March 26, 2002

CHARLES E. BRAVO
SENIOR VICE PRESIDENT, CHIEF TECHNOLOGY OFFICER

ROBERT L. OTTO
VICE PRESIDENT, INFORMATION TECHNOLOGY

SUBJECT: Audit Report - Vehicle Operations Information System
(Report Number EM-AR-02-005)

This report presents the results of our audit of the Vehicle Operations Information System (Project Number 01BS009IS000). This audit was a self-initiated review that was included in our fiscal year 2002 Audit Workload Plan.

The audit disclosed Postal Service program management did not always follow established Postal Service system development guidelines, policies, and directives during requirements definition and that a key deliverable was not fully completed. As a result, program management may select a commercial off-the-shelf package that does not effectively secure sensitive information contained in the system. In addition, program management cannot ensure that the development process was appropriately monitored, established standards were followed, and system inadequacies were brought to management's attention. The Vehicle Operations Information System has been cancelled due to budget constraints. Management agreed with our recommendations and should the project be restarted, appropriate actions will be taken to address the recommendations in this report. Management's comments and our evaluation of these comments are included in this report.

We appreciate the cooperation and courtesies provided by your staff during the review. If you have any questions or need additional information, please contact Robert Batta, director, Electronic Commerce and Marketing, at (703) 248-2100, or me at (703) 248-2300.

Ronald D. Merryman
Acting Assistant Inspector General
for eBusiness

Attachment

cc: James W. Buie
James L. Golden
Susan M. Duchek

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EXECUTIVE SUMMARY

Introduction

There are five major stages in the systems development life cycle.[1] Each stage has several process points that need to be accomplished to develop a successful project. This report presents our self-initiated audit of the feasibility study and requirements definition of the Vehicle Operations Information System. This is the fourth report in a series of Office of Inspector General (OIG) audits of Postal Service initiatives in the early phases of development. By early involvement in the process, the OIG can make recommendations to resolve issues in development prior to system implementation. Studies indicated that it is up to 100 times more costly to make changes after a system is placed into production. Our objectives were to determine if Postal Service management: (1) followed sound systems development life cycle processes, (2) produced key deliverables, and (3) included key security features during systems development.

Results in Brief

Our review found program management did not always follow established Postal Service system development guidelines, policies, and directives during requirements definition of the Vehicle Operations Information System. Specifically, detailed data and security requirements were not defined, and an independent software quality assurance representative[2] was not assigned. In addition, we found that a key deliverable was not fully completed during the concept phase.

As a result, program management may select a commercial off-the-shelf package that does not effectively secure sensitive information contained in the system. In addition, program management cannot ensure that the development process was appropriately monitored, established standards were followed, and system inadequacies were brought to management's attention. Further, program management could not ensure that the project initiative was justified, alternative solutions were properly analyzed, and the solution selected would satisfy the functional requirements.

[1] A systems development life cycle is a logical process by which systems analysts, software engineers, programmers, and end users build information systems and computer applications to solve business problems and needs.
[2] The software quality assurance representative independently facilitates the development of defect free products that meet all requirements and are delivered on time at the lowest possible cost.

Summary of Recommendations	We concluded that the Vehicle Operations Information System development effort should remain in the planning phase until completion of the recommended actions. Specifically, we recommended management conduct a feasibility study, risk assessment, business impact assessment, appoint a software quality assurance representative, and define detailed data and security requirements before moving the project to the design phase.
Summary of Management's Comments	Management agreed with our recommendations. However, the Vehicle Operations Information System has been cancelled due to budget constraints. For that reason, management does not believe there is value in addressing the specific recommendations contained in this audit report. Should the project be restarted, appropriate actions will be taken to address the recommendations contained in this report. Management's comments, in their entirety, are included in Appendix B of this report.
Overall Evaluation of Management's Comments	Management's comments were responsive to our findings and recommendations. We agree with management that should the Vehicle Operations Information System project be restarted, appropriate actions will be taken to address the recommendations contained in this report. However, since the project has been cancelled due to budget constraints, we recommend closure of all recommendations.

INTRODUCTION

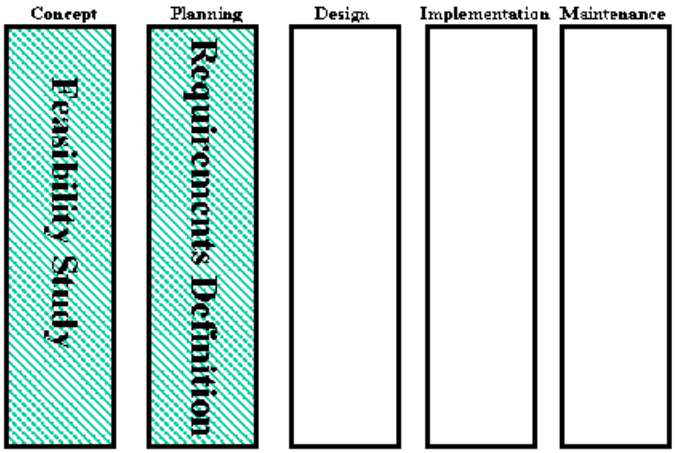
Background

The Postal Service operates a large fleet of motor vehicles used to move and deliver mail throughout the United States. The Delivery Vehicle Operations Group has responsibility for repair and maintenance of vehicles in this fleet. The Vehicle Management Accounting System is currently used to track the cost of vehicle operation and to schedule and manage repair and maintenance operations. The Postal Service decided to replace the Vehicle Management Accounting System with the Vehicle Operations Information System. The Postal Service planned that the new system will use a commercial off-the-shelf software package to provide information management for all vehicle repair and maintenance operations, as well as tracking and analysis of the total cost of vehicle operations.

The Vehicle Operations Information System will support approximately 5,000 users. These users are located at 193 Postal Service vehicle maintenance facilities, 148 auxiliary vehicle maintenance facilities, Postal Service Headquarters, area offices, and district offices. The system would be used to manage repair and maintenance operations and records for approximately 250,000 leased and Postal Service owned motor vehicles. In addition, it would help manage parts inventories with over 250,000 individual inventory line items system wide, and would be used to manage fuel and oil inventories stored in more than 1,000 bulk storage tanks.

When our review took place, the Vehicle Operations Information System was at the end of the planning phase undergoing review of commercial off-the-shelf software packages.

Process Points Reviewed In Relation
to the Systems Development Life Cycle Phases



Objectives, Scope, and Methodology

The purpose of this audit was to evaluate the Postal Service's Vehicle Operations Information System development effort in the concept and planning phases of the systems development life cycle. We reviewed the feasibility study and requirements definition process points of the development effort. Specifically, for these processes, we determined if Postal Service management: (1) followed sound systems development life cycle processes, (2) produced key deliverables, and (3) included key security features during systems development.

To accomplish our first objective, we interviewed key project management personnel, including the program manager, program owner, developers, and the information system security officer. In addition, we reviewed the business needs statement, project plan, functional requirements document, and Postal Service security policies and directives. To accomplish our second objective, we interviewed key project management personnel and end-users to determine their involvement in the development effort. In addition, we reviewed the draft Decision Analysis Report, assessment study,[3] and contract documents. Finally, to accomplish our third objective, we interviewed the information system security officer and reviewed appropriate requirements documents.

[3] The assessment study was conducted to analyze the current vehicle operations database environment.

We conducted audit fieldwork at Postal Service Headquarters and the processing and distribution center, in Merrifield Virginia, from September through October 2001. In addition, we also reviewed applicable laws and regulations, as well as industry standards and best practices. This audit was conducted from September 2001 through March 2002 in accordance with generally accepted government auditing standards and included tests of internal controls as were considered necessary under the circumstances. We discussed our conclusions and observations with appropriate management officials and included their comments, where appropriate. We did not rely on computer-generated data to accomplish the objectives of this audit.

Prior Audit Coverage

Our September 29, 2000, report, State of Computer Security in the Postal Service (Report Number IS-AR-00-004) cited that: (1) many Postal Service managers were not fully aware of their responsibilities for computer security; and many Postal Service officials viewed computer security as the sole responsibility of the information technology office; (2) a lack of security awareness has resulted in less than sufficient emphasis placed on planning and budgeting for computer security; (3) policies and procedures for computer security were nonexistent, outdated, or oftentimes not implemented or followed; and (4) the National Information Systems Security organization did not have computer security enforcement authority, and was understaffed, underfunded, and not visible postalwide. Management agreed with Office of Inspector General's recommendations and indicated they are working to address the issues.

AUDIT RESULTS

Systems Development Guidelines, Policies, and Directives	We found program management did not always follow established Postal Service systems development guidelines, policies, and directives during requirements definition of the Vehicle Operations Information System. Specifically, detailed data and security requirements were not defined, and an independent software quality assurance representative was not assigned. As a result, program management may select commercial off-the-shelf software that does not effectively secure the sensitive information contained in the system. In addition, program management cannot ensure that the development process was appropriately monitored, established standards were followed, and system inadequacies were brought to management's attention. The purpose of this audit was to evaluate the Postal Service's Vehicle Operations Information System development effort in the concept and planning phases of the systems development life cycle. Specifically, for these processes, we determined if Postal Service management followed sound systems development life cycle processes, produced key deliverables, and included key security features during systems development. Audit fieldwork was conducted from September through October 2001. Data requirements describe the following components of data: relationship, storage, volume, definition or logical representation, location, any interfaces, or security requirements. In addition, data requirements define how the data will migrate into the new system. Security requirements describe all security restrictions such as limiting access to hardware, software, network and data; defining level of access by user such as read, write, and execute; or whether the data will be confidential or available for public use.
Detailed Data Requirements	Program management defined data requirements, such as data descriptions, potential data elements, and the impact of data requirements at a high level in the functional requirements document. However, these requirements did not contain the appropriate level of detail. In addition, some data requirements were not defined at all, such as technical information about dynamic and static data collection requirements, subjects or other grouping mechanisms used

by the system, description of the characteristics for each, and the procedures for data collection.

The Postal Service Software Process Standards and Procedures guideline states that data requirements are necessary to satisfy the business need, as identified in the business needs document. This guideline also states that technical solutions should not be identified, until the requirements document, which includes data requirements, has been reviewed and approved by the end-users.

Program management told us that this occurred because detailed data requirements should be developed in the design phase, which would occur prior to selecting commercial off-the-shelf software. Program management explained that they solicited and reviewed commercial off-the-shelf software to gain an initial understanding of the software's capabilities. They planned to adjust their data elements to fit those established in the commercial off-the-shelf software, thus reducing the high costs associated with customizing the software. However, program management also indicated there are unique Postal Service data elements that cannot be changed. Program management explained that the commercial off-the-shelf providers would have to demonstrate their ability to customize their software to meet these unique data requirements, prior to contract award.

We concluded program management is taking a proactive approach to select commercial off-the-shelf software. As a consequence, program management reduced costs by limiting the amount of customization to the commercial off-the-shelf software.

Recommendation

We recommend the senior vice president, chief technology officer, ensure:

1. Detailed data requirements are defined and included in the requirements document and ensure commercial off-the-shelf providers demonstrate their ability to meet these requirements, prior to contract award.

Management's Comments

Management agreed with the recommendation. However, management has cancelled the Vehicle Operations Information System due to budget constraints. Should the

	project be restarted, appropriate actions will be taken to address the recommendation.
Evaluation of Management's Comments	Management's comments were responsive to our finding and recommendation. We recommend closure of this recommendation.
Detailed Security Requirements	Program management referenced applicable Postal Service security policies and directives in the functional requirements document. We found that security requirements, such as general controls, methods for detecting errors and irregularities, responsibilities for the protection of sensitive information, and protection against system tampering were defined at a high level in these security policies and directives. However, detailed security requirements were not established to mitigate potential risks and exposures associated with the site locations and application. The information security process states that the management control process must address information protection, internal controls, privacy, and security issues in the original system design. The process requires a risk assessment program to be performed, which evaluates potential risks and exposures associated with both the site and the application. The process also requires completion of a business impact assessment, which addresses the disclosure and unauthorized modification of sensitive information, the unauthorized destruction or unavailability of critical information, legal and regulatory requirements, and prudent business practices. In addition, security controls must be implemented to satisfy the mandatory security requirements to protect sensitive**,** critical, and business-controlled information resources. Detailed security requirements were not established because program management had not followed Postal Service guidelines to ensure security requirements were defined. Specifically, program management had not completed a risk assessment and business impact assessment which are key components to developing detailed security requirements. As a result, program management may select commercial off-the-shelf software that does not effectively secure the sensitive information contained in the system.

Recommendations	We recommend the senior vice president, chief technology officer, ensure: 2. A risk assessment is completed, which addresses information protection, internal controls, privacy, and security issues. 3. A business impact assessment is completed, which identifies the sensitivity and criticality levels of Postal Service information resources that will reside in the Vehicle Operations Information System. 4. Detailed security requirements are defined and included in the requirements document, which mitigate the risks identified during the risk assessment and business impact assessment.
Management's Comments	Management agreed with the recommendations. However, management has cancelled the Vehicle Operations Information System due to budget constraints. Should the project be restarted, appropriate actions will be taken to address these recommendations.
Evaluation of Management's Comments	Management's comments were responsive to our finding and recommendations. We recommend closure of these recommendations.
Independent Software Quality Assurance Representative	Program management did not appoint a key development team member. Specifically, the program manager did not have a software quality assurance representative. The Postal Service Software Process Standards and Procedures guideline recommends that at project initiation a software quality assurance representative should be appointed to each project. The guidelines also recommend that the software quality assurance representative perform a review of the requirements document, prior to the end-users review. The engineering software process improvement guideline states that the product assurance organization is responsible for ensuring software products meet customer's quality expectations throughout the systems development life cycle. Specifically, product assurance validates and

verifies field worthiness of software, provides support during software testing, performs independent audits, and monitors process compliance.

An appointment was not made because program management did not follow existing Postal Service policies and guidelines or establish an alternate system of controls. As a result, program management cannot ensure that the development process was appropriately monitored, established standards were followed, and system inadequacies were brought to management's attention.

Recommendation

We recommend the senior vice president, chief technology officer:

5. Formally appoint an independent software quality assurance representative to the remaining system development tasks.

Management's Comments

Management agreed with the recommendation. However, management has cancelled the Vehicle Operations Information System due to budget constraints. Should the project be restarted, appropriate actions will be taken to address the recommendation.

Evaluation of Management's Comments

Management's comments were responsive to our finding and recommendation. We recommend closure of this recommendation.

Key Deliverable

Program management did not perform all the aspects of a feasibility study for the Vehicle Operations Information System. We found that the development team conducted an assessment study of the current system, which identified the strengths and weaknesses of the local area network and mainframe components of the existing system. However, they did not evaluate alternative solutions to ensure established objectives and business needs were achieved.

The Postal Service Software Process Standards and Procedures guideline states that a feasibility study should be prepared to justify the project initiative, analyze alternative solutions, and recommend a specific course of action. This guideline also provides a feasibility study template, which addresses the scope, summary, business need, alternative solutions, cost/benefit analysis, alternatives eliminated, conclusion and recommendation, and exhibits.

Industry best practices recommend that each alternative be evaluated to ensure that the organization has the capability to manage the technology, time and cost estimates can be supported, and costs and benefits are identified. In addition, impact studies should be conducted to measure the current and anticipated cost savings and revenue increases, as well as provide insight into the benefits to be delivered.

The Postal Service F-66 Handbook, General Investment Policy requires the project to be properly analyzed (that is all viable alternatives considered, the impact of the investment properly evaluated, and the backup documentation adequately supports the investment) and appropriate concurrences for major assumptions have been obtained.

The feasibility study was not fully completed because program management believed the assessment study met the needs of a feasibility study. However, our review of the assessment study disclosed it did not contain all the required elements of a feasibility study. As a result, program management could not ensure that the project initiative was justified, alternative solutions were properly analyzed, and the solution selected would satisfy the functional requirements.

Recommendation	We recommend the senior vice president, chief technology officer: 6. Complete the remaining elements of the feasibility study on Vehicle Operations Information System prior to obtaining funding approval.
Management's Comments	Management agreed with our recommendation. However, management has cancelled the Vehicle Operations Information System due to budget constraints. Should the project be restarted, appropriate actions will be taken to address the recommendation.
Evaluation of Management's Comments	Management's comments were responsive to our finding and recommendation. We recommend closure of this recommendation.

Additional Areas for Management Consideration	During our review of the Vehicle Operations Information System, we also noted the following conditions:
Decision Analysis Report Improvements	Program management indicated that they are in the process of finalizing the Decision Analysis Report for the Vehicle Operations Information System. During our review of the draft Decision Analysis Report, we found that the following areas of the report could be improved: • A measure to support the statement about the second and third alternatives not being cost prohibitive. • A discussion on the need for protection of privacy of data. • A discussion on the impact and cost of internal control requirements. • A risk management section, which explains how the funds will be spent. This may include a general discussion of how the Vehicle Management Accounting System and the Vehicle Operations Information System requirements have been prioritized. • Discussion as to staging of the requirements and bringing modules into production. Replacing all the functionality at once may be too much to accomplish at one time. It may make sense to discuss the basic Vehicle Management Accounting System requirements in the new system first, then the new improvements. • Identification of the accounting interfaces or the basic accounting functions of the Vehicle Management Accounting System that will be present in the Vehicle Operations Information System.
Formally Approved Requirements	Program management indicated that the requirements document does not include a sign-off sheet or any indication by Postal Service management that the requirements were formally accepted. The program manager and end users verbally indicated that they are satisfied all requirements are included in the requirements document. However, having

all responsible parties sign the document would verify the requirements have been formally accepted and approved.

APPENDIX A. GLOSSARY

Term	Description
Assessment Report	The assessment study was conducted to analyze the current vehicle operations database environment.
Business Impact Assessment	The business impact assessment addresses the disclosure and unauthorized modification of sensitive information, the unauthorized destruction or unavailability of critical information, legal and regulatory requirements, and prudent business practices.
Commercial Off-the-Shelf Software	Software available through lease or purchase in the commercial market from an organization representing itself to have ownership of marketing rights in the software.
Data Requirements	Data requirements describe the data, data relationships, data storage, volume of the data, definitions or logical data representation, where data may currently be located, any data interfaces, or security requirements of the data. In addition, data requirements define how the data will be migrated into the new system.
Decision Analysis Report	The Decision Analysis Report is a document developed by the requiring organization to justify a project investment and to assist the approval authorities in making decisions concerning the use of Postal Service funds.
Dynamic Data	Dynamic data is data that can be changed.
Feasibility Study	The feasibility study is a document that justifies the project initiative, analyzes alternative solutions, and recommends a specific course of action. The feasibility study typically includes scope, summary, business need, alternative solutions, cost/benefit analysis, alternatives eliminated, conclusion, recommendation, and exhibits to be addressed.
General Controls	General controls are the structure, policies, and procedures that apply to an entity's overall computer operations. They create the environment in which application systems and controls operate.

APPENDIX A. GLOSSARY (CONTINUED)

Impact Studies	Impact studies measure the current and anticipated cost savings and revenue increases that organizations believe have been created by their investment in the proposed solutions, as well as provide insights into the mechanisms by which the benefits are to be delivered.
Risk Assessment	A risk assessment evaluates potential risks and exposures associated with both the site and the application, such as information protection, internal controls, privacy, and security issues.
Security Requirements	Security requirements describe all security restrictions such as limiting access to hardware, software, network and data; defining level of access by user such as read, write, and execute; or whether the data will be confidential or available for public use.
Software Quality Assurance Representative	The software quality assurance representative independently facilitates the development of defect free products that meet all requirements and are delivered on time at the lowest possible cost.
Static Data	Static data is bound to memory cells before program execution begins and remains bound to those same memory cells until program execution terminates.
Systems Development Life Cycle	A systems development life cycle is a logical process by which systems analysts, software engineers, programmers, and end users build information systems and computer applications to solve business problems and needs.

APPENDIX B. MANAGEMENT'S COMMENTS

Charles E. Bravo
Chief Technology Officer
Senior Vice President

UNITED STATES POSTAL SERVICE

March 18, 2002

DONNA EDSALL

SUBJECT: Management Response to Draft Audit Report for Vehicle Operations Information System (VOIS) Application Development Review (Report Number EM-AR-02-DRAFT)

The Office of Inspector General (OIG) performed an audit to determine if systems development lifecycle processes were followed, key deliverables were produced, and security features were addressed during the Vehicle Operations Information System (VOIS) development. We believe there is value in early identification of potential concerns, when issues can be resolved more cost-effectively. However, it is important to understand that the VOIS audit was conducted during the planning phase and several of the deliverables and activities recommended in the audit report were not yet scheduled to be completed.

Additionally, this audit may give the misimpression that the development team did not follow an established systems development lifecycle methodology during the concept and planning phases. The audit should explain that the Engineering Software Development Methodology was followed. For example, the program team performed extensive market research, evaluated solution alternatives, developed high-level requirements and architecture documents, and involved key stakeholders early in the process.

Notwithstanding the above, this letter is to notify you that postal management cancelled the VOIS project due to budget constraints. For that reason, we do not believe there is value in addressing the specific recommendations contained in the VOIS audit report and, therefore, consider them closed. Although we have identified several concerns on the audit findings, we generally agree with the audit recommendations. Should the project be restarted, appropriate actions will be taken to address the recommendations contained in the report.

The attached information is classified as "restricted" and should be exempt from disclosure under the Freedom of Information Act.

If you have questions regarding our response and would like to discuss them further, please contact the CTO audit coordinator, Kathleen Sober at (202) 268-6156.

Charles E. Bravo

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