



# CITY OF SAN ANTONIO

P. O. BOX 839966  
SAN ANTONIO, TEXAS 78283-3966

October 9, 2006

Phil Hardberger  
Mayor

Roland Gutierrez  
Councilman, District 3

Delicia Herrera  
Councilwoman, District 6

Kevin Wolff  
Councilman, District 9

Michael Bernard  
City Attorney

Roger O. Flores  
Councilman, District 1

Richard Perez  
Councilman, District 4

Elena Guajardo  
Councilwoman, District 7

Christopher "Chip" Haass  
Councilman, District 10

Michael Armstrong  
Assistant City Manager,  
Chief Information Officer

Sheila D. McNeil  
Councilwoman, District 2

Patti Radle  
Councilwoman, District 5

Art A. Hall  
Councilman, District 8

Sheryl Sculley  
City Manager

William McManus  
Police Chief,  
Police Department

Ladies and Gentlemen:

**SUBJECT: Audit of San Antonio Police Department Direct Report Entry System**

We are pleased to send you the report and Management responses for an audit of the San Antonio Police Department Direct Report Entry (DRE) System. This audit began in June 2006 after Police Chief William McManus requested an independent review to help him determine the merits of continuing investing resources and City funds in this System. An exit conference with San Antonio Police Department Management was held in August 2006 to discuss the results of the audit and the draft audit report.

Management's Corrective Action Plan indicates acceptance of the audit's recommendation to discontinue additional investment in the current DRE System and consider replacing the System with a commercial off-the-shelf solution.

The Internal Audit Department co-sourced with Catapult Systems, which is an information technology consulting firm specializing in custom applications, to assist in reviewing the DRE System. Additionally, the Department appreciates the opportunity to have performed this review and is available to discuss this material with you individually at your convenience.

Respectfully submitted,

Mark S. Swann CPA, CIA, CISA  
Interim City Auditor

cc: Leticia Vacek, City Clerk



**CITY OF SAN ANTONIO**

**INTERNAL AUDIT DEPARTMENT**

**Audit of the San Antonio Police Department  
Direct Report Entry System**

Project No. AU06-012

Issue Date: October 9, 2006

Mark Swann CPA, CIA, CISA  
Denis Cano CPA, CIA, CISA  
Frank Cortez CIA, CISA, CISSP

## Table of Contents

	<b>PAGE</b>
<b>Executive Summary</b> .....	1
<b>Introduction</b>	
Background .....	2
Objectives .....	3
Scope .....	3
Criteria .....	3
Methodology .....	3
Conclusion .....	3
Software Assessment Capability .....	4
<b>Observations and Recommendations</b>	
1.1 DRE System sustainability is uncertain .....	5
1.2 Comprehensive project management practices were not followed by SAPD .....	5
1.3 The City does not have access to modify the DRE System .....	6
1.4 The DRE System lacks appropriate password security measures .....	6
1.5 Complete documentation to support the DRE System does not exist .....	6
1.6 The current DRE System will need re-programming in a new language .....	6
1.7 Redundant case management systems are being utilized .....	6
<b>Attachment</b>	
A Capability Maturity Model Integration .....	8

## Executive Summary

### Overview

A review of the San Antonio Police Department's (SAPD) Direct Report Entry (DRE) System, as requested by the Police Chief, has been completed. The objective of the audit was to determine whether the DRE System, as currently structured, satisfies the Department's goals and objectives.

The DRE System is one of ten components in the Public Safety Integrated Technology (PSIT) Project and part of SAPD's 1996 Five-Year Strategic Plan to enhance customer service. This reporting system allows timely input of case reporting data into the City's database, thereby increasing the speed at which investigators can access case reports and begin an investigation. It also provides Police Officers and investigators immediate access to crucial information such as that maintained in local, state and federal law enforcement databases from their patrol cars.

### Results In Brief

Historically, the SAPD has chosen to develop software internally rather than purchase commercial off-the-shelf (COTS) products. The SAPD's belief is that COTS products come with high maintenance costs and slow response time for requested customized changes. While this may be true in some cases, internally developed software, such as the DRE System, creates significant inherent financial and potential long-term risks for the City.

Significant software development risks observed are as follows:

- The project to create electronic forms, workflow, and reporting for the SAPD has not gone as smoothly as expected. Issues include insufficient human resources, lack of appropriate project management, and lack of overall stability of the system.
- Although the SAPD formally accepted this product from a third party vendor in August 2003, it still requires major enhancements and additional investment to improve its features. Currently, it is only being utilized in two of six police substations, and continues to have numerous issues since its implementation in May 2006.
- Although a stress test was performed by the vendor, it did not include full simulation over a sufficient time period using projected data volumes. Consequently, the lack of a fully stress-tested system may result in unanticipated issues that could affect the entire system and adversely impact SAPD's day-to-day operations.
- The DRE System will require additional development and expense to keep it "current" with technology advancements.

In summary, based on the operational risks, lack of software maturity, and the impracticality of the City keeping pace with the technology churn associated with a custom reporting system, it is our recommendation that the City replace the DRE System with a commercial off-the-shelf product.

## INTRODUCTION

### **Background**

The information technology revolution has changed the law enforcement field. In 1996, the San Antonio Police Department (SAPD) published a Five-Year Strategic Plan (i.e., Vision 2001), which included a field entry reporting system. The Department realized that existing technology could greatly expand its capacity for tactical, strategic, and investigative analysis, including management of the Department.

The objective of the field entry reporting system was to “enable entry, retrieval, and modification of all reports, including parking and traffic citations, generated by a Police Officer”. It should provide efficient submission and handling of police reports.

For the last seven years, SAPD has worked with The Open System Group, Inc. (OSG) and Texas Software Development Center to enhance its technology and internal processes. According to the SAPD, the selection of OSG was based on a recommendation from the Information Technology System Department (ITSD).

The overall project, named the Public Safety Integrated Technology (PSIT) System, consisted of three major components: the Field Reporting System (FERS), the Supplemental Report Management System, and the Electronic Document Management System. This project was divided into the following ten sub-components:

- Laptop Mobile Data Terminal Server Hardware and Software
- Laptop Mobile Data Terminal Client Software
- Case Tracking System Manager Software
- Cellular Digital Packet Data Monitor
- Automated Vehicle Locator Watch
- Case Tracking System Designer
- **Case Tracking System Reporting (DRE System)**
- Case Tracking System Case Management
- Case Tracking System Data Mart
- Case Tracking System Records Management System (RMS) and Electronic Data Management System (EDMS)

As of August 2006, the Case Tracking System Data Mart and the Case Tracking System RMS and EDMS have not been implemented. The PSIT Project was funded with \$17.4 million earmarked from a 1999 - 2000 General Obligation Public Safety Improvement Bond Issue. According to SAPD documents, as of March 7, 2006, total expenditures for the PSIT Project were approximately \$13 million, of which, \$908,343 were for the DRE System, excluding human resource and support system costs. SAPD also stated that the funding for the overall PSIT Project only covered hardware and software cost. It did not include sufficient resources to perform activities and deliverables typical of a software development project.

This audit focused on the Case Tracking System Reporting component of the PSIT Project, which is referred to as the DRE System. This System provides Police Officers the ability to input and transmit reports while on patrol, have the reports reviewed by their supervisors, and route completed reports to specific investigation offices. Management expected the DRE System to reduce the time spent entering reports, eliminate current redundant activities, and increase the availability of reports to Police Officers and external customers.

According to the SAPD, it has processed 5,548 police reports and 250 supplemental reports using the DRE System between June and August 2006. Total average time to complete a report has decreased to thirteen hours, compared to three to five business days using the manual method.

### **Objective**

The objective of this audit was to determine whether the DRE System, as currently structured, satisfies the appropriate business requirements as driven by the Department's goals and objectives.

### **Scope**

The scope of this audit included reviewing the DRE System for the period January 1, 2003 through July 31, 2006. This audit did not include a detailed review or evaluation of the other nine sub-components of the PSIT project.

### **Criteria**

During the review, the following criteria were used to determine the adequacy of the implementation of the DRE System:

- Control Objectives for Information and related Technology (CobiT)
- U.S. Department of Justice, Office of Community Oriented Policing, *Law Enforcement Tech Guide: How to plan, purchase and manage technology (successfully!)*
- Institute of Electrical and Electronics Engineers Software Inspection Checklist
- Capability Maturity Model Integration (CMMI) developed by the Software Engineering Institute (SEI) at Carnegie Mellon University
- Past experiences from Catapult Systems, which is certified by Microsoft Corporation as a Gold Partner

In addition, audit reports and studies from other municipalities on system implementation provided information regarding necessary controls.

### **Methodology**

The methodology used for this project, generally, included the following:

- Interviewing various SAPD and ITSD personnel
- Conducting site visits to SAPD's Training Facility for the DRE System
- Conducting a site visit to Austin's Police Training Facility to gain an understanding of its mobile reporting system
- Observing report entry processes during a ride-along with SAPD Officers
- Examining documentation related to the development and implementation of the DRE System
- Performing a code review of the DRE System with the assistance of Catapult Systems

Catapult Systems, which is a Microsoft Gold Partner solutions information technology consulting firm specializing in custom applications, assisted the City Internal Audit Department in reviewing the DRE System. Catapult Systems is a member of the Microsoft Mobile Partner Advisory Council and has a dedicated Mobile practice, Catapult Mobile. Catapult Systems principals are considered by Microsoft as experts in seven key information technology service competencies and have had previous experience with similar software audits.

The review was performed in compliance with generally accepted government auditing standards issued by the U.S. Government Accountability Office.

### **Conclusion**

The primary decision facing the City is assessing whether the benefits of a custom reporting system are worth the operational risks and additional investment required to complete it and keep pace with technology changes. The benefit of a custom reporting system is that, if developed properly, it can meet the unique needs of the City, current and future. However, custom reporting systems typically require very specialized knowledge and expertise to support, as well as substantial ongoing investments for enhancement and operational maintenance. In contrast, an off-the-shelf system would provide the City a more standardized architecture and easily maintained system, reducing the need for specialized expertise and lowering operational risks.

This report consists of issues related to operational risks and additional investments required to support and maintain the DRE System. The issues include the following:

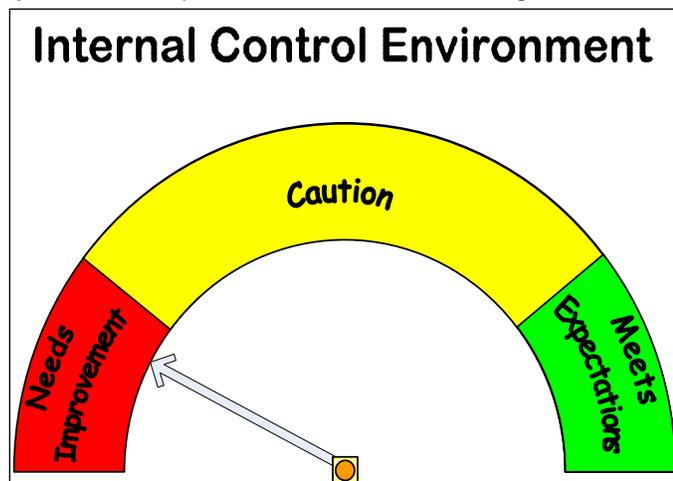
- Lack of City staff to maintain and enhance the system
- Strong (if not total) dependence on two contract developers
- Insufficient project management practices
- Insufficient testing environment
- Inadequate password security measures
- Incomplete and outdated documentation
- Complex system architecture which will require significant additional investment
- Redundant case management systems

In summary, based on the operational risks, lack of software maturity, and the impracticality of the City keeping pace with the technology churn associated with a custom reporting system, it is our recommendation that the City replace the DRE System with a commercial off-the-shelf product.

### **Software Assessment Capability**

An overall conclusion was formed through performing generally accepted audit procedures and was based on the Capability Maturity Model Integration (CMMI). The CMMI was formed to provide a structured view of process improvement across an organization. CMMI is made up of four disciplines: Systems Engineering (SE), Software Engineering (SW), Supplier Sourcing (SS) and Integrated Product and Process Development (IPPD). The DRE System development was evaluated using the Software Engineering model. The five levels of the CMMI-SW and their associated Key Process Areas are included in **Attachment A**.

It was determined that the software process capability stage for the DRE System development was “Initial”; the internal control environment for system development “Needs Improvement”. At the “Initial” stage, there is little focus on incorporating project management into software projects. There is a reliance on key individuals who are almost solely responsible for a project’s success or failure. In addition, inadequate documentation exists to demonstrate compliance with policies and requirements for software projects.



## OBSERVATIONS AND RECOMMENDATIONS

### Conditions

#### **1.1 DRE System sustainability is uncertain**

The DRE System was originally developed by a company named Open Systems Group (OSG), which filed for bankruptcy in 2005. In December 2005, the current third party vendor, Texas Software Development Company (TSDC), submitted the lowest bid and was awarded the contract to continue development of the DRE System. This vendor consists of two former OSG employees that were primarily involved in the initial development of the DRE System.

These two individuals developed SAPD's PSIT System components, including the DRE System, with minimal City staff involvement. The specialized knowledge and expertise to support these components reside with these two individuals. Currently, SAPD personnel do not possess the knowledge to support the functionality of the DRE System without them.

City staff is not sufficiently familiar with the DRE System to handle documentation, training, hardware upgrades, system-bug resolution, and regular maintenance. According to the vendor, there would be a significant learning curve for the SAPD programmers and the City's Information Technology Services Department (ITSD) to support the DRE System.

Inherent with internally developed systems are the ongoing efforts necessary to deal with and adapt to new requirements and technology changes. Presently, the City does not have adequate staff to maintain, support, and enhance the DRE System.

#### **1.2 Comprehensive project management practices were not followed by SAPD**

Overall, the development process for the DRE System lacked common project management procedures. To some extent, this is due to assignment of a project manager for the development of the DRE System, who still had to perform his regular duties as the Information Technology Manager for SAPD. This employee has not been formally trained in proper project management techniques.

Included in any successful development project is the establishment of a decision-making structure to oversee its progress and direction. However, the SAPD did not form a steering committee until late 2005, which was several years into the DRE System's development.

The lack of comprehensive project management practices resulted in the following issues related to the DRE System project:

- Risk, scope, communications and quality management were not performed in managing this project.
- Processes related to direct entry reporting were not fully evaluated before the system was developed.
- Necessary changes to the direct entry reporting process were only considered after the system was accepted and implemented.
- Minimal time was allocated for testing the system, including time necessary for regular maintenance (i.e. patches) to the system.
- Statements of work deliverables were loosely defined, requiring multiple attempts to meet user requirements and making it difficult to determine if the contracted work was fully performed.
- According to various user groups within SAPD, the system was designed without their participation.
- Training was performed on a system that contained multiple problems, preventing an appropriate learning environment and frustrating end-users.
- Weekly status reports and project plan updates, with expected completion timelines, were not documented by SAPD.

As part of the statement of work documents, the vendor was required to submit formal written weekly status reports and the project plan. According to the project manager, the vendor only communicated this verbally to SAPD. In addition, statements of work deliverables were verbally approved by the Project Manager, even though the contract required formal written acknowledgement.

### **1.3 The City does not have access to modify the DRE System**

Presently, the development setup for the DRE System is maintained at the vendor's location in Irving, Texas. SAPD programmers do not have access to this environment. In order for SAPD programmers to maintain and support the DRE System, a test environment needs to be established in the City.

Although the source code for the DRE System is owned by the City of San Antonio, the City does not have the most up-to-date copy. This circumstance places the City completely dependent on the outside vendor's continued existence and goodwill.

Furthermore, this issue impacts ITSD's ability to recover the DRE System in case of a failure. Presently, ITSD does not have complete documentation related to the installation of the DRE System nor a current copy of the source code.

### **1.4 The DRE System lacks appropriate password security measures**

Overall, password security measures used for the DRE System need strengthening. Police Officer and Database Administrator passwords are stored in plain text in the DRE System, with easy access by moderately savvy computer individuals. In addition, the DRE System lacks the strong password requirements prescribed in the City's Administrative Directive 7.6 Security and Passwords. Common words such as "password" can be used to access the system. Also, DRE allows passwords with fewer than eight characters, which is no longer accepted practice by the City.

On several occasions, the outside vendor was observed logging into the DRE System using another user's name and password. The lack of strong security passwords brings into question the integrity of DRE System reports.

### **1.5 Complete documentation to support the DRE System does not exist**

According to the SAPD, the decision was made by the City to reduce PSIT Project costs by excluding documentation requirements at the project's inception. However, there is considerable risk associated with not maintaining formal documentation related to business requirements, design, testing, support, and maintenance of a computer system, which is the case with the DRE System.

Since documentation to support the DRE System was not required as a deliverable in the contract with the third party vendor, current documentation is incomplete and outdated. ITSD has in the past requested that the contract be modified to include functional and technical designs, code specifications, and other necessary documentation to maintain and support the DRE System. As of August 2006, this has not occurred.

### **1.6 The current DRE System will need re-programming in a new language**

In the near future (i.e., three to four years), the DRE System's programming code will need to be converted to a new language. However, there are still major requirements yet to be satisfied relating to inquiry access and archival purposes. In addition, the DRE System is still being enhanced and/or errors remediated because of new issues being identified as part of the phased rollout within the substations.

By the time the DRE System becomes reasonably stable, the system will require conversion to a new language due to advancements in software language. Presently, SAPD programmers are not familiar enough with the system to perform the conversion.

### **1.7 Redundant case management systems are being utilized**

The SAPD uses two distinct modules for case management purposes. The case management module developed by SAPD staff in September 2002 is still used by the City. Part of the PSIT Project required the development of a case management function for the DRE System. However, since the outside vendor's case management module contained less functionality than the previous in-house module, SAPD staff continued to use the old case management module for some functions while adopting the new one for others. For example, cases are assigned to follow-up units with the new case management system; however, searches and changes to cases are being performed with the old case management system.

### **Risk**

The impact of losing the third party vendor would be catastrophic to the Police Department and approximately 151 other law enforcement agencies which are currently using SAPD's software for Texas driver license queries and information sharing. The lack of vendor support depth, the limited transfer of DRE System knowledge to City staff, and incomplete documentation of the DRE System places the SAPD at significant risk. The vendor's failure to continue its current support of SAPD systems will ultimately result in the systems' failure.

If SAPD staff is unable to support and enhance this technology on an ongoing basis, law enforcement activities for the City as well as law enforcement agencies throughout Texas could be jeopardized.

### **Recommendations**

The City Manager, Police Chief, and Chief Information Officer should evaluate the risk of continuing investment in the DRE System. Two potential alternatives are presented below:

#### **I – COTS system**

Under this scenario, all programming efforts related to the DRE System ceases immediately. A committee would be formed to begin documenting business requirements and start evaluating various COTS products. A full time project manager would be assigned or hired to lead the project, while focus groups consisting of users would assist in gathering user requirements. This could affect the current outside vendor's support to the Mobile Data Terminal and Automatic Vehicle Locator Systems. In addition, this option would require the two substations (South and East) to resume handwriting their reports.

Although the primary objective and outcome of this scenario is the implementation of a replacement system, it will probably require a two to three year effort to complete. As with any successful replacement system, strong project management should be in place. SAPD should hire, assign, or train a full time project manager to assist in the implementation of any new system.

#### **II – Stabilize the DRE System and begin the process of replacing all or part of this system by a COTS product**

Under this scenario, all enhancements to the system would be halted. Only efforts to maintain the current system would be allowed. Time and effort are devoted towards stabilizing the system, fixing errors, documenting the system, establishing a development environment at the City, and providing a transfer of knowledge to City staff.

At the same time, a group of individuals would be assigned the task of researching and documenting business requirements for a new system. This new system could replace all or certain parts of the DRE System to reduce its design complexity. Although this scenario will require a support contract with a third party vendor, it would allow SAPD to receive support 24/7 for the current DRE System, and the other systems associated with the PSIT project.

This scenario allows Police Officers to continue training on a direct report system. However, a decision would have to be made on whether to expand the DRE System throughout the SAPD, with the understanding that it is only an interim solution, or to keep the system in only the two substations that are currently using it.

**ATTACHMENT A**

**OVERVIEW OF THE CAPABILITY MATURITY MODEL INTEGRATION – SOFTWARE ENGINEERING**

Capability Maturity Model Integration (CMMI) is a process improvement approach that provides organizations with the essential elements of effective processes. It can be used to guide process improvement across a project, a division, or an entire organization. The CMMI software engineering (SW) model was used for this project.

CMM Level	Definition	Description	Key Process Areas
1	Initial	Unpredictable and poorly controlled	At maturity level 1, processes are usually ad hoc and the organization usually does not provide a stable environment. Success in these organizations depends on the competence and heroics of the people in the organization and not on the use of proven processes. <b>Key Process Areas: None</b>
2	Repeatable	Ability to repeat previously mastered tasks	At maturity level 2, software development successes are repeatable. The organization may use some basic project management to track cost and schedule. When these practices are in place, projects are performed and managed according to their documented plans. <b>Key Process Areas:</b> Project Planning, Project Tracking & Oversight, Requirements Management, Quality Assurance, Configuration Management, Subcontract Management
3	Defined	Process is characterized and fairly well understood	The organization's set of standard processes, which is the basis for level 3, is established and improved over time. Projects establish their defined processes by the organization's set of standard processes according to tailoring guidelines. <b>Key Process Areas:</b> Peer Reviews; Intergroup Coordination; Software Product Engineering; Integrated Software Management; Training Program; Organization Process Definition; Organization Process Focus
4	Managed	Process is measured and controlled	Using precise measurements, management can effectively control the software development effort. In particular, management can identify ways to adjust and adapt the process to particular projects without measurable losses of quality or deviations from specifications. <b>Key Process Areas:</b> Software Quality Management; Quantitative Process Management
5	Optimizing	Focus on process improvement	Maturity level 5 focuses on continually improving process performance through both incremental and innovative technological improvements. <b>Key Process Areas:</b> Process Change Management; Technology Change Management; Defect Prevention

Source: Software Engineering Institute (SEI) at Carnegie Mellon University

# CITY OF SAN ANTONIO

P. O. BOX 839966  
SAN ANTONIO TEXAS 78283-3966

October 6, 2006

Interim City Auditor  
San Antonio, Texas

RE: Management's Corrective Action Plan response to the Audit of the San Antonio Police Department  
– Direct Report Entry System

On May 1, 1999, city voters approved a General Obligation Bond Authorization proposition for public safety. The City's FY 1999-2000 Adopted Capital Budget earmarked \$17,368,125 for the Public Safety Integrated Technology System (PSIT) project. In April 2006, SAPD Police Chief WP McManus requested the Internal Audit Department to conduct a review of SAPD's Case Tracking or Direct Report Entry (DRE) – one of the ten components of PSIT.

The auditor's report recommends SAPD discontinue development of the DRE system immediately, move current users back to handwriting reports (these steps were taken approximately one month ago), perform an analysis and select a commercial off-the-shelf (COTS) product to replace the current custom reporting system; OR alternatively, SAPD could keep the current custom reporting system as an interim solution until a permanent COTS product is selected and implemented or until components of the current system are replaced with COTS products. The other components of PSIT are currently functioning as intended, and we believe they will continue to do so.

DRE was intended to provide SAPD officers with the ability to enter and transmit reports electronically while on patrol, have the reports reviewed by their supervisors, and route completed reports to specific investigative offices. The goal of DRE was to reduce the time spent entering reports, eliminate redundant steps, and improve the availability of reports to police officers and external customers. The total amount spent on the DRE is \$824,415. The remaining unspent balance from the PSIT project is \$2,845,524.

Following discussion with the City Manager and the Chief Information Officer, SAPD has elected to discontinue development of DRE and immediately begin the process to identify and implement a COTS product to provide field reporting capability. We will also continue with a vulnerability assessment of all modules of the PSIT system to reduce risks identified in the audit. We will take steps that may be necessary to provide required support for operating modules while appropriate decisions are made concerning the continued use of the PSIT system to provide mobile functionality for SAPD.

Recommendation					
#	Description	Audit Report Page	Accept, Partially Accept, Decline	Responsible Person's Name/Title	Next Update
	<b>Detail Report</b>				
1	<b>Based on the operational risk, lack of software maturity, and the impracticality of the City keeping pace with the technology churn associated with a custom reporting system, it is our recommendation that the City replace the DRE System with a commercial off-the-shelf product.</b>				

Recommendation					
#	Description	Audit Report Page	Accept, Partially Accept, Decline	Responsible Person's Name/Title	Next Update
	<ul style="list-style-type: none"> <li>Discontinue development of the DRE system immediately, move current users back to handwriting reports, and perform an analysis and selection of a commercial off-the-shelf (COTS) product to replace the current custom reporting system.</li> </ul>	7	Accept	Captain William Smith	May 2007
	<ul style="list-style-type: none"> <li>Alternatively, SAPD could keep the current custom reporting system as an interim solution until a permanent (COTS) product is selected and implemented or until components of the current system are replaced with COTS products.</li> </ul>	7	Decline		
<p><b>Action plan:</b> See above</p>					

We appreciate the City Auditor's comments on the SAPD's Direct Report Entry System. We are committed to addressing the recommendation in the audit report and the plan of actions presented.

Sincerely,

  
William McManus  
Chief of Police



Michael Armstrong  
Assistant City Manager  
Chief Information Officer