *Measurement and analysis*: This feature describes the activities necessary to measure progress and analyze the measurements. Key practices typically involve defining the measurements to be taken and the

analyses to be conducted to determine the status and effectiveness of the activities performed.

- *Verifying implementation*: This feature describes the steps the organization must take to ensure that project activities are performed in accordance with established processes. Key practices typically involve regular reviews by management.

Each common feature consists of a number of key practices—specific activities such as developing an organizational policy for software acquisition, developing various plans for software acquisition activities, and tracking a contractor's progress. When an organization is evaluated against the SA-CMM, comparisons of actual performance against a key practice can result in one of four possible outcomes or ratings:

- Strength: The key practice involved was effectively implemented.
- Weakness: The key practice was ineffectively implemented or was not implemented.
- Observation: The key practice was evaluated, but cannot be characterized as a strength because the (1) project team did not provide sufficient evidence to support a strength rating or (2) key practice was only partially performed.
- Not rated: The key practice is not relevant to the project and was therefore not rated.

To achieve the repeatable level, HUD would have to demonstrate that the key practices related to that level were implemented effectively in its software acquisition projects.

Objective, Scope, and Methodology

The Ranking Minority Member of the Subcommittee on Housing and Transportation, Senate Committee on Banking, Housing, and Urban Affairs, requested that we review HUD's software acquisition capabilities. Our objective for this review was to determine the maturity of HUD's software acquisition processes.

To determine HUD's software acquisition process maturity, we applied the Software Engineering Institute's SA-CMM using our SEI-trained analysts. We focused on the key process areas necessary to obtain a repeatable level of maturity, the second level of SEI's five-level model. We met with project managers and project team members to determine whether and to

what extent they implemented each key practice and to obtain relevant documentation. In accordance with the SEI model, for each key process area we reviewed,[6] we evaluated HUD's institutional policies and practices and compared project-specific guidance and practices against the required key practices.

More specifically, for each key practice we reviewed, we compared project-specific documentation and practices against the criteria in the software acquisition model. If the project met the criteria for the key practice reviewed, we rated it as a strength. If the project did not meet the criteria for the key practice reviewed, we rated it as a weakness. If the evidence did not support a rating of a strength or a weakness, we rated it as an observation. If the key practice was not relevant to a project, we stated that the key practice was not rated.

We evaluated five HUD projects, each of which is described below. We asked HUD to select five system acquisition projects that were representative of HUD software acquisition practices and met the following criteria: all were (1) major efforts with large software acquisition components, (2) managed by integrated project teams, (3) at different stages of the life cycle, and (4) among the best-managed acquisitions. HUD selected the following projects:

- Public and Indian Housing Information Center system (PIC)—an Internet-based system that collects information about the public housing inventory managed by HUD and automates the processes for allocating program funds to public housing authorities. It is a central repository for information about public and Indian housing events and program areas as well as for the housing inventory.
- Real Estate Management System (REMS)—a system that provides automated support to collect and maintain data on multifamily insured and assisted properties and their ownership/management entities and provides access to data collected by HUD on physical and financial assessments.

[6]We evaluated HUD on four of the seven key process areas—requirements development and management, project management, contract tracking and oversight, and software evaluation. We did not evaluate HUD on the three other key process areas—software acquisition planning, solicitation, and transition to support—because these were not recently performed for the selected projects.

- Resident Assessment Subsystem (RASS)—a system that collects information on public housing from residents and manages the resident assessment process.
- HUD Central Accounting and Program System (HUDCAPS)—HUD's core accounting and general ledger system. It serves as the standard accounting system for all program areas.
- Empowerment Information System (EIS)—an enterprisewide data warehouse project that is to provide HUD users and business partners with access to reports and analytical information across a large variety of program data sources.

We performed our work from March 2001 through August 2001 in accordance with generally accepted government auditing standards. We provided a draft of our report to HUD for review, and the department's comments are addressed in chapter 6 and reprinted as appendix I.

Chapter 2: HUD's Requirements Development and Management Processes Are Not Repeatable

HUD did not satisfy the criteria for the repeatable level of maturity in this key process area because of the number and severity of key practice weaknesses found. As a result of these weaknesses, HUD is at greater risk of acquiring software products that do not meet mission needs and that exceed cost, schedule, and performance goals.

The purpose of requirements development and management is to establish and maintain a common and unambiguous definition of software requirements[1] among the acquisition team, system users, and software development contractor. Within this key process area, the SA-CMM specifies key practices for each of the five common features that an organization must implement effectively to achieve the repeatable level of maturity. Generally, these practices include having a written organizational policy for establishing and managing requirements allocated to software, documenting plans for the development and management of requirements, having documented processes for requirements development, including elicitation, analysis, and verification, measuring and reporting on the status of activities to management, appraising the impact of system-level requirements changes on the software, and having a mechanism to ensure that contractor-delivered work products meet the specified requirements.

Of the 70 key practices for this key process area, HUD had 27 strengths, 31 weaknesses and 12 observations. For the

- Commitment to perform feature, there were two strengths, five weaknesses, and three observations.
- Ability to perform feature, there were nine strengths, five weaknesses, and one observation.
- Activities performed feature, there were ten strengths, 14 weaknesses, and six observations.
- Measurement and analysis feature, there were one strength, three weaknesses, and one observation.
- Verifying implementation feature, there were five strengths, four weaknesses, and one observation.

In addition, none of the projects had strengths in all the key practices.

[1] Requirements describe the functions that the software will perform to meet user needs and provide support for business processes.

As a result of these weaknesses, HUD is exposed to increased risks that acquired software will not meet its needs and that projects will exceed cost, schedule, and performance goals. HUD acknowledges the need to improve its requirements development and management processes and is committed to improving its software and systems acquisition capability. The department has prepared a statement of work to obtain contractor support to begin a software process improvement effort. This document specifies that the contractor would review HUD software acquisition processes, prioritize the key processes and practices to address, and develop a plan to improve HUD's acquisition processes.

Details of our evaluation are provided in the following figure and tables. Figure 2 provides a comprehensive listing of the strengths, weaknesses, and observations for the requirements development and management key process area. The specific findings supporting the practice ratings cited in figure 2 are in tables 3 through 7.

Figure 2: Requirements Development and Management Summary

Common features	Key practices	Projects				
		PIC	REMS	RASS	HUDCAPS	EIS
Commitment to perform 1	The acquisition organization has a written policy for establishing and managing the software-related contractual requirements.	Weakness	Weakness	Observation	Observation	Weakness
Commitment to perform 2	Responsibility has been designated for requirements development and management activities.	Weakness	Strength	Strength	Observation	Weakness
Ability to perform 1	A group is responsible for performing requirements development and management activities.	Weakness	Strength	Strength	Observation	Strength
Ability to perform 2	Adequate resources are provided for requirements development and management activities.	Weakness	Weakness	Strength	Weakness	Weakness
Ability to perform 3	Individuals performing requirements development and management activities have experience or receive training.	Strength	Strength	Strength	Strength	Strength
Activity performed 1	The project team performs its activities in accordance with its documented requirements development and management plans.	Weakness	Observation	Strength	Weakness	Weakness
Activity performed 2	The project team develops, baselines, and maintains software-related contractual requirements and places them under change control early in the project, but not later than the release of the solicitation package.	Observation	Weakness	Strength	Strength	Observation
Activity performed 3	The project team appraises system requirements change requests for their impact on the software being acquired.	Weakness	Weakness	Strength	Strength	Weakness
Activity performed 4	The project team appraises changes to the software-related contractual requirements for their impact on performance, architecture, supportability, system resource utilization, and contract schedule and cost.	Weakness	Weakness	Strength	Weakness	Weakness
Activity performed 5	Bidirectional traceability between the contractual requirements and the contractor team's software products and services is maintained throughout the effort.	Observation	Weakness	Strength	Strength	Weakness
Activity performed 6	The end user and other affected groups are involved in the development of all software-related contractual requirements and any subsequent change activity.	Observation	Strength	Strength	Observation	Weakness
Measurement and analysis 1	Measurements are made and used to determine the status of the requirements development and management activities and resultant products.	Weakness	Weakness	Observation	Weakness	Strength
Verifying implementation 1	Requirements development and management activities are reviewed by the acquisition organization on a periodic basis.	Strength	Observation	Weakness	Strength	Strength
Verifying implementation 2	Requirements development and management activities are reviewed by the project manager on both a periodic and an event-driven basis.	Weakness	Strength	Weakness	Strength	Weakness

Key		
	Strength	Strength: Key practice effectively implemented.
	Weakness	Weakness: Key practice not effectively implemented.
	Observation	Observation: Key practice evaluated; evidence not sufficient to rate as a strength, or practice only partially performed.

Table 3: Requirements Development and Management Findings for the Public and Indian Housing Information Center System

Public and Indian Housing Information Center system			
Common feature	**Key practice**	**Finding**	**Rating**
Commitment to perform 1	The acquisition organization has a written policy for establishing and managing the software-related contractual requirements.	HUD has no written policy for establishing and managing software-related contractual requirements.	Weakness
Commitment to perform 2	Responsibility has been designated for requirements development and management activities.	Responsibility for requirements development and management has not been designated.	Weakness
Ability to perform 1	A group is responsible for performing requirements development and management activities.	No group is assigned responsibility for performing requirements development and management.	Weakness
Ability to perform 2	Adequate resources are provided for requirements development and management activities.	There is no mechanism to identify resource needs and ensure that they are provided to the project. Team members indicated that they do not have adequate resources for performing these activities.	Weakness
Ability to perform 3	Individuals performing requirements development and management activities have experience or receive training.	Project team members performing requirements development and management activities have experience.	Strength
Activity performed 1	The project team performs its activities in accordance with its documented requirements development and management plans.	There is no requirements development and management plan, and so the activities are not performed in accordance with it.	Weakness
Activity performed 2	The project team develops, baselines, and maintains software-related contractual requirements and places them under change control early in the project, but not later than the release of the solicitation package.	The project team developed and baselined software-related requirements before the solicitation package was released. The project team provided no evidence of change control.	Observation
Activity performed 3	The project team appraises system requirements change requests for their impact on the software being acquired.	The project team does not assess system requirements change requests for their impact on the software being acquired.	Weakness
Activity performed 4	The project team appraises changes to the software-related contractual requirements for their impact on performance, architecture, supportability, system resource utilization, and contract schedule and cost.	The project team does not assess the impact of software-related contractual requirements changes on performance, architecture, supportability, and resource utilization. Cost and schedule impacts are assessed.	Weakness
Activity performed 5	Bidirectional traceability between the contractual requirements and the contractor team's software products and services is maintained throughout the effort.	The project team maintains traceability between the contract deliverables and the contractor's task/subtask specification numbering. Traceability to HUD's original requirements, however, is not maintained.	Observation
Activity performed 6	The end user and other affected groups are involved in the development of all software-related contractual requirements and any subsequent change activity.	End users are involved in identifying software-related requirements for development but are not involved in subsequent change activities.	Observation

Public and Indian Housing Information Center system			
Common feature	**Key practice**	**Finding**	**Rating**
Measurement and analysis 1	Measurements are made and used to determine the status of the requirements development and management activities and resultant products.	No measurements are made of HUD's requirements development and management activities and resultant products.	Weakness
Verifying implementation 1	Requirements development and management activities are reviewed by the acquisition organization on a periodic basis.	Project status, including requirements development and management activities, is reviewed quarterly by acquisition management.	Strength
Verifying implementation 2	Requirements development and management activities are reviewed by the project manager on both a periodic and an event-driven basis.	The project manager is not briefed on project activities and the project manager's reviews are not documented.	Weakness

Table 4: Requirements Development and Management Findings for the Real Estate Management System

Real Estate Management System			
Common feature	**Key practice**	**Finding**	**Rating**
Commitment to perform 1	The acquisition organization has a written policy for establishing and managing the software-related contractual requirements.	HUD has no written policy for establishing and managing software-related contractual requirements.	Weakness
Commitment to perform 2	Responsibility has been designated for requirements development and management activities.	Responsibility for requirements development and management activities is designated in the project plan.	Strength
Ability to perform 1	A group is responsible for performing requirements development and management activities.	End users and project staff are responsible for performing requirements development and management activities.	Strength
Ability to perform 2	Adequate resources are provided for requirements development and management activities.	There is no mechanism to identify resource needs and ensure that they are provided to the project. The project manager said that the team does not have adequate resources for performing these activities.	Weakness
Ability to perform 3	Individuals performing requirements development and management activities have experience or receive training.	Project team members performing requirements development and management activities have experience.	Strength
Activity performed 1	The project team performs its activities in accordance with its documented requirements development and management plans.	There is no requirements development and management plan, and so the activities are not performed in accordance with it. The team does follow a process for requirements gathering.	Observation
Activity performed 2	The project team develops, baselines, and maintains software-related contractual requirements and places them under change control early in the project, but not later than the release of the solicitation package.	The project team did not baseline requirements before solicitation. Task orders do not show traceability to software-related requirements.	Weakness
Activity performed 3	The project team appraises system requirements change requests for their impact on the software being acquired.	The project team does not appraise system requirements change requests for their impact on the software being acquired.	Weakness
Activity performed 4	The project team appraises changes to the software-related contractual requirements for their impact on performance, architecture, support-ability, system resource utilization, and contract schedule and cost.	The project team does not assess the impact of software-related contractual requirements changes on performance, architecture, supportability, and resource utilization. Cost and schedule are assessed.	Weakness
Activity performed 5	Bidirectional traceability between the contractual requirements and the contractor team's software products and services is maintained throughout the effort.	The project team does not maintain bidirectional traceability between the contractual requirements and contractor work products.	Weakness

Real Estate Management System			
Common feature	**Key practice**	**Finding**	**Rating**
Activity performed 6	The end user and other affected groups are involved in the development of all software-related contractual requirements and any subsequent change activity.	End users are involved in the development of and changes to software-related contractual requirements.	Strength
Measurement and analysis 1	Measurements are made and used to determine the status of the requirements development and management activities and resultant products.	No measurements are made of HUD's requirements development and management activities and resultant products.	Weakness
Verifying implementation 1	Requirements development and management activities are reviewed by the acquisition organization on a periodic basis.	Requirements development and management activities are not routinely reviewed by the acquisition organization. However, the project manager is a senior official of the acquisition organization.	Observation
Verifying implementation 2	Requirements development and management activities are reviewed by the project manager on both a periodic and an event-driven basis.	The project manager told us that he participates in biweekly status meetings that include a review of requirements development and management issues. The status meetings are documented.	Strength

Table 5: Requirements Development and Management Findings for the Resident Assessment Subsystem

Resident Assessment Subsystem			
Common feature	**Key practice**	**Finding**	**Rating**
Commitment to perform 1	The acquisition organization has a written policy for establishing and managing the software-related contractual requirements.	HUD has no written policy for establishing and managing software-related contractual requirements. The project team used HUD's software development methodology as its standard for establishing and managing software-related contractual requirements.	Observation
Commitment to perform 2	Responsibility has been designated for requirements development and management activities.	Responsibility for requirements development and management is designated in the project plan.	Strength
Ability to perform 1	A group is responsible for performing requirements development and management activities.	The project team is responsible for performing requirements development and management activities.	Strength
Ability to perform 2	Adequate resources are provided for requirements development and management activities.	There is no mechanism to identify resource needs and ensure that they are provided to the project. However, the project manager stated that they do have adequate resources for performing requirements development and management activities.	Strength
Ability to perform 3	Individuals performing requirements development and management activities have experience or receive training.	Project team members performing requirements development and management activities have experience and have received training.	Strength
Activity performed 1	The project team performs its activities in accordance with its documented requirements development and management plans.	The project team performs its activities in accordance with its requirements development and management plan.	Strength
Activity performed 2	The project team develops, baselines, and maintains software-related contractual requirements and places them under change control early in the project, but not later than the release of the solicitation package.	The project team developed and baselined contract requirements in its functional requirements document and requirements traceability matrix, and placed the requirements under change control.	Strength
Activity performed 3	The project team appraises system requirements change requests for their impact on the software being acquired.	The project team assesses system requirements change requests for their impact on the software being acquired.	Strength
Activity performed 4	The project team appraises changes to the software-related contractual requirements for their impact on performance, architecture, support-ability, system resource utilization, and contract schedule and cost.	The project team appraises changes to the software-related contractual requirements for impact on performance, architecture, support-ability, system resource utilization, and contract schedule and cost.	Strength

Resident Assessment Subsystem			
Common feature	**Key practice**	**Finding**	**Rating**
Activity performed 5	Bidirectional traceability between the contractual requirements and the contractor team's software products and services is maintained throughout the effort.	The project team maintains bidirectional traceability between contractual requirements and contractor work products.	Strength
Activity performed 6	The end user and other affected groups are involved in the development of all software-related contractual requirements and any subsequent change activity.	End users are involved in the development of contractual requirements, generation of system change requests, and testing.	Strength
Measurement and analysis 1	Measurements are made and used to determine the status of the requirements development and management activities and resultant products.	Masurements are only made of HUD's requirements development and management products.	Observation
Verifying implementation 1	Requirements development and management activities are reviewed by the acquisition organization on a periodic basis.	Requirements development and management activities are not routinely reviewed by the acquisition organization. However, cost and schedule performance is reviewed periodically by the acquisition organization.	Weakness
Verifying implementation 2	Requirements development and management activities are reviewed by the project manager on both a periodic and an event-driven basis.	The project manager is not briefed on requirements development and management activities, and the project manager's reviews are not documented.	Weakness

Table 6: Requirements Development and Management Findings for HUD's Central Accounting and Program System

HUD's Central Accounting and Program System			
Common feature	**Key practice**	**Finding**	**Rating**
Commitment to perform 1	The acquisition organization has a written policy for establishing and managing the software-related contractual requirements.	HUD has no written policy for establishing and managing the software-related contractual requirements. The project team used HUD's software development methodology as its standard for establishing and managing software-related contractual requirements.	Observation
Commitment to perform 2	Responsibility has been designated for requirements development and management activities.	The project team has been designated responsible for requirements development and management, with no specific designation of what group or person within the team.	Observation
Ability to perform 1	A group is responsible for performing requirements development and management activities.	The project manager told us that the project team is responsible for requirements development and management activities.	Observation
Ability to perform 2	Adequate resources are provided for requirements development and management activities.	There is no mechanism to identify resource needs and ensure that they are provided to the project. The project team indicated that they do not have adequate resources for performing requirements development and management activities.	Weakness
Ability to perform 3	Individuals performing requirements development and management activities have experience or receive training.	Project team members performing requirements development and management activities have experience and have received training.	Strength
Activity performed 1	The project team performs its activities in accordance with its documented requirements development and management plans.	There is no requirements development and management plan, and so the activities are not performed in accordance with it.	Weakness
Activity performed 2	The project team develops, baselines, and maintains software-related contractual requirements and places them under change control early in the project, but not later than the release of the solicitation package.	The project team developed and baselined software-related contractual requirements before the contractor began work, and has maintained the requirements under configuration board control.	Strength
Activity performed 3	The project team appraises system requirements change requests for their impact on the software being acquired.	The project team assesses all system requirements change requests for their impact on the software being acquired.	Strength
Activity performed 4	The project team appraises changes to the software-related contractual requirements for their impact on performance, architecture, support-ability, system resource utilization, and contract schedule and cost.	The project team does not assess the impact of software-related contractual requirements changes on performance, architecture, supportability, and system resource utilization. Cost is appraised.	Weakness

HUD's Central Accounting and Program System			
Common feature	**Key practice**	**Finding**	**Rating**
Activity performed 5	Bidirectional traceability between the contractual requirements and the contractor team's software products and services is maintained throughout the effort.	The project team maintains bidirectional traceability between the contractual requirements and the contractor team's software products and services.	Strength
Activity performed 6	The end user and other affected groups are involved in the development of all software-related contractual requirements and any subsequent change activity.	End users and an independent verification and validation team were involved in testing of changes. No evidence was provided to document user activity in the development of requirements.	Observation
Measurement and analysis 1	Measurements are made and used to determine the status of the requirements development and management activities and resultant products.	No measurements are made of HUD's requirements development and management activities or resultant products.	Weakness
Verifying implementation 1	Requirements development and management activities are reviewed by the acquisition organization on a periodic basis.	Acquisition management is regularly updated on project status, including requirements development and maintenance activities.	Strength
Verifying implementation 2	Requirements development and management activities are reviewed by the project manager on both a periodic and an event-driven basis.	Project manager has regular, documented meetings to review requirements development and management activities.	Strength

Table 7: Requirements Development and Management Findings for the Empowerment Information System

Empowerment Information System			
Common feature	**Key practice**	**Finding**	**Rating**
Commitment to perform 1	The acquisition organization has a written policy for establishing and managing the software-related contractual requirements.	HUD has no written policy for establishing and managing software-related contractual requirements.	Weakness
Commitment to perform 2	Responsibility has been designated for requirements development and management activities.	Responsibility for requirements development and management has not been designated.	Weakness
Ability to perform 1	A group is responsible for performing requirements development and management activities.	The project team is responsible for performing these activities.	Strength
Ability to perform 2	Adequate resources are provided for requirements development and management activities.	There is no mechanism to identify resource needs and ensure that they are provided to the project. The project team stated that they do not have adequate resources for performing requirements development and management activities.	Weakness
Ability to perform 3	Individuals performing requirements development and management activities have experience or receive training.	Project team members have training in IT project management, including requirements management.	Strength
Activity performed 1	The project team performs its activities in accordance with its documented requirements development and management plans.	There is no requirements development and management plan, and so the activities are not performed in accordance with it.	Weakness
Activity performed 2	The project team develops, baselines, and maintains software-related contractual requirements and places them under change control early in the project, but not later than the release of the solicitation package.	The project team developed high-level requirements. Detailed requirements were developed by the contractor. No evidence was provided regarding change control.	Observation
Activity performed 3	The project team appraises system requirements change requests for their impact on the software being acquired.	The project team does not appraise system requirements changes for their impact on the software being acquired.	Weakness
Activity performed 4	The project team appraises changes to the software-related contractual requirements for their impact on performance, architecture, supportability, system resource utilization, and contract schedule and cost.	The project team does not assess the impact of software-related contractual requirements changes on performance, architecture, supportability, system resource utilization, and contract schedule and cost.	Weakness
Activity performed 5	Bidirectional traceability between the contractual requirements and the contractor team's software products and services is maintained throughout the effort.	The project team does not maintain bidirectional traceability between the contractual requirements and contractor work products.	Weakness

Empowerment Information System			
Common feature	**Key practice**	**Finding**	**Rating**
Activity performed 6	The end user and other affected groups are involved in the development of all software-related contractual requirements and any subsequent change activity.	No end users were involved in requirements development or subsequent change activities.	Weakness
Measurement and analysis 1	Measurements are made and used to determine the status of the requirements development and management activities and resultant products.	Measurements are made that identify the status of requirements development and management activities.	Strength
Verifying implementation 1	Requirements development and management activities are reviewed by the acquisition organization on a periodic basis.	Requirements development and management activities are reviewed periodically by the acquisition organization.	Strength
Verifying implementation 2	Requirements development and management activities are reviewed by the project manager on both a periodic and an event-driven basis.	The project manager told us that he is not briefed on activities, and the project manager's reviews are not documented.	Weakness

Chapter 3: HUD's Project Management Processes Are Not Repeatable

HUD did not meet the criteria for the repeatable level in the project management key process area because of the number and severity of key practice weaknesses found. These weaknesses increase the risk that the software acquisition project, the project team, and supporting contractors will not be adequately managed, resulting in software that does not meet mission needs or acquisitions that do not meet cost, schedule, and performance goals.

The purpose of project management is to direct and oversee the activities of the project team and supporting contractors to ensure a timely, efficient, and effective software acquisition. Within this key process area, the SA-CMM specifies key practices for each of the five common features that an organization must implement effectively to achieve the repeatable level of maturity. Generally, these practices include having a project team organized to accomplish the project's objective; having a written policy for the management of the project; documenting plans for the activities of the project team; measuring and controlling the cost, schedule, and performance objectives throughout the software acquisition; and reporting to management periodically on the status of project management activities.

Of the 80 key practices for this key process area, HUD had 45 strengths, 25 weaknesses, and 10 observations. For the

- Commitment to perform feature, there were four strengths and six weaknesses.
- Ability to perform feature, there were 14 strengths, four weaknesses, and two observations.
- Activities performed feature, there were 22 strengths, seven weaknesses, and six observations.
- Measurement and analysis feature, there were no strengths, four weaknesses, and one observation.
- Verifying implementation feature, there were five strengths, four weaknesses, and one observation.

In addition, none of the projects had strengths in all the key practices.

As a result of these weaknesses, HUD is exposed to increased risks that software acquisition projects will exceed cost, schedule, and performance goals, and that acquired software will not meet mission needs. HUD acknowledges the need to improve its project management processes and is committed to improving its software and system acquisition capability. The department has prepared a statement of work to obtain contract

support to begin a software process improvement effort. This document specifies that the contractor would review HUD software acquisition processes, prioritize the key processes and practices to address, and develop a plan to improve HUD's acquisition processes.

Details of our evaluation are provided in the following figure and tables. Figure 3 provides a comprehensive listing of the strengths, weaknesses, and observations for the project management key process area. The specific findings supporting the practice ratings cited in figure 3 are in tables 8 through 12.

Figure 3: Project Management Summary

Common features	Key practices	Projects				
		PIC	REMS	RASS	HUDCAPS	EIS
Commitment to perform 1	The acquisition organization has a written policy for management of the software acquisition project.	Weakness	Weakness	Weakness	Weakness	Weakness
Commitment to perform 2	Responsibility has been designated for project management activities.	Weakness	Strength	Strength	Strength	Strength
Ability to perform 1	A group is responsible for managing software acquisition activities.	Observation	Strength	Strength	Strength	Strength
Ability to perform 2	Adequate resources for the project team are provided for the duration of the project.	Weakness	Weakness	Strength	Weakness	Weakness
Ability to perform 3	When project trade-offs are necessary, the project manager is permitted to alter the software acquisition cost, schedule, or performance.	Strength	Strength	Strength	Strength	Strength
Ability to perform 4	Individuals performing software acquisition management activities have experience or receive training.	Strength	Observation	Strength	Strength	Strength
Activity performed 1	The project team performs its activities in accordance with its documented software acquisition plans.	Observation	Strength	Strength	Strength	Strength
Activity performed 2	The roles, responsibilities, and authority of the project function are documented, maintained, and communicated to affected groups.	Weakness	Observation	Strength	Strength	Strength
Activity performed 3	The project team's commitments, and changes to commitments, are communicated to affected groups.	Observation	Strength	Strength	Strength	Strength
Activity performed 4	The project team tracks the cost, schedule, resource, and technical risks of the project.	Observation	Weakness	Strength	Weakness	Strength
Activity performed 5	The project team tracks project issues, status, execution, funding, and expenditures against project plans and takes action.	Observation	Strength	Strength	Strength	Strength
Activity performed 6	The project team implements a corrective action system for the identification, recording, tracking, and correction of problems discovered during the software acquisition.	Weakness	Observation	Strength	Strength	Strength
Activity performed 7	The project team keeps its plans current during the life of the project as replanning occurs, issues are resolved, and new risks are discovered.	Weakness	Weakness	Strength	Weakness	Strength
Measurement and analysis 1	Measurements are made and used to determine the status of the project management activities and resultant products.	Weakness	Weakness	Observation	Weakness	Weakness
Verifying implementation 1	Project management activities are reviewed by the acquisition organization on a periodic basis.	Strength	Weakness	Strength	Strength	Strength
Verifying implementation 2	Project management activities are reviewed by the project manager on both a periodic and an event-driven basis.	Weakness	Observation	Weakness	Strength	Weakness

Key		
	Strength	Strength: Key practice effectively implemented.
	Weakness	Weakness: Key practice not effectively implemented.
	Observation	Observation: Key practice evaluated; evidence not sufficient to rate as a strength, or practice only partially performed.

Table 8: Project Management Findings for the Public and Indian Housing Information Center System

Public and Indian Housing Information Center system			
Common feature	**Key practice**	**Finding**	**Rating**
Commitment to perform 1	The acquisition organization has a written policy for management of the software acquisition project.	HUD has no written policy for managing the acquisition of software products and services.	Weakness
Commitment to perform 2	Responsibility has been designated for project management activities.	The project team told us that project management responsibilities had been assigned, but no documentation was provided to support this statement.	Weakness
Ability to perform 1	A group is responsible for managing software acquisition activities.	The project team told us that IT and business project leads and support staff are responsible for managing software acquisition activities, but no documentation was provided to support this statement.	Observation
Ability to perform 2	Adequate resources for the project team are provided for the duration of the project.	There is no mechanism to identify resource needs and ensure that they are provided to the project. Team members indicated that the team does not have adequate resources for conducting project management activities.	Weakness
Ability to perform 3	When project trade-offs are necessary, the project manager is permitted to alter the software acquisition cost, schedule, or performance.	The project manager is permitted to alter schedule or performance to ensure that annual project budgets are not exceeded.	Strength
Ability to perform 4	Individuals performing software acquisition management activities have experience or receive training.	Project team members performing project management activities have experience and project management training.	Strength
Activity performed 1	The project team performs its activities in accordance with its documented software acquisition plans.	The project team told us they did develop project management plans, but no documentation was provided to support this statement.	Observation
Activity performed 2	The roles, responsibilities, and authority of the project function are documented, maintained, and communicated to affected groups.	The project team has not documented the roles, responsibilities, and authority of its members.	Weakness
Activity performed 3	The project team's commitments, and changes to commitments, are communicated to affected groups.	The commitments and changes to commitments are communicated during small informal group meetings, but they are not documented and no records are kept.	Observation
Activity performed 4	The project team tracks the cost, schedule, resource, and technical risks of the project.	Cost and schedule are tracked, but resource and technical risks of the project are not tracked.	Observation
Activity performed 5	The project team tracks project issues, status, execution, funding, and expenditures against project plans and takes action.	The project team only tracks and takes action on changes to the project schedule.	Observation

Public and Indian Housing Information Center system			
Common feature	**Key practice**	**Finding**	**Rating**
Activity performed 6	The project team implements a corrective action system for the identification, recording, tracking, and correction of problems discovered during the software acquisition.	The project team does not maintain a corrective action system for the identification, recording, tracking, and correction of problems discovered during the software acquisition.	Weakness
Activity performed 7	The project team keeps its plans current during the life of the project as replanning occurs, issues are resolved, and new risks are discovered.	The project team does not keep its plans up to date over the life of the project.	Weakness
Measurement and analysis 1	Measurements are made and used to determine the status of the project management activities and resultant products.	No measurements are made of HUD's project management activities or resultant products.	Weakness
Verifying implementation 1	Project management activities are reviewed by the acquisition organization on a periodic basis.	Acquisition management reviews project activities quarterly.	Strength
Verifying implementation 2	Project management activities are reviewed by the project manager on both a periodic and an event-driven basis.	The project manager stated that while he meets with members of his staff daily to discuss the status of the project, meeting results and action items are not documented.	Weakness

Table 9: Project Management Findings for the Real Estate Management System

Real Estate Management System			
Common feature	**Key practice**	**Finding**	**Rating**
Commitment to perform 1	The acquisition organization has a written policy for management of the software acquisition project.	HUD has no written policy for managing the acquisition of software products and services.	Weakness
Commitment to perform 2	Responsibility has been designated for project management activities.	Responsibility for project management activities has been assigned to the project manager in the project management plan.	Strength
Ability to perform 1	A group is responsible for managing software acquisition activities.	The project manager, along with business and IT support staff, is responsible for project management activities.	Strength
Ability to perform 2	Adequate resources for the project team are provided for the duration of the project.	There is no mechanism to identify resource needs and ensure that they are provided to the project. The project manager stated that the team does not have adequate resources for conducting project management activities.	Weakness
Ability to perform 3	When project trade-offs are necessary, the project manager is permitted to alter the software acquisition cost, schedule, or performance.	The project manager is permitted to alter schedule or performance to ensure that annual project budgets are not exceeded.	Strength
Ability to perform 4	Individuals performing software acquisition management activities have experience or receive training.	The project team told us that individuals performing project management activities have experience and have had training. However, the team did not provide documentation to support this statement.	Observation
Activity performed 1	The project team performs its activities in accordance with its documented software acquisition plans.	Software acquisition project management plans are used to guide the activities of the project team.	Strength
Activity performed 2	The roles, responsibilities, and authority of the project function are documented, maintained, and communicated to affected groups.	Roles and responsibilities are defined in the project plan; however, responsible team members are not named, which hinders effective communication of this information.	Observation
Activity performed 3	The project team's commitments, and changes to commitments, are communicated to affected groups.	The commitments, and changes to commitments, are communicated to affected groups through weekly status meetings, emails, and telephone conversations.	Strength
Activity performed 4	The project team tracks the cost, schedule, resource, and technical risks of the project.	The project team does not track risks related to cost, schedule, resource, and technical aspects of the project.	Weakness
Activity performed 5	The project team tracks project issues, status, execution, funding, and expenditures against project plans and takes action.	The project manager tracks project status, execution, funding, and expenditures, and changes the scope or schedule if necessary.	Strength

Real Estate Management System			
Common feature	**Key practice**	**Finding**	**Rating**
Activity performed 6	The project team implements a corrective action system for the identification, recording, tracking, and correction of problems discovered during the software acquisition.	The project team does not maintain a corrective action system for the identification, recording, tracking, and correction of problems discovered during the software acquisition. Minutes of biweekly status meetings identify action items and who is responsible for each item.	Observation
Activity performed 7	The project team keeps its plans current during the life of the project as replanning occurs, issues are resolved, and new risks are discovered.	The project team does not keep its plans up to date over the life of the project.	Weakness
Measurement and analysis 1	Measurements are made and used to determine the status of the project management activities and resultant products.	No measurements are made of HUD's project management activities or resultant products.	Weakness
Verifying implementation 1	Project management activities are reviewed by the acquisition organization on a periodic basis.	Acquisition management does not regularly review project management activities.	Weakness
Verifying implementation 2	Project management activities are reviewed by the project manager on both a periodic and an event-driven basis.	The project manager is involved with the project, and status meetings are held regularly; however, the project manager's reviews are not documented.	Observation

Table 10: Project Management Findings for the Resident Assessment Subsystem

Resident Assessment Subsystem			
Common feature	**Key practice**	**Finding**	**Rating**
Commitment to perform 1	The acquisition organization has a written policy for management of the software acquisition project.	HUD has no written policy for managing the acquisition of software products and services. The project team uses HUD's software development methodology where applicable.	Weakness
Commitment to perform 2	Responsibility has been designated for project management activities.	Responsibility for project management activities has been assigned to the IT and business project leads.	Strength
Ability to perform 1	A group is responsible for managing software acquisition activities.	The IT and business project leads and support staff are responsible for project management activities.	Strength
Ability to perform 2	Adequate resources for the project team are provided for the duration of the project.	There is no mechanism to identify resource needs and ensure that they are provided to the project. The project manager stated that the team has adequate resources for conducting project management activities.	Strength
Ability to perform 3	When project trade-offs are necessary, the project manager is permitted to alter the software acquisition cost, schedule, or performance.	The project manager is permitted to alter schedule or performance to ensure that annual project budgets are not exceeded.	Strength
Ability to perform 4	Individuals performing software acquisition management activities have experience or receive training.	Project team members performing project management activities have experience and have had training.	Strength
Activity performed 1	The project team performs its activities in accordance with its documented software acquisition plans.	Software acquisition project management plans are used to guide the activities of the project team.	Strength
Activity performed 2	The roles, responsibilities, and authority of the project function are documented, maintained, and communicated to affected groups.	Roles, responsibilities, and authority are defined in the project plan and in the Configuration Control Board's (CCB) role matrix.	Strength
Activity performed 3	The project team's commitments, and changes to commitments, are communicated to affected groups.	The project team's commitments and changes to commitments regarding this project are communicated to affected groups.	Strength
Activity performed 4	The project team tracks the cost, schedule, resource, and technical risks of the project.	A risk management plan is maintained that tracks risks associated with costs, schedule, resource, and technical risks.	Strength
Activity performed 5	The project team tracks project issues, status, execution, funding, and expenditures against project plans and takes action.	The project team uses contractor weekly and monthly status reports to track contractor costs and schedule issues. Also, a quarterly project control review is done to review cost and schedule status.	Strength
Activity performed 6	The project team implements a corrective action system for the identification, recording, tracking, and correction of problems discovered during the software acquisition.	A corrective action system has been implemented for the identification, recording, tracking, and correction of problems discovered during the software acquisition.	Strength

Resident Assessment Subsystem			
Common feature	**Key practice**	**Finding**	**Rating**
Activity performed 7	The project team keeps its plans current during the life of the project as replanning occurs, issues are resolved, and new risks are discovered.	The project plans are kept up to date as replanning occurs, issues are resolved, and new risks are discovered. Monthly reports are provided that show changes to scheduled software releases resulting from replanning.	Strength
Measurement and analysis 1	Measurements are made and used to determine the status of the project management activities and resultant products.	Measurements are only made of HUD's project management products.	Observation
Verifying implementation 1	Project management activities are reviewed by the acquisition organization on a periodic basis.	The acquisition organization reviews project management activities on a quarterly basis.	Strength
Verifying implementation 2	Project management activities are reviewed by the project manager on both a periodic and an event-driven basis.	The project manager stated that while he meets with members of his staff daily to discuss the status of the project, meeting results and action items are not documented.	Weakness

Table 11: Project Management Findings for HUD's Central Accounting and Program System

HUD's Central Accounting and Program System			
Common feature	**Key practice**	**Finding**	**Rating**
Commitment to perform 1	The acquisition organization has a written policy for management of the software acquisition project.	HUD has no written policy for managing the acquisition of software products and services.	Weakness
Commitment to perform 2	Responsibility has been designated for project management activities.	Responsibility for project management activities has been assigned to the project lead.	Strength
Ability to perform 1	A group is responsible for managing software acquisition activities.	The IT and business project leads are responsible for managing software acquisition activities.	Strength
Ability to perform 2	Adequate resources for the project team are provided for the duration of the project.	There is no mechanism to identify resource needs and ensure they were made available to the project. The project manager stated that the team does not have adequate resources for performing project management activities.	Weakness
Ability to perform 3	When project trade-offs are necessary, the project manager is permitted to alter the software acquisition cost, schedule, or performance.	The project manager is permitted to alter the schedule or performance to ensure that annual project budgets are not exceeded.	Strength
Ability to perform 4	Individuals performing software acquisition management activities have experience or receive training.	Project team members performing project management activities have experience and have had training.	Strength
Activity performed 1	The project team performs its activities in accordance with its documented software acquisition plans.	Software acquisition project management plans are used to guide the activities of the project team.	Strength
Activity performed 2	The roles, responsibilities, and authority of the project function are documented, maintained, and communicated to affected groups.	The roles, responsibilities, and authority of the project team are defined in the software acquisition project plan.	Strength
Activity performed 3	The project team's commitments, and changes to commitments, are communicated to affected groups.	The commitments and changes to commitments are communicated to affected groups through weekly status meetings, emails, and telephone conversations.	Strength
Activity performed 4	The project team tracks the cost, schedule, resource, and technical risks of the project.	The project plans and exhibits identify risks associated with the project and define mitigation plans for these risks. However, the project team does not track the risks.	Weakness
Activity performed 5	The project team tracks project issues, status, execution, funding, and expenditures against project plans and takes action.	The project team tracks project issues, status, execution, and funding through weekly functional and technical status meetings. Funding is tracked and actual costs compared to projected costs.	Strength
Activity performed 6	The project team implements a corrective action system for the identification, recording, tracking, and correction of problems discovered during the software acquisition.	A corrective action system has been implemented for the identification, recording, tracking, and correction of problems discovered during the software acquisition.	Strength

HUD's Central Accounting and Program System			
Common feature	**Key practice**	**Finding**	**Rating**
Activity performed 7	The project team keeps its plans current during the life of the project as replanning occurs, issues are resolved, and new risks are discovered.	The project team does have a risk assessment and mitigation strategy. However, the risks are not tracked, and plans are not kept current.	Weakness
Measurement and analysis 1	Measurements are made and used to determine the status of the project management activities and resultant products.	No measurements are made of HUD's project management activities or resultant products.	Weakness
Verifying implementation 1	Project management activities are reviewed by the acquisition organization on a periodic basis.	The acquisition organization reviews project management activities on a regular basis through meetings with the project manager.	Strength
Verifying implementation 2	Project management activities are reviewed by the project manager on both a periodic and an event-driven basis.	The project manager reviews project management activities regularly through briefings and document review.	Strength

Table 12: Project Management Findings for the Empowerment Information System

Empowerment Information System			
Common feature	**Key practice**	**Finding**	**Rating**
Commitment to perform 1	The acquisition organization has a written policy for management of the software acquisition project.	HUD has no written policy for managing the acquisition of software products and services.	Weakness
Commitment to perform 2	Responsibility has been designated for project management activities.	Responsibility for project management activities has been assigned to the project technical lead.	Strength
Ability to perform 1	A group is responsible for managing software acquisition activities.	The project lead and assigned staff are responsible for performing project management activities.	Strength
Ability to perform 2	Adequate resources for the project team are provided for the duration of the project.	There is no mechanism to identify resource needs and ensure that they are made available to the project. The project manager stated that the team does not have adequate resources for performing project management activities.	Weakness
Ability to perform 3	When project trade-offs are necessary, the project manager is permitted to alter the software acquisition cost, schedule, or performance.	The project manager is allowed to alter schedule or performance to ensure that annual project budgets are not exceeded.	Strength
Ability to perform 4	Individuals performing software acquisition management activities have experience or receive training.	Project team members performing project management activities have experience and project management training.	Strength
Activity performed 1	The project team performs its activities in accordance with its documented software acquisition plans.	Software acquisition project management plans are used to guide the activities of the project team.	Strength
Activity performed 2	The roles, responsibilities, and authority of the project function are documented, maintained, and communicated to affected groups.	Roles, responsibilities, and authority of the project team are defined in the project organization chart.	Strength
Activity performed 3	The project team's commitments, and changes to commitments, are communicated to affected groups.	The project manager uses contractor status reports to communicate commitments and changes to commitments to the project team and other affected groups in meetings.	Strength
Activity performed 4	The project team tracks the cost, schedule, resource, and technical risks of the project.	The project team does assess and track risks for several areas, including contract, funding, schedule, management, and technical areas.	Strength
Activity performed 5	The project team tracks project issues, status, execution, funding, and expenditures against project plans and takes action.	The project team did conduct a review of the software developed by the contractor. As a result of issues found during that review, modifications were made to the contract.	Strength
Activity performed 6	The project team implements a corrective action system for the identification, recording, tracking, and correction of problems discovered during the software acquisition.	A remedial action plan was developed and a corrective action system implemented to record, track, and correct problems found during the software acquisition.	Strength

Empowerment Information System			
Common feature	**Key practice**	**Finding**	**Rating**
Activity performed 7	The project team keeps its plans current during the life of the project as replanning occurs, issues are resolved, and new risks are discovered.	The replanning is documented in the remedial action plan.	Strength
Measurement and analysis 1	Measurements are made and used to determine the status of the project management activities and resultant products.	No measurements are made of HUD's project management activities and resultant products.	Weakness
Verifying implementation 1	Project management activities are reviewed by the acquisition organization on a periodic basis.	The acquisition organization reviews project management activities quarterly.	Strength
Verifying implementation 2	Project management activities are reviewed by the project manager on both a periodic and an event-driven basis.	The project manager is not briefed by other members on either a regular or event-driven basis, and project manager reviews are not documented.	Weakness

Chapter 4: HUD's Contract Tracking and Oversight Processes Are Not Repeatable

HUD's contract tracking and oversight processes do not satisfy the criteria for the repeatable level of maturity because of the number and severity of key practice weaknesses found. These weaknesses increase the risk that software activities will not be performed in accordance with contractual requirements, resulting in software acquisitions being late, costing more than intended, and not performing as intended.

The purpose of contract tracking and oversight is to ensure that the software activities under contract are being performed in accordance with contractual requirements. Within this key process area, the SA-CMM specifies a number of key practices across the five common features that an organization must implement effectively to achieve the repeatable level of maturity. Generally, these practices include having a written organizational policy for contract tracking and oversight, documenting plans for contract tracking and oversight activities, reviewing contractor software planning documents and using those documents to oversee the contractor's efforts, comparing actual cost and schedule to planned budgets and schedules, and having a mechanism to ensure that contractor-delivered work products meet contract requirements.

For the 85 key practices in this key process area, HUD had 45 strengths, 33 weaknesses, four observations, and three practices not rated. For the

- Commitment to perform feature, there were 12 strengths and three weaknesses.
- Ability to perform feature, there were ten strengths and five weaknesses.
- Activities performed feature, there were 20 strengths, 15 weaknesses, two observations, and three practices not rated.
- Measurement and analysis feature, there were no strengths and five weaknesses.
- Verifying implementation feature, there were three strengths, five weaknesses, and two observations.

In addition, none of the projects had strengths in all the key practices.

As a result of these weaknesses, HUD is exposed to increased risk that software activities will not be performed in accordance with contractual requirements, resulting in software acquisitions being late, costing more than planned, and not performing as intended. HUD acknowledges the need to improve its contract tracking and oversight processes and is committed to improving its software and system acquisition capability. The department has prepared a statement of work to obtain contractor support to begin a software process improvement effort. This document

specifies that the contractor would review HUD software acquisition processes, prioritize the key processes and practices to address, and develop a plan to improve HUD's acquisition processes.

Details of our evaluation are provided in the following figure and tables. Figure 4 provides a comprehensive listing of the strengths, weaknesses, and observations for the contract tracking and oversight key process area. The specific findings supporting the practice ratings cited in figure 4 are in tables 13 through 17.

Figure 4: Contract Tracking and Oversight Summary

Common features	Key practices	Projects				
		PIC	REMS	RASS	HUDCAPS	EIS
Commitment to perform 1	The acquisition organization has a written policy for managing the contract tracking and oversight of the software acquisition project.	Weakness	Strength	Strength	Strength	Strength
Commitment to perform 2	Responsibility has been designated for contract tracking and oversight activities.	Weakness	Strength	Strength	Strength	Strength
Commitment to perform 3	The project team includes contracting specialists in the management of the contract.	Weakness	Strength	Strength	Strength	Strength
Ability to perform 1	A group is responsible for managing contract tracking and oversight activities.	Weakness	Strength	Strength	Strength	Strength
Ability to perform 2	Adequate resources are provided for contract tracking and oversight activities.	Weakness	Weakness	Strength	Weakness	Weakness
Ability to perform 3	Individuals performing contract tracking and oversight activities have experience or receive training.	Strength	Strength	Strength	Strength	Strength
Activity performed 1	The project team performs its activities in accordance with documented contract tracking and oversight plans.	Weakness	Weakness	Strength	Weakness	Weakness
Activity performed 2	The project team reviews required contractor software planning documents which, when satisfactory, are used to oversee the contractor team's software effort.	Weakness	Weakness	Weakness	Weakness	Weakness
Activity performed 3	The project team conducts periodic reviews and interchanges with the contractor team.	Strength	Strength	Strength	Strength	Strength
Activity performed 4	The actual cost and schedule of the contractor's software effort are compared to planned budgets and schedules, and issues are identified.	Strength	Strength	Strength	Observation	Strength
Activity performed 5	The size, critical computer resources, and technical activities associated with the contractor team's work products are tracked, and issues are identified.	Weakness	Weakness	Strength	Strength	Observation
Activity performed 6	The project team reviews and tracks the development of the software engineering environment required to provide life-cycle support for the acquired software, and issues are identified.	Strength	Strength	Strength	Strength	Strength
Activity performed 7	Any issues found by the project team during contract tracking and oversight activities are recorded in the appropriate corrective action system, action is taken, and issues are tracked to closure.	Weakness	Weakness	Strength	Weakness	Strength
Activity performed 8	The project team ensures that changes to the software-related contractual requirements are coordinated with affected groups and individuals, such as the contracting official, contractor, and end user.	Strength	*Not rated*	*Not rated*	*Not rated*	Weakness
Measurement and analysis 1	Measurements are made and used to determine the status of the contract tracking and oversight activities and resultant products.	Weakness	Weakness	Weakness	Weakness	Weakness
Verifying implementation 1	Contract tracking and oversight activities are reviewed by acquisition management on a periodic basis.	Weakness	Weakness	Weakness	Strength	Strength
Verifying implementation 2	Contract tracking and oversight activities are reviewed by the project manager on both a periodic and an event-driven basis.	Weakness	Observation	Weakness	Strength	Observation

Key	
Strength	Strength: Key practice effectively implemented.
Weakness	Weakness: Key practice not effectively implemented.
Observation	Observation: Key practice evaluated; evidence not sufficient to rate as a strength, or practice only partially performed.

Table 13: Contract Tracking and Oversight Findings for the Public and Indian Housing Information Center System

Public and Indian Housing Information Center system			
Common feature	**Key practice**	**Finding**	**Rating**
Commitment to perform 1	The acquisition organization has a written policy for managing the contract tracking and oversight of the software acquisition project.	HUD has no written policy for contract tracking and oversight of the acquisition of software products and services, and the project team did not establish one.	Weakness
Commitment to perform 2	Responsibility has been designated for contract tracking and oversight activities.	Responsibility for contract tracking and oversight activities is not designated.	Weakness
Commitment to perform 3	The project team includes contracting specialists in the management of the contract.	The project team told us they did include contracting specialists in the management of the contract, but no documentation was provided to support this statement.	Weakness
Ability to perform 1	A group is responsible for managing contract tracking and oversight activities.	The project team told us there was a group assigned responsibility for contract tracking and oversight activities, but no documentation was provided to support this statement.	Weakness
Ability to perform 2	Adequate resources are provided for contract tracking and oversight activities.	There is no mechanism to identify resource needs and ensure that they are provided to the project. Team members indicated that the resources for performing contract tracking and oversight activities are not adequate.	Weakness
Ability to perform 3	Individuals performing contract tracking and oversight activities have experience or receive training.	Project team members performing contract tracking and oversight activities have experience.	Strength
Activity performed 1	The project team performs its activities in accordance with its documented contract tracking and oversight plans.	There is no contract tracking and oversight plan; therefore, the activities are not performed in accordance with it.	Weakness
Activity performed 2	The project team reviews required contractor software planning documents which, when satisfactory, are used to oversee the contractor team's software effort.	The contractor did not prepare software planning documents that the project team could use to oversee the contractor's software development effort.	Weakness
Activity performed 3	The project team conducts periodic reviews and interchanges with the contractor team.	The project team does have periodic reviews and discussions with the contractor team that are documented.	Strength
Activity performed 4	The actual cost and schedule of the contractor's software effort are compared to planned budgets and schedules, and issues are identified.	The project team does compare the actual cost and schedule of the contractor's software engineering effort to planned schedules and budgets, identifies issues, and documents results.	Strength
Activity performed 5	The size, critical computer resources, and technical activities associated with the contractor team's work products are tracked, and issues are identified.	The project team does not track the size, critical computer resources, and technical activities associated with the contractor team's work products or identify issues.	Weakness

Public and Indian Housing Information Center system			
Common feature	**Key practice**	**Finding**	**Rating**
Activity performed 6	The project team reviews and tracks the development of the software engineering environment required to provide life-cycle support for the acquired software, and issues are identified.	The project team does review and track development of the software engineering environment required to provide life-cycle support for the acquired software, and issues are identified and documented.	Strength
Activity performed 7	Any issues found by the project team during contract tracking and oversight activities are recorded in the appropriate corrective action system, action is taken, and issues are tracked to closure.	The project team does not have a corrective action system to record or track action taken on issues found by the project team during contract tracking and oversight activities.	Weakness
Activity performed 8	The project team ensures that changes to the software-related contractual requirements are coordinated with affected groups and individuals, such as the contracting official, contractor, and end user.	The project team does ensure that changes to contractual requirements are coordinated with all affected groups and individuals.	Strength
Measurement and analysis 1	Measurements are made and used to determine the status of the contract tracking and oversight activities and resultant products.	No measurements are made of HUD's contract tracking and oversight activities or resultant products.	Weakness
Verifying implementation 1	Contract tracking and oversight activities are reviewed by acquisition management on a periodic basis.	The acquisition organization does not review contract tracking and oversight activities on a periodic basis.	Weakness
Verifying implementation 2	Contract tracking and oversight activities are reviewed by the project manager on both a periodic and an event-driven basis.	The project manager stated that while he discusses the status of the project with team members, meeting results and action items are not documented.	Weakness

Table 14: Contract Tracking and Oversight Findings for the Real Estate Management System

Real Estate Management System			
Common feature	**Key practice**	**Finding**	**Rating**
Commitment to perform 1	The acquisition organization has a written policy for managing the contract tracking and oversight of the software acquisition project.	HUD has no written policy for contract tracking and oversight of the acquisition of software products and services. The project team is following the policy in HUD's procurement manual for contract tracking and oversight.	Strength
Commitment to perform 2	Responsibility has been designated for contract tracking and oversight activities.	Responsibility for contract tracking and oversight activities has been designated to contract specialists on the team.	Strength
Commitment to perform 3	The project team includes contracting specialists in the management of the contract.	The project team includes contract specialists to help manage the contract.	Strength
Ability to perform 1	A group is responsible for managing contract tracking and oversight activities.	A group is assigned responsibility for contract tracking and oversight activities.	Strength
Ability to perform 2	Adequate resources are provided for contract tracking and oversight activities.	There is no mechanism to identify resource needs and ensure that they are provided to the project. Team members indicated that the resources for performing contract tracking and oversight activities are not adequate.	Weakness
Ability to perform 3	Individuals performing contract tracking and oversight activities have experience or receive training.	Project team members performing contract tracking and oversight activities have experience and have received training.	Strength
Activity performed 1	The project team performs its activities in accordance with its documented contract tracking and oversight plans.	There is no contract tracking and oversight plan; therefore, the activities are not performed in accordance with it.	Weakness
Activity performed 2	The project team reviews required contractor software planning documents which, when satisfactory, are used to oversee the contractor team's software effort.	The contractor did prepare software planning documents that could be used to oversee the contractor team's software development effort, but no evidence was provided that these were reviewed and/or approved by the project team.	Weakness
Activity performed 3	The project team conducts periodic reviews and interchanges with the contractor team.	The project team does have periodic reviews and discussions with the contractor team that are documented.	Strength
Activity performed 4	The actual cost and schedule of the contractor's software effort are compared to planned budgets and schedules, and issues are identified.	The project team does compare the actual cost and schedule of the contractor's software engineering effort to planned schedules and budgets, identify issues, and document results.	Strength
Activity performed 5	The size, critical computer resources, and technical activities associated with the contractor team's work products are tracked, and issues are identified.	The project team told us they track the size, critical computer resources, and technical activities associated with the contractor team's work products, but no documentation was provided to support this statement.	Weakness

Real Estate Management System			
Common feature	**Key practice**	**Finding**	**Rating**
Activity performed 6	The project team reviews and tracks the development of the software engineering environment required to provide life-cycle support for the acquired software, and issues are identified.	The project team does review and track the development of the software engineering environment required to provide life-cycle support for the acquired software, and issues are identified and documented.	Strength
Activity performed 7	Any issues found by the project team during contract tracking and oversight activities are recorded in the appropriate corrective action system, action is taken, and issues are tracked to closure.	The project team does not have a corrective action system to record or track action taken on issues found by the project team during contract tracking and oversight activities.	Weakness
Activity performed 8	The project team ensures that changes to the software-related contractual requirements are coordinated with affected groups and individuals, such as the contracting official, contractor, and end user.	The project team stated that no changes to the software-related contractual requirements have taken place because their contracts are broad enough to cover changes to the contractual requirements.	Not rated
Measurement and analysis 1	Measurements are made and used to determine the status of the contract tracking and oversight activities and resultant products.	No measurements are made of HUD's contract tracking and oversight activities or resultant products.	Weakness
Verifying implementation 1	Contract tracking and oversight activities are reviewed by acquisition management on a periodic basis.	The acquisition organization does not review contract tracking and oversight activities on a periodic basis.	Weakness
Verifying implementation 2	Contract tracking and oversight activities are reviewed by the project manager on both a periodic and an event-driven basis.	The project manager informally reviews the work of the project team; however, the results of these reviews are not documented. Minutes of biweekly status meetings with contractors are maintained.	Observation

Table 15: Contract Tracking and Oversight Findings for the Resident Assessment Subsystem

Resident Assessment Subsystem			
Common feature	**Key practice**	**Finding**	**Rating**
Commitment to perform 1	The acquisition organization has a written policy for managing the contract tracking and oversight of the software acquisition project.	HUD has no written policy for contract tracking and oversight of the acquisition of software products and services. The project team is following the policy in HUD's Procurement Handbook for contract tracking and oversight.	Strength
Commitment to perform 2	Responsibility has been designated for contract tracking and oversight activities.	Responsibility for contract tracking and oversight activities is designated in the project plan.	Strength
Commitment to perform 3	The project team includes contracting specialists in the management of the contract.	The project team includes contract specialists to help manage the contract.	Strength
Ability to perform 1	A group is responsible for managing contract tracking and oversight activities.	A group is assigned responsibility for contract tracking and oversight activities.	Strength
Ability to perform 2	Adequate resources are provided for contract tracking and oversight activities.	There is no mechanism to identify resource needs and ensure that they are provided to the project. The project manager stated that the team does have adequate resources for performing contract tracking and oversight activities.	Strength
Ability to perform 3	Individuals performing contract tracking and oversight activities have experience or receive training.	Project team members performing contract tracking and oversight activities have experience and have received training.	Strength
Activity performed 1	The project team performs its activities in accordance with its documented contract tracking and oversight plans.	The project team performs its activities in accordance with its documented contract tracking and oversight plan.	Strength
Activity performed 2	The project team reviews required contractor software planning documents which, when satisfactory, are used to oversee the contractor team's software effort.	The contractor did not prepare software planning documents that the project team could use to oversee the contractor's software development effort.	Weakness
Activity performed 3	The project team conducts periodic reviews and interchanges with the contractor team.	The project team does have periodic reviews and discussions with the contractor team that are documented.	Strength
Activity performed 4	The actual cost and schedule of the contractor's software effort are compared to planned budgets and schedules, and issues are identified.	The project team does compare the actual cost and schedule of the contractor's software engineering effort to planned schedules and budgets, identify issues, and document results.	Strength
Activity performed 5	The size, critical computer resources, and technical activities associated with the contractor team's work products are tracked, and issues are identified.	The project team does track the size, critical computer resources, and technical activities associated with the contractor team's work products and identifies and documents issues.	Strength

Resident Assessment Subsystem			
Common feature	**Key practice**	**Finding**	**Rating**
Activity performed 6	The project team reviews and tracks the development of the software engineering environment required to provide life-cycle support for the acquired software, and issues are identified.	The project team does review and track the development of the software engineering environment required to provide life-cycle support for the acquired software, and issues are identified and documented.	Strength
Activity performed 7	Any issues found by the project team during contract tracking and oversight activities are recorded in the appropriate corrective action system, action is taken, and issues are tracked to closure.	The project team records issues related to contract tracking and oversight in a corrective action system, and tracks corrective actions to closure.	Strength
Activity performed 8	The project team ensures that changes to the software-related contractual requirements are coordinated with affected groups and individuals, such as the contracting official, contractor, and end user.	The project team stated that no changes to the software-related contractual requirements have taken place.	Not rated
Measurement and analysis 1	Measurements are made and used to determine the status of the contract tracking and oversight activities and resultant products.	No measurements are made of HUD's contract tracking and oversight activities and resultant products.	Weakness
Verifying implementation 1	Contract tracking and oversight activities are reviewed by acquisition management on a periodic basis.	The acquisition organization does not review contract tracking and oversight activities on a periodic basis.	Weakness
Verifying implementation 2	Contract tracking and oversight activities are reviewed by the project manager on both a periodic and an event-driven basis.	The project manager informally reviews the work of the project team. However, the results of these reviews are not documented.	Weakness

Table 16: Contract Tracking and Oversight Findings for HUD's Central Accounting and Program System

HUD's Central Accounting and Program System			
Common feature	**Key practice**	**Finding**	**Rating**
Commitment to perform 1	The acquisition organization has a written policy for managing the contract tracking and oversight of the software acquisition project.	HUD has no written policy for contract tracking and oversight of the acquisition of software products and services. The project team is following the policy in HUD's Procurement Handbook for contract tracking and oversight.	Strength
Commitment to perform 2	Responsibility has been designated for contract tracking and oversight activities.	Responsibility for contract tracking and oversight activities is designated in the organization chart.	Strength
Commitment to perform 3	The project team includes contracting specialists in the management of the contract.	The project team includes contract specialists to help manage the contract.	Strength
Ability to perform 1	A group is responsible for managing contract tracking and oversight activities.	A group is assigned responsibility for contract tracking and oversight activities.	Strength
Ability to perform 2	Adequate resources are provided for contract tracking and oversight activities.	There is no mechanism to identify resource needs and ensure that they are provided to the project. The project manager stated that the team does not have adequate resources for performing contract tracking and oversight activities.	Weakness
Ability to perform 3	Individuals performing contract tracking and oversight activities have experience or receive training.	Project team members performing contract tracking and oversight activities have experience and have received training.	Strength
Activity performed 1	The project team performs its activities in accordance with its documented contract tracking and oversight plans.	There is no contract tracking and oversight plan; therefore, the activities are not performed in accordance with it.	Weakness
Activity performed 2	The project team reviews required contractor software planning documents which, when satisfactory, are used to oversee the contractor team's software effort.	The contractor did not prepare software planning documents that the project team could use to oversee the contractor's software development effort.	Weakness
Activity performed 3	The project team conducts periodic reviews and interchanges with the contractor team.	The project team does have periodic reviews and discussions with the contractor team that are documented.	Strength
Activity performed 4	The actual cost and schedule of the contractor's software effort are compared to planned budgets and schedules, and issues are identified.	The project team told us they do compare the actual cost and schedule of the contractor's software engineering effort to planned schedules and budgets, but no documentation was provided to support this statement.	Observation
Activity performed 5	The size, critical computer resources, and technical activities associated with the contractor team's work products are tracked, and issues are identified.	The project team does track the size, critical computer resources, and technical activities associated with the contractor team's work products and identifies and documents issues.	Strength

HUD's Central Accounting and Program System			
Common feature	**Key practice**	**Finding**	**Rating**
Activity performed 6	The project team reviews and tracks the development of the software engineering environment required to provide life-cycle support for the acquired software, and issues are identified.	The project team does review and track the development of the software engineering environment required to provide life-cycle support for the acquired software, and issues are identified and documented.	Strength
Activity performed 7	Any issues found by the project team during contract tracking and oversight activities are recorded in the appropriate corrective action system, action is taken, and issues are tracked to closure.	The project team does not have a corrective action system to record or track action taken on issues found by the project team during contract tracking and oversight activities.	Weakness
Activity performed 8	The project team ensures that changes to the software-related contractual requirements are coordinated with affected groups and individuals, such as the contracting official, contractor, and end user.	The project team stated that no changes to the software-related contractual requirements have taken place because their contracts are broad enough to cover changes to contractual requirements.	Not rated
Measurement and analysis 1	Measurements are made and used to determine the status of the contract tracking and oversight activities and resultant products.	No measurements are made of HUD's contract tracking and oversight activities or resultant products.	Weakness
Verifying implementation 1	Contract tracking and oversight activities are reviewed by acquisition management on a periodic basis.	The acquisition organization regularly reviews contract tracking and oversight activities.	Strength
Verifying implementation 2	Contract tracking and oversight activities are reviewed by the project manager on both a periodic and an event-driven basis.	The project manager is briefed weekly on project status, including contract tracking and oversight activities.	Strength

Table 17: Contract Tracking and Oversight Findings for the Empowerment Information System

Empowerment Information System			
Common feature	**Key practice**	**Finding**	**Rating**
Commitment to perform 1	The acquisition organization has a written policy for managing the contract tracking and oversight of the software acquisition project.	HUD has no written policy for contract tracking and oversight of the acquisition of software products and services. The project team is following the policy in HUD's Procurement Handbook for contract tracking and oversight.	Strength
Commitment to perform 2	Responsibility has been designated for contract tracking and oversight activities.	Responsibility for contract tracking and oversight activities has been designated in the organization chart.	Strength
Commitment to perform 3	The project team includes contracting specialists in the management of the contract.	The project team includes contract specialists to help manage the contract.	Strength
Ability to perform 1	A group is responsible for managing contract tracking and oversight activities.	A group is assigned responsibility for managing contract tracking and oversight activities.	Strength
Ability to perform 2	Adequate resources are provided for contract tracking and oversight activities.	There is no mechanism to identify resource needs and ensure that they are provided to the project. The project manager indicated that the team does not have adequate resources for performing contract tracking and oversight activities.	Weakness
Ability to perform 3	Individuals performing contract tracking and oversight activities have experience or receive training.	Project team members performing contract tracking and oversight activities have experience and have received training.	Strength
Activity performed 1	The project team performs its activities in accordance with its documented contract tracking and oversight plans.	There is no contract tracking and oversight plan; therefore, the activities are not performed in accordance with it.	Weakness
Activity performed 2	The project team reviews required contractor software planning documents which, when satisfactory, are used to oversee the contractor team's software effort.	The contractor did not prepare software planning documents that the project team could use to oversee the contractor's software development effort.	Weakness
Activity performed 3	The project team conducts periodic reviews and interchanges with the contractor team.	The project team does have periodic reviews and discussions with the contractor team that are documented.	Strength
Activity performed 4	The actual cost and schedule of the contractor's software effort are compared to planned budgets and schedules, and issues are identified.	The project team does compare the actual cost and schedule of the contractor's software engineering effort to planned schedules and budgets, identify issues, and document results.	Strength
Activity performed 5	The size, critical computer resources, and technical activities associated with the contractor team's work products are tracked, and issues are identified.	The project team reviewed the size, critical computer resources, and technical activities associated with the contractor team's work products only during pre-release testing.	Observation

Empowerment Information System			
Common feature	**Key practice**	**Finding**	**Rating**
Activity performed 6	The project team reviews and tracks the development of the software engineering environment required to provide life-cycle support for the acquired software, and issues are identified.	The project does review and track development of the software engineering environment required to provide life-cycle support for the acquired software, and issues are identified and documented.	Strength
Activity performed 7	Any issues found by the project team during contract tracking and oversight activities are recorded in the appropriate corrective action system, action is taken, and issues are tracked to closure.	The project team records issues related to contract tracking and oversight in a corrective action system, and tracks corrective actions to closure.	Strength
Activity performed 8	The project team ensures that changes to the software-related contractual requirements are coordinated with affected groups and individuals, such as the contracting official, contractor, and end user.	The project team stated that changes to software-related contractual requirements were coordinated with all affected groups and individuals, but they provided no documentation to support this statement.	Weakness
Measurement and analysis 1	Measurements are made and used to determine the status of the contract tracking and oversight activities and resultant products.	No measurements are made of HUD's contract tracking and oversight activities or resultant products.	Weakness
Verifying implementation 1	Contract tracking and oversight activities are reviewed by acquisition management on a periodic basis.	The acquisition organization periodically reviews contract tracking and oversight activities.	Strength
Verifying implementation 2	Contract tracking and oversight activities are reviewed by the project manager on both a periodic and an event-driven basis.	The project manager works closely with and informally reviews the work of the project team. However, the results of these reviews are not documented.	Observation

Chapter 5: HUD's Software Evaluation Processes Are Not Repeatable

HUD did not satisfy the criteria for the repeatable level of maturity in this key process area because of the number and severity of key practice weaknesses found. These weaknesses result in increased risk that HUD's software acquisition projects will not be evaluated effectively, software products will not work effectively or meet mission needs, and cost, schedule, and other performance goals will not be met.

The purpose of evaluation is to determine that the acquired software products and services satisfy contract requirements before acceptance. Within this key process area, the SA-CMM specifies key practices for each of the five common features that an organization must implement effectively to achieve the repeatable level of maturity. Generally, these practices include having a written organizational policy for evaluating acquired software products and services, documenting plans for evaluating software products and services, developing and managing evaluation requirements in conjunction with software technical requirements, tracking contractor evaluation activities for compliance with the contract, and measuring and reporting on the status and results of evaluation activities to management.

For the 75 key practices in this key process area, HUD had 37 strengths, 33 weaknesses, and five observations. For the

- Commitment to perform feature, there were four strengths, four weaknesses, and two observations.
- Ability to perform feature, there were 11 strengths and nine weaknesses.
- Activities performed feature, there were 19 strengths, nine weaknesses, and two observations.
- Measurement and analysis feature, there were no strengths, four weaknesses, and one observation.
- Verifying implementation feature, there were three strengths and seven weaknesses.

In addition, none of the projects had strengths in all the key practices.

As a result of these weaknesses, HUD is exposed to increased risk that software acquisition projects will not be evaluated effectively, that acquired software will not work efficiently or meet mission needs, and that cost, schedule, and other performance goals will not be met. HUD acknowledges the need to improve its software evaluation processes and is committed to improving its software and system acquisition capability. The department has prepared a statement of work to obtain contract support to begin a software process improvement effort. This document

specifies that the contractor would review HUD software acquisition processes, prioritize the key processes and practices to address, and develop a plan to improve HUD's acquisition processes.

Details of our evaluation are provided in the following figure and tables. Figure 5 provides a comprehensive listing of the strengths, weaknesses, and observations in the evaluation key process area. The specific findings supporting the practice ratings cited in figure 5 are in tables 18 through 22.

Figure 5: Software Evaluation Summary

Common features	Key practices	Projects				
		PIC	REMS	RASS	HUDCAPS	EIS
Commitment to perform 1	The acquisition organization has a written policy for managing the evaluation of acquired software products and services.	Weakness	Weakness	Observation	Observation	Weakness
Commitment to perform 2	Responsibility has been designated for evaluation activities.	Weakness	Strength	Strength	Strength	Strength
Ability to perform 1	A group is responsible for planning, managing, and performing evaluation activities.	Weakness	Strength	Strength	Strength	Strength
Ability to perform 2	Adequate resources are provided for evaluation activities.	Weakness	Weakness	Strength	Weakness	Weakness
Ability to perform 3	Individuals performing evaluation activities have experience or receive training.	Strength	Strength	Strength	Strength	Strength
Ability to perform 4	Members of the project team and groups supporting the software acquisition receive orientation on the objectives of the evaluation approach.	Weakness	Weakness	Weakness	Weakness	Strength
Activity performed 1	The project team performs its activities in accordance with its documented evaluation plans.	Strength	Strength	Strength	Weakness	Weakness
Activity performed 2	The project's evaluation requirements are developed in conjunction with the development of the system or software technical requirements.	Strength	Observation	Strength	Strength	Weakness
Activity performed 3	The project's evaluation activities are planned to minimize duplication and take advantage of all evaluation results, where appropriate.	Strength	Strength	Strength	Strength	Weakness
Activity performed 4	The project team appraises the contractor team's performance over the total period of the contract for compliance with requirements.	Weakness	Observation	Strength	Strength	Weakness
Activity performed 5	Planned evaluations are performed on the evolving software products and services before acceptance for operational use.	Strength	Strength	Strength	Strength	Weakness
Activity performed 6	Results of the evaluations are analyzed and compared to the contract's requirements to establish an objective basis to support the decision to accept the product or services or to take further action.	Weakness	Strength	Strength	Strength	Weakness
Measurement and analysis 1	Measurements are made and used to determine the status of the evaluation activities and resultant products.	Weakness	Weakness	Weakness	Weakness	Observation
Verifying implementation 1	Evaluation activities are reviewed by acquisition organization management on a periodic basis.	Strength	Strength	Weakness	Weakness	Weakness
Verifying implementation 2	Evaluation activities are reviewed by the project manager on both a periodic and an event-driven basis.	Weakness	Strength	Weakness	Weakness	Weakness

Key		
	Strength	Strength: Key practice effectively implemented.
	Weakness	Weakness: Key practice not effectively implemented.
	Observation	Observation: Key practice evaluated; evidence not sufficient to rate as a strength, or practice only partially performed.

Table 18: Software Evaluation Findings for the Public and Indian Housing Information Center System

Public and Indian Housing Information Center system			
Common feature	**Key practice**	**Finding**	**Rating**
Commitment to perform 1	The acquisition organization has a written policy for managing the evaluation of acquired software products and services.	HUD has no written policy for managing the evaluation of acquired software products and services.	Weakness
Commitment to perform 2	Responsibility has been designated for evaluation activities.	The project team told us that responsibility for evaluation activities has been assigned to the lead technical person, but no documentation was provided to support this statement.	Weakness
Ability to perform 1	A group is responsible for planning, managing, and performing evaluation activities.	The project team told us that evaluation activities are managed by the lead technical person, but no documentation was provided to support this statement.	Weakness
Ability to perform 2	Adequate resources are provided for evaluation activities.	There is no mechanism to identify needed resources and ensure that they are provided to the project. The lead technical person indicated that the team does not have adequate resources for performing evaluation activities.	Weakness
Ability to perform 3	Individuals performing evaluation activities have experience or receive training.	Project team members performing evaluation activities have experience.	Strength
Ability to perform 4	Members of the project team and groups supporting the software acquisition receive orientation on the objectives of the evaluation approach.	Members of the project team or others supporting the software acquisition did not receive orientation on the objectives of the evaluation approach.	Weakness
Activity performed 1	The project team performs its activities in accordance with its documented evaluation plans.	The project team performs its evaluation activities in accordance with its documented evaluation plans.	Strength
Activity performed 2	The project's evaluation requirements are developed in conjunction with the development of the system or software technical requirements.	Project evaluation requirements were developed in conjunction with software technical requirements and are designated in the test plans and test scripts.	Strength
Activity performed 3	The project's evaluation activities are planned to minimize duplication and take advantage of all evaluation results, where appropriate.	There appears to be no duplication of evaluation activities.	Strength
Activity performed 4	The project team appraises the contractor team's performance over the total period of the contract for compliance with requirements.	The project team stated that quarterly reports of contractor deliverables were used to appraise contractor performance, but no documentation was provided to support this statement.	Weakness
Activity performed 5	Planned evaluations are performed on the evolving software products and services before acceptance for operational use.	Several evaluations are performed on evolving software products and services before acceptance for operational use.	Strength

Public and Indian Housing Information Center system			
Common feature	**Key practice**	**Finding**	**Rating**
Activity performed 6	Results of the evaluations are analyzed and compared to the contract's requirements to establish an objective basis to support the decision to accept the product or services or to take further action.	There is no analysis or comparison of evaluation results to contract requirements to establish an objective basis supporting the decision to accept the products and services or to take further action.	Weakness
Measurement and analysis 1	Measurements are made and used to determine the status of the evaluation activities and resultant products.	No measurements are made of HUD's evaluation activities and resultant products.	Weakness
Verifying implementation 1	Evaluation activities are reviewed by acquisition organization management on a periodic basis.	Acquisition organization management regularly reviews evaluation activities.	Strength
Verifying implementation 2	Evaluation activities are reviewed by the project manager on both a periodic and an event-driven basis.	The project manager does not formally review evaluation activities, and the project manager's reviews are not documented.	Weakness

Table 19: Software Evaluation Findings for the Real Estate Management System

Real Estate Management System			
Common feature	**Key practice**	**Finding**	**Rating**
Commitment to perform 1	The acquisition organization has a written policy for managing the evaluation of acquired software products and services.	HUD has no written policy for managing the evaluation of acquired software products and services.	Weakness
Commitment to perform 2	Responsibility has been designated for evaluation activities.	Contractors and users have been assigned responsibility for evaluation activities.	Strength
Ability to perform 1	A group is responsible for planning, managing, and performing evaluation activities.	The contractor and end users are responsible for evaluation activities.	Strength
Ability to perform 2	Adequate resources are provided for evaluation activities.	There is no mechanism to identify needed resources and ensure that they are provided to the project. The project manager stated that the team does not have adequate resources for performing evaluation activities.	Weakness
Ability to perform 3	Individuals performing evaluation activities have experience or receive training.	Project team members performing evaluation activities have experience.	Strength
Ability to perform 4	Members of the project team and groups supporting the software acquisition receive orientation on the objectives of the evaluation approach.	Members of the project team or others supporting the software acquisition did not receive orientation on the objectives of the evaluation approach.	Weakness
Activity performed 1	The project team performs its activities in accordance with its documented evaluation plans.	The team performs its evaluation activities in accordance with its documented evaluation plans.	Strength
Activity performed 2	The project's evaluation requirements are developed in conjunction with the development of the system or software technical requirements.	Project evaluation requirements are documented in the project plan, but no documentation was provided showing that they were developed in conjunction with development of the software technical requirements.	Observation
Activity performed 3	The project's evaluation activities are planned to minimize duplication and take advantage of all evaluation results, where appropriate.	There appears to be no duplication of evaluation activities.	Strength
Activity performed 4	The project team appraises the contractor team's performance over the total period of the contract for compliance with requirements.	The project team assesses contractor team performance for compliance with requirements only during user acceptance testing.	Observation
Activity performed 5	Planned evaluations are performed on the evolving software products and services before acceptance for operational use.	Planned evaluations are performed before software releases are accepted for operational use.	Strength

Real Estate Management System			
Common feature	**Key practice**	**Finding**	**Rating**
Activity performed 6	Results of the evaluations are analyzed and compared to the contract's requirements to establish an objective basis to support the decision to accept the product or services or to take further action.	The results of evaluations are analyzed and compared to the contract's requirements to establish an objective basis supporting the decision to accept the products and services or to take further action.	Strength
Measurement and analysis 1	Measurements are made and used to determine the status of the evaluation activities and resultant products.	No measurements are made of HUD's evaluation activities or resultant products.	Weakness
Verifying implementation 1	Evaluation activities are reviewed by acquisition organization management on a periodic basis.	Acquisition organization management regularly reviews evaluation activities.	Strength
Verifying implementation 2	Evaluation activities are reviewed by the project manager on both a periodic and an event-driven basis.	Project reviews conducted by the project manager cover evaluation activities.	Strength

Table 20: Software Evaluation Findings for the Resident Assessment Subsystem

Resident Assessment Subsystem			
Common feature	**Key practice**	**Finding**	**Rating**
Commitment to perform 1	The acquisition organization has a written policy for managing the evaluation of acquired software products and services.	HUD has no written policy for managing the evaluation of acquired software products and services. The project is following the evaluation policies in HUD's software development methodology.	Observation
Commitment to perform 2	Responsibility has been designated for evaluation activities.	Responsibility for evaluation activities has been assigned to the IT project lead.	Strength
Ability to perform 1	A group is responsible for planning, managing, and performing evaluation activities.	The IT project lead and support staff are responsible for evaluation activities.	Strength
Ability to perform 2	Adequate resources are provided for evaluation activities.	There is no mechanism to identify resource needs and ensure that they are provided to the project. According to the project manager, the project team has adequate resources for conducting evaluation activities.	Strength
Ability to perform 3	Individuals performing evaluation activities have experience or receive training.	Project team members performing evaluation activities have experience and have received training.	Strength
Ability to perform 4	Members of the project team and groups supporting the software acquisition receive orientation on the objectives of the evaluation approach.	Members of the project team or others supporting the software acquisition did not receive orientation on the objectives of the evaluation approach.	Weakness
Activity performed 1	The project team performs its activities in accordance with its documented evaluation plans.	The project team performs its evaluation activities in accordance with its documented evaluation plan.	Strength
Activity performed 2	The project's evaluation requirements are developed in conjunction with the development of the system or software technical requirements.	Project evaluation requirements are developed in conjunction with software technical requirements.	Strength
Activity performed 3	The project's evaluation activities are planned to minimize duplication and take advantage of all evaluation results, where appropriate.	There appears to be no duplication of evaluation activities.	Strength
Activity performed 4	The project team appraises the contractor team's performance over the total period of the contract for compliance with requirements.	The project team appraises the contractor team's performance over the total period of the contract for compliance with requirements.	Strength
Activity performed 5	Planned evaluations are performed on the evolving software products and services before acceptance for operational use.	Planned evaluation activities are performed on the evolving software products and services before they are accepted for operational use.	Strength
Activity performed 6	Results of the evaluations are analyzed and compared to the contract's requirements to establish an objective basis to support the decision to accept the product or services or to take further action.	Results of the evaluations are analyzed and compared to the contract's requirements to establish an objective basis supporting the decision to accept the software products or to take further action.	Strength

Resident Assessment Subsystem			
Common feature	**Key practice**	**Finding**	**Rating**
Measurement and analysis 1	Measurements are made and used to determine the status of the evaluation activities and resultant products.	No measurements are made of HUD's evaluation activities and resultant products.	Weakness
Verifying implementation 1	Evaluation activities are reviewed by acquisition organization management on a periodic basis.	Acquisition organization management does not review evaluation activities on a regular basis.	Weakness
Verifying implementation 2	Evaluation activities are reviewed by the project manager on both a periodic and an event-driven basis.	The project manager stated that while he meets with his staff daily to discuss the status of the project, meeting results and action items are not documented.	Weakness

Table 21: Software Evaluation Findings for HUD's Central Accounting and Program System

HUD's Central Accounting and Program System			
Common feature	**Key practice**	**Finding**	**Rating**
Commitment to perform 1	The acquisition organization has a written policy for managing the evaluation of acquired software products and services.	HUD has no written policy for managing the evaluation of acquired software products and services. The project is following the evaluation policy in HUD's software development methodology.	Observation
Commitment to perform 2	Responsibility has been designated for evaluation activities.	Responsibility for evaluation activities has been assigned to the project lead.	Strength
Ability to perform 1	A group is responsible for planning, managing, and performing evaluation activities.	The project lead and support staff are responsible for evaluation activities.	Strength
Ability to perform 2	Adequate resources are provided for evaluation activities.	There is no mechanism to identify needed resources and ensure that they are provided to the project. The project manager stated that the team does not have adequate resources for performing evaluation activities.	Weakness
Ability to perform 3	Individuals performing evaluation activities have experience or receive training	Project team members performing evaluation activities have experience and have received training.	Strength
Ability to perform 4	Members of the project team and groups supporting the software acquisition receive orientation on the objectives of the evaluation approach.	Members of the project team and groups supporting the software acquisition did not receive orientation on the objectives of the evaluation approach.	Weakness
Activity performed 1	The project team performs its activities in accordance with its documented evaluation plans.	There is no evaluation plan; therefore, the activities are not performed in accordance with it.	Weakness
Activity performed 2	The project's evaluation requirements are developed in conjunction with the development of the system or software technical requirements.	Project evaluation requirements were developed in conjunction with software technical requirements and are designated in the statement of work.	Strength
Activity performed 3	The project's evaluation activities are planned to minimize duplication and take advantage of all evaluation results, where appropriate.	There appears to be no duplication of evaluation activities.	Strength
Activity performed 4	The project team appraises the contractor team's performance over the total period of the contract for compliance with requirements.	The project team appraises the contractor team's performance over the total period of the contract for compliance with requirements.	Strength
Activity performed 5	Planned evaluations are performed on the evolving software products and services before acceptance for operational use.	Planned evaluation activities are performed on the evolving software products and services before they are accepted for operational use.	Strength
Activity performed 6	Results of the evaluations are analyzed and compared to the contract's requirements to establish an objective basis to support the decision to accept the product or services or to take further action.	Results of the evaluations are analyzed and compared to the contract's requirements to establish an objective basis to support the decision to accept the software products or to take further action.	Strength

HUD's Central Accounting and Program System			
Common feature	**Key practice**	**Finding**	**Rating**
Measurement and analysis 1	Measurements are made and used to determine the status of the evaluation activities and resultant products.	No measurements are made of HUD's evaluation activities or resultant products.	Weakness
Verifying implementation 1	Evaluation activities are reviewed by acquisition organization management on a periodic basis.	Acquisition organization management does not review evaluation activities on a regular basis.	Weakness
Verifying implementation 2	Evaluation activities are reviewed by the project manager on both a periodic and an event-driven basis.	The project manager stated that while he discusses the status of the project with team members, meeting results and action items are not documented.	Weakness

Table 22: Software Evaluation Findings for the Empowerment Information System

Empowerment Information System			
Common feature	**Key practice**	**Finding**	**Rating**
Commitment to perform 1	The acquisition organization has a written policy for managing the evaluation of acquired software products and services.	HUD has no written policy for managing the evaluation of acquired software products and services.	Weakness
Commitment to perform 2	Responsibility has been designated for evaluation activities.	Responsibility for evaluation activities has been assigned to the project lead.	Strength
Ability to perform 1	A group is responsible for planning, managing, and performing evaluation activities.	The project lead and team members are responsible for evaluation activities.	Strength
Ability to perform 2	Adequate resources are provided for evaluation activities.	There is no mechanism to identify needed resources and ensure that they are provided to the project. The project manager stated that the team does not have adequate resources for performing evaluation activities.	Weakness
Ability to perform 3	Individuals performing evaluation activities have experience or receive training.	Project team members performing evaluation activities have experience and have received training.	Strength
Ability to perform 4	Members of the project team and groups supporting the software acquisition receive orientation on the objectives of the evaluation approach.	Members of the project team or others supporting the software acquisition did receive orientation on the objectives of the evaluation approach.	Strength
Activity performed 1	The project team performs its activities in accordance with its documented evaluation plans.	There is no evaluation plan; therefore, the activities were not performed in accordance with it.	Weakness
Activity performed 2	The project's evaluation requirements are developed in conjunction with the development of the system or software technical requirements.	The project's evaluation requirements were not developed in conjunction with the development of the software technical requirements.	Weakness
Activity performed 3	The project's evaluation activities are planned to minimize duplication and take advantage of all evaluation results, where appropriate.	There is no evidence of evaluation activities being performed.	Weakness
Activity performed 4	The project team appraises the contractor team's performance over the total period of the contract for compliance with requirements.	The project team assessed contractor team performance for compliance with requirements only at the end of the effort.	Weakness
Activity performed 5	Planned evaluations are performed on the evolving software products and services before acceptance for operational use.	No planned evaluations were performed on the software. A user survey was conducted, and the software was rejected on the basis of the survey.	Weakness
Activity performed 6	Results of the evaluations are analyzed and compared to the contract's requirements to establish an objective basis to support the decision to accept the product or services or to take further action.	No planned evaluations were conducted. The software was rejected based on the results of the user survey.	Weakness

Empowerment Information System			
Common feature	**Key practice**	**Finding**	**Rating**
Measurement and analysis 1	Measurements are made and used to determine the status of the evaluation activities and resultant products.	No measurements are made of HUD's evaluation activities or resultant products. The cost of the user survey was reported.	Observation
Verifying implementation 1	Evaluation activities are reviewed by acquisition organization management on a periodic basis.	Acquisition organization management does not review evaluation activities on a regular basis.	Weakness
Verifying implementation 2	Evaluation activities are reviewed by the project manager on both a periodic and an event-driven basis.	The project manager does not formally review evaluation activities, and the project manager's reviews are not documented.	Weakness

hapter 6: Conclusions, Recommendations, and Agency Comments

HUD's software acquisition processes are immature and are not repeatable on a project-by-project basis because of the many weaknesses it has in the key practices. Strong performance of the key practices is essential for achieving effective, repeatable, and lasting implementation and institutionalization of the four key process areas we reviewed. Currently, HUD's success or failure in acquiring software depends largely on specific individuals, rather than on well-defined and disciplined software acquisition management practices. As a result, HUD is exposed to higher risks that software-intensive acquisition projects will not consistently meet mission requirements, perform as intended, or be delivered on schedule and within budget.

HUD acknowledged that it has software acquisition weaknesses and is committed to improving its software and system acquisition processes. We agree that HUD should begin a software process improvement effort. However, for HUD to successfully complete such an effort, its software process improvement plan must address several important issues. To be comprehensive, this plan should include the results of our review and include measurable goals and time frames, estimates of resource requirements, and time frames to reach the repeatable level. It should also contain steps to address the systemic weaknesses we found. Finally, the plan should include steps to address the areas we did not review and to ensure that all ongoing as well as new software acquisition projects adopt processes and meet the requirements for the repeatable level of maturity.

To improve HUD's software acquisition capabilities, GAO recommends that the Secretary of Housing and Urban Development direct the HUD Chief Information Officer to develop and implement a comprehensive plan for software acquisition process improvement that is based on the software capability results in this report and specifies measurable goals and time frames, sets priorities for initiatives, estimates resource requirements (for trained staff and funding), and defines a process improvement management structure.

Also, to address the systemic weaknesses mentioned above, the plan should contain steps to

- develop a comprehensive policy for the acquisition of software,
- require plans for specific acquisition activities,
- measure and track the status of activities performed by the software acquisition teams, and
- report regularly to management on progress and problems.

In addition, to ensure that all aspects of software acquisition are addressed, we recommend that the Secretary direct the CIO to

- assess HUD's maturity in the three key process areas that could not be evaluated by GAO and include any needed improvement actions in the comprehensive plan for software acquisition process improvement;
- ensure that all new software acquisition projects in HUD adopt processes that satisfy at least SA-CMM level 2 requirements; and
- ensure that process improvement activities are initiated for all ongoing software acquisition projects.

Agency Comments and Our Evaluation

In providing written comments on a draft of this report, the Chief Information Officer (CIO) stated that HUD concurred with our recommendations to strengthen its software acquisition processes. The CIO acknowledged that its software acquisition processes have weaknesses and stated that it has an improvement project under way. This project includes plans to seek contractor assistance to address the weaknesses we identified and help improve HUD's software acquisition processes. Finally, the CIO stated that the department generally agreed with our assessment of its software acquisition practices. HUD also provided additional documentation on its practices for the Resident Assessment Subsystem. We reviewed this information and made revisions where appropriate and supported by the additional documentation. The department's comments are reprinted as appendix I.

Appendix I: Comments From the Department of Housing and Urban Development

U.S. DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT
WASHINGTON, D.C. 20410-3000

CHIEF INFORMATION OFFICER

August 17, 2001

Mr. Joel Willemssen
Managing Director
Information Technology Issues
General Accounting Office
Washington, DC 20548

Dear Mr. Willemssen:

This is in response to your letter to Secretary Martinez dated August 3, 2001, transmitting the GAO Draft Report: HUD Information Systems: Immature Software Acquisition Capability Increases Project Risks (CIO-1526/511866). Your letter requested comments on the draft report within 14 days.

HUD previously recognized weaknesses in the area of software acquisition and has an active Software Acquisition Capability Maturity Model (SA-CMM) Improvement Project already underway. HUD's plan is to award a contract to a CMM level 3 or higher company that will assist HUD in addressing the weaknesses in the GAO report, along with the three key process areas that could not be evaluated by GAO, ultimately achieving compliance with SA-CMM level 2.

HUD agrees with the draft recommendations. While HUD agrees that an aggressive improvement plan is needed, HUD believes that a systematic, planned approach to the following recommendations is critical for success:

- Ensure that all new software acquisition projects adopt processes that satisfy at least SA-CMM level 2 requirements.
- Ensure that process improvement activities are initiated for all ongoing software acquisition projects.

HUD will include implementation schedules for these two recommendations in the comprehensive improvement plan.

All appropriate HUD program offices have reviewed the draft report. All generally agree with the findings except for the Real Estate Assessment Center (REAC) which is currently working with GAO to resolve proposed weaknesses with the Resident Assessment Subsystem (RASS) in the areas of Requirements Development and Management, Project Management, Contract Tracking and Oversight, and Evaluation.

If you or your staff have any questions, please contact Pamela Woodside, Director, Office of Systems Integration and Efficiency, on (202) 708-2050.

Sincerely,

Gloria R. Parker

Gloria R. Parker
Chief Information Officer

cc:
James M. Martin, Deputy Assistant Chief Financial Officer for Financial Management

Appendix II: GAO Contact and Staff Acknowledgments

GAO Contact

David G. Gill (202) 512-6250

Staff Acknowledgments

In addition to those named above, Naba Barkakati, Suzanne M. Burns, John Christian, Barbara Collier, Tonia Johnson, Barbara Oliver, and Madhav Panwar made key contributions to this report.

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