

AUDIT REPORT



CITY OF NEW YORK
OFFICE OF THE COMPTROLLER
BUREAU OF FINANCIAL AUDIT
WILLIAM C. THOMPSON, JR., COMPTROLLER

Audit Report on the Development and Implementation of the Automated City Register Information System by the Department of Finance

7A05-084

January 27, 2006



THE CITY OF NEW YORK
OFFICE OF THE COMPTROLLER
1 CENTRE STREET
NEW YORK, N.Y. 10007-2341

WILLIAM C. THOMPSON, JR.
COMPTROLLER

To the Citizens of the City of New York

Ladies and Gentlemen:

In accordance with the responsibilities of the Comptroller contained in Chapter 5, § 93, of the New York City Charter, my office has audited the Department of Finance's Development and Implementation of the Automated City Register Information System.

The results of our audit, which are presented in this report, have been discussed with officials of the Department of Finance, and their comments have been considered in preparing this report. Their complete written response is attached to this report.

I trust that this report contains information that is of interest to you. If you have any questions concerning this report, please e-mail my audit bureau at audit@Comptroller.nyc.gov or telephone my office at 212-669-3747.

Very truly yours,

A handwritten signature in cursive script that reads "William C. Thompson, Jr.".

William C. Thompson, Jr.

WCT/fh

Report: 7A05-084
Filed: January 27, 2006

TABLE OF CONTENT

AUDIT REPORT IN BRIEF	1
INTRODUCTION	3
Background	3
Objective	3
Scope and Methodology	4
Discussion of Audit Results	5
Findings and Recommendations	6
Lack of an Independent Quality Assurance Consultant.....	6
User Accounts Not Adequately Controlled.....	7
User Satisfaction Survey.....	8
Appendix	

*The City of New York
Office of the Comptroller
Bureau of Financial Audit
EDP Audit Division*

**Audit Report on the
Development and Implementation of the
Automated City Register Information System
By the Department of Finance**

7A05-084

AUDIT REPORT IN BRIEF

We performed an audit on the development and implementation on the Automated City Register Information System (ACRIS) by the Department of Finance (Department). The goal of the system is to search records and view document images for properties in Manhattan, Queens, Bronx, and Brooklyn. The system is designed to improve access to information about real and personal property, and to improve the processing and recording of property documents and related fees and taxes.

Audit Findings and Conclusions

ACRIS is operational and generally meets the initial business and system requirements of Phases 1 and 2. Phases 1 and 2 as finished products meet the overall goals stated in the system justification. In addition, the system design allows for future enhancements and upgrades; the vendor followed a formal system development methodology; the system functions reliably, is generally secure from unauthorized access, and contains accurate information recorded on its database. ACRIS has been incorporated into the Department's disaster recovery plan. Finally, the Department procured the system in accordance with City Charter provisions and PPB rules.

However, the Department did not hire an independent quality-assurance consultant, as recommended by Comptroller's Directive 18, and does not have adequate controls to identify and eliminate improper user IDs or the IDs of users who are inactive. ACRIS users are not required to change their passwords regularly, and the ACRIS user list is not reviewed periodically. In addition, our survey of ACRIS users disclosed that 70 percent of the respondents would like to see changes made to ACRIS to correct problems with data entry, to standardize and enhance user screens, and to improve response time to user problems.

Audit Recommendations

To address these issues, we recommend that the Department:

- Employ an independent quality-assurance consultant to monitor and review development work and any system enhancements or subsequent work on ACRIS and on any future development projects.
- Complete and implement procedures for security controls over user accounts.
- Terminate inactive accounts identified in this audit.
- Periodically identify and terminate inactive user accounts.
- Ensure that ACRIS is more user-friendly by addressing the concerns identified in the report. In that regard, the Department should improve the timelines of the help desk response, simplify data entry, provide additional training to users, standardize user screens, and improve response times for completing multiple actions.
- Conduct periodic surveys of users to ensure that their concerns are addressed.

INTRODUCTION

Background

The Department of Finance (Department) administers and enforces New York City business, property, and excise tax laws and collects these taxes as well as parking ticket fines, penalties, judgments, and other charges related to those taxes and fines. The Department also educates the public about its rights and responsibilities in order to achieve the highest level of voluntary compliance, responds to requests from the public for information and assistance, provides a forum for contesting parking tickets, and protects the confidentiality of tax returns. The Department's Office of the City Register is responsible for documenting, filing, updating, managing, and storing all real and personal property records for the boroughs of Manhattan, Bronx, Brooklyn, and Queens.¹

The Automated City Register Information System (ACRIS) is a large-scale electronic document management system designed to improve access to information about real and personal property, and to improve the processing and recording of property documents and related fees and taxes. Department officials consider ACRIS to be critical to their mission. In September 2000, the Department contracted with Bearing Point (formerly KPMG Consulting) to design, develop, program, equip, and maintain the system, which has three major phases. Phases 1 and 2 have been completed; the system is currently being used by people in all 50 states and in approximately 30 countries worldwide. The ACRIS Web site is accessible from the Internet and registers approximately 300,000 visitors, with one billion hits per year and 850 GB of data downloaded from the site every month.² Through February 2005, the Department expended \$56,687,429 of the \$71,141,671 Bearing Point contract.

Objective

The objectives of the audit were to determine whether ACRIS:

- was designed and developed by following a formal systems development methodology;
- meets the Department's initial business and operating requirements;
- as a finished product, meets the overall goals stated in the system's justification description;

¹Staten Island records are maintained in the Richmond County Clerk's Office.

²Users can search ACRIS files via the Internet for City property record indexes and document images starting from 1966. Also included is access to approximately 53 million real property and personal property instrument images and three million real property index records converted from Department's legacy systems (systems preexisting ACRIS) and microfilm.

- was designed to allow for future enhancements and upgrades;
- functions reliably, is secure from unauthorized access, and contains accurate information;
- was procured in accordance with City Charter provisions and Procurement Policy Board (PPB) rules; and
- has been incorporated into the Department's disaster recovery plan.

Scope and Methodology

We conducted fieldwork between September 2004 and June 2005. To achieve our audit objectives, we reviewed and analyzed the Department's:

- contracts with various vendors and related procurement documentation;
- system requirements definitions;
- project plan and project management documentation;
- functional design;
- user acceptance test plan and user manuals; and
- training curricula and training evaluations.

We conducted inspections of work sites where ACRIS is in use. We also tested the accuracy of the ACRIS user list by comparing it to the list of Department employees listed in the City Payroll Management System (PMS).

In addition, we conducted a user satisfaction survey, whose purpose was to determine whether users are satisfied with ACRIS, whether they have been appropriately trained in its use, and whether any changes should be made to the system. We sent our survey to all 142 users identified by the Department; 105 responded. While we did not statistically project the results of the survey to all ACRIS users, the results provide a reasonable basis to assess user satisfaction.

To determine whether payments made through ACRIS were properly recorded in the City's Financial Management System (FMS), we traced 40 randomly selected payment transactions of the 720 transactions processed through ACRIS that were sent to FMS between November 5, 2004, and June 3, 2005. To determine whether the ACRIS search function was reliable, we conducted searches for 12 parcel identifiers, 20 party names, and 70 documents from these same 720 transactions. Finally, to determine whether ACRIS accurately calculated document recording fees, we reviewed the calculations made for 18 randomly selected

transactions taken from the 720 transactions processed during this period. While we did not statistically project the results of each test, they provide a reasonable basis for determining whether: ACRIS payments are properly recorded in FMS; the ACRIS search function is reliable; and, ACRIS accurately calculates document recording fees.

We used Comptroller's Internal Control and Accountability Directive 18, *Guidelines for the Management, Protection and Control of Agency Information and Information Processing Systems* (Directive 18), the National Institute of Standards and Technology (NIST) *Contingency Planning Guide for Information Technology Systems*, and applicable City Charter and PPB rules as criteria for this audit. Since the City has no stated formal system-development methodology, we used the National Institute of Standards and Technology Special Publication 500-223, *A Framework for the Development and Assurance of High Integrity Software*, to assess whether the Department followed a formal methodology.

This audit was conducted in accordance with generally accepted government auditing standards (GAGAS) and included tests of the records and other auditing procedures considered necessary. This audit was performed in accordance with the audit responsibilities of the City Comptroller, as set forth in Chapter 5, § 93, of the New York City Charter.

Discussion of Audit Results

The matters covered in this report were discussed with Department officials during and at the conclusion of this audit. A preliminary draft report was sent to Department officials and was discussed at an exit conference held on November 1, 2005. On November 16, 2005, we submitted a draft report to Department officials with a request for comments. We received a written response from the Department on December 8, 2005, which stated:

“The Finance Department appreciates the audit’s positive findings regarding the overall success of the ACRIS system’s design, development, general functioning, accuracy and reliability; also that the system was procured in accordance with applicable City Charter provisions and PPB (Procurement Policy Board) rules. As the report indicates, the system met all seven stated objectives of the audit. As also indicated, Finance considers ACRIS to be critical to its mission. The agency is therefore justifiably proud of its success.”

FINDINGS AND RECOMMENDATIONS

ACRIS is operational and generally meets the initial business and system requirements of Phases 1 and 2. Phases 1 and 2 as finished products meet the overall goals stated in the system justification. In addition, the system design allows for future enhancements and upgrades; the vendor followed a formal system development methodology; the system functions reliably, is generally secure from unauthorized access, and contains accurate information recorded on its database. ACRIS has been incorporated into the Department's disaster recovery plan. Finally, the Department procured the system in accordance with City Charter provisions and PPB rules.

However, the Department did not hire an independent quality-assurance consultant, as recommended by Directive 18, and does not have adequate controls to identify and eliminate improper user IDs or the IDs of users who are inactive. ACRIS users are not required to change their passwords regularly, and its user list is not reviewed periodically. In addition, our survey of ACRIS users disclosed that 70 percent would like to see changes made to ACRIS to correct problems with data entry, to standardize and enhance user screens, and to improve response time to user problems.

These matters are discussed in the following sections of this report.

Lack of an Independent Quality Assurance Consultant

The Department did not employ an independent consultant to conduct quality-assurance reviews during the system's development. Instead, the Department used its own personnel to provide quality assurance reviews. Directive 18 states that agencies should, "for very large and/or highly critical projects, engage an independent quality assurance consultant to assist the agency monitoring and reviewing the work of the development and integration team."

Although we found no significant development problems with ACRIS, our user survey revealed that users consider ACRIS to be labor intensive and therefore not user-friendly (see section below). In addition, our testing disclosed weaknesses in the system's access controls. Had the Department employed an independent quality-assurance consult for the system's development, these problems might have been addressed during the development process.

Recommendation

1. The Department should employ an independent quality-assurance consultant to monitor and review development work and any system enhancements or subsequent work on ACRIS and on any future system development projects.

Department Response: "The agency disagrees. While fully recognizing the value and importance of Comptroller's Directive 18 and specifically Section 9.5.1 System Development Controls which recommends the engagement of an independent quality assurance specialist for very large and/or highly critical projects, the agency believes it

has exercised proper judgment and due diligence in creatively using its 'in-house' resources to provide quality assurance for this project. It will always seriously consider the option to use such outside independent quality assurance specialists in the future as it has in the past based on a judgment of all relevant circumstances to the project in question. As the audit report states, the City 'has no stated formal system-development methodology....' but the ACRIS project has strictly followed the internationally recognized methodology promulgated by the Software Engineering Institute known as Capability Maturity Model (CMM). This methodology exceeds the standards of rigor followed by the quality assurance consultants currently retained by the Department of Information Technology and Telecommunications (currently CTGi, Gartner Consulting and VIP and most other software QA vendors. In fact, our own experience with these vendors is that they look to standards like CMM to guide their recommendations on 'best practices.' The ACRIS project achieved a Level 3 (of five Levels) certification within the first year of the engagement, and advanced to Level 4 after the second year of the engagement. Software engineering methods advanced significantly during the 1990s, when the collective experience of many large software projects from government and industry were codified as formal methodologies, and CMM, considered by many in the industry to be the most rigorous, gained widespread recognition and acceptance. These important factors mitigated the necessity for an outside quality assurance consultant in these particular circumstances."

Auditor Comment: While we agree that the Department generally followed a CMM methodology when it developed ACRIS we still believe that the Department would have benefited from using an independent quality-assurance consultant to monitor and review the development work. As stated previously, such a consultant might have ensured that the problems noted were addressed before the system was completed.

User Accounts Not Adequately Controlled

The Department does not have adequate controls to identify and eliminate improper user IDs or the IDs of users who are inactive. Specifically, as of April 1, 2005, seven user IDs were not uniquely identified; nine IDs were duplicates; and 26 IDs were inactive for over six months although they were still recorded in the system. Moreover, users are not required to change their passwords regularly, and the user list is not reviewed periodically to ensure that inactive user accounts are deactivated. Two employees who appeared in the Department's organization table did not appear in the PMS database; an additional employee listed as being assigned to the Queens City Register office was actually employed at the Bronx City Register office.

Directive 18, §8.1.2, states that "user identifications and passwords are among the most widely used and visible forms of access controls. The user identification identifies the individual to the system." In addition, Directive 18, §8.1.2, states that "active password management includes deactivation of inactive user accounts and accounts for employees whose services have terminated." Neglecting to delete inactive user IDs and to correct office-assignment information increases the vulnerability of the system to fraud and abuse.

Recommendations

The Department should:

2. Complete and implement procedures for security controls over user accounts.

Department Response: “The agency agrees. Such controls are already in place. The Department will review the specific procedure cited in the audit regarding changing of passwords. It should be noted, however, that all ACRIS security measures, including user account administration, have been reviewed and accepted by Finance’s internal security as well as the Department of Investigation (DOI) staff.”

3. Terminate inactive accounts identified in this audit.

Department Response: “The agency disagrees. All internal Finance users of ACRIS must first be authenticated at Finance’s network level, which is managed and controlled by Finance technical staff that is responsible for the Finance domain. Authenticated users then log on to ACRIS. ACRIS manages their permissions to limit their access to perform specific authorized business functions. To ensure high standards of data accuracy, audit trailing of all user activity, and supporting management reporting needs, user accounts are never deleted. They are maintained perpetually in one of two states: active or inactive. For example, a historical trail of each and every document that flows through ACRIS is maintained by the system. Part of that historical record is the user account of the individual who accessed the record through the entire workflow, from Intake, through Scan, QC, and Examine. The deletion or purging of inactive user accounts would render this history invalid. Although user accounts are never deleted, a user in an inactive state is unable to logon to ACRIS and will always be denied access. Procedurally, if an employee is terminated, quits, or no longer needs access to the system, the City Register deactivates that employee’s account or privileges as appropriate.”

Auditor Comment: The termination of inactive user accounts ensures the security and integrity of the IT environment; however the Department’s response that a user in an inactive state is unable to logon to ACRIS and will always be denied access fails to consider that the status could be changed, whether inadvertently or intentionally, without the approval of management. Moreover, the Department is violating the Department of Investigation’s *User Account Management Directive §2.1*, which states that “after six (6) months of inactivity, user accounts **must** [emphasis added] be purged from City agency systems”; therefore, we reiterate our recommendation.

User Satisfaction Survey

Seventy percent of users who responded to our survey would like to see changes made to the system. These changes include: making ACRIS easier to use; improving the timeliness of the help desk response; simplifying data entry; providing additional training to users; standardizing

user screens; and improving response times for completing multiple actions. The specific results of our survey are indicated in Table I below.

Table I
System Problems and Their Effects on Users

Percent	Reported Problem	Effect
48	Somewhat easy to use; but not user-friendly	Hinders productivity.
48	Problems are not addressed in a timely manner	Frustrates users and hinders productivity
55	Problems entering data, but can manage	User must resubmit transactions
57	Additional training needed	Users don't make full use of the system
60	Screens can be improved	Affects work flow and productivity
70	Somewhat satisfied; would like to see changes	Affects productivity

Recommendations

The Department should:

4. Ensure that ACRIS is more user-friendly by addressing the concerns identified in the report. In that regard, the Department should improve the timeliness of the help desk response; simplify data entry; provide additional training to users; standardize user screens; and improve response times for completing multiple actions.

Department Response: “The Department agrees that all software applications can be improved and made user-friendlier over their operating life cycles and it is continuously making improvements to the system. Finance maintains an on-going dialogue with the community of users as a means of identification of issues that need to be addressed.”

5. Conduct periodic surveys of users to ensure that their concerns are addressed.

Department Response: “The agency agrees. As indicated in the above response, the agency is committed to maintaining an on-going dialogue with the user community as a means of improving the system.”



FINANCE
NEW • YORK
THE CITY OF NEW YORK
DEPARTMENT OF FINANCE

December 7, 2005

Mr. Gregg Brooks
Deputy Comptroller
The City of New York
Office of the Comptroller
1 Centre Street
New York, New York 10007

**Re: Audit Report on the Development and Implementation
Of the Automated City Register Information System
By the Department of Finance 7A05-084**

Dear Mr. Brooks:

Thank you for the opportunity to respond to the City of New York Office of the Comptroller ("Comptroller") Draft Audit Report on the Development and Implementation of the Automated City Register Information System ("ACRIS") by the New York City Department of Finance.

The Finance Department appreciates the audit's positive findings regarding the overall success of the ACRIS system's design, development, general functioning, accuracy and reliability; also that the system was procured in accordance with applicable City Charter provisions and PPB (Procurement Policy Board) rules. As the report indicates, the system met all seven stated objectives of the audit. As also indicated, Finance considers ACRIS to be critical to its mission. The agency is therefore justifiably proud of its success.

The agency, however, wants to address some of the report's inaccuracies. First, as a note of clarification, the statement on page 3 of the Report, under Background, indicates, "the Department expended \$56,687,429 of its \$71,141,671 Bearing Point Contract on ACRIS development"; this is not accurate. The dollar amount cited includes expenditures for significantly more than just development. The ACRIS contract includes, in addition to the cost of software development, acquisition of hardware to equip 2 fully redundant data centers and the City Register workforce, digital conversion of over 8 million index records and 40 million microfilmed document images, as well as on-going technical and operational support of the production system through 2007.

As requested at the Exit Conference, the agency would appreciate more specific detail regarding references to data entry problems, standardization and enhancement of user

screens, and improved response time to user problems referenced by the auditor's user survey. The agency reserves comment specifically on the survey findings cited pending more complete information, which would aid in addressing those concerns; it would be helpful as well to know how the survey was conducted and the responses were tabulated. Finance is and has been extremely proactive in its approach to making the system as user-friendly as possible. Information continues to be collected by the Help Desks; regular City Register/industry meetings are held, as well as focus group sessions to closely monitor users' satisfaction with ACRIS.

User community interests were also actively considered during the development of ACRIS. Throughout the system development life cycle, representatives from the title industry and other real estate professional organizations were kept informed about the project. Significant resources were devoted to training any interested user from companies doing business with the City Register in advance of the launch. Prototypes of the application were demonstrated to these representatives on several occasions during development and design changes were made as a result. A user help desk has been in operation at the City Register since ACRIS was launched. Upgrades that add new features to ACRIS have been developed with input from industry focus groups organized by the Department. Several innovations added in recent releases have come directly from our engagements with these groups.

Comments on the audit's findings regarding system security are addressed in our responses to the corresponding recommendations:

Recommendation 1:

The Department should employ an independent quality-assurance specialist to monitor and review development work and any system enhancements or subsequent work on ACRIS and on any future system development projects.

Finance Response:

The agency disagrees. While fully recognizing the value and importance of Comptroller's Directive 18 and specifically Section 9.5.1. System Development Controls which recommends the engagement of an independent quality assurance specialist for very large and/or highly critical projects, the agency believes it has exercised proper judgment and due diligence in creatively using its "in-house" resources to provide quality assurance for this project. It will always seriously consider the option to use such outside independent quality assurance specialists in the future as it has in the past based on a judgment of all relevant circumstances to the project in question.

As the audit report states, the City "has no stated formal system-development methodology...." but the ACRIS project has strictly followed the internationally recognized methodology promulgated by the Software Engineering Institute known as Capability Maturity Model (CMM). This methodology exceeds the standards of rigor followed by the quality assurance consultants currently retained by the Department of

Information Technology and Telecommunications (currently CTGi, Gartner Consulting and VIP) and most other software QA vendors. In fact, our own experience with these vendors is that they look to standards like CMM to guide their recommendations on “best practices.” The ACRIS project achieved a Level 3 (of five Levels) certification within the first year of the engagement, and advanced to Level 4 after the second year of the engagement. Software engineering methods advanced significantly during the 1990s, when the collective experience of many large software projects from government and industry were codified as formal methodologies, and CMM, considered by many in the industry to be the most rigorous, gained widespread recognition and acceptance. These important factors mitigated the necessity for an outside quality assurance consultant in these particular circumstances.

Recommendation 2:

Complete and implement procedures for security controls over user accounts.

Finance Response:

The agency agrees. Such controls are already in place. The Department will review the specific procedure cited in the audit regarding changing of passwords. It should be noted, however, that all ACRIS security measures, including user account administration, have been reviewed and accepted by Finance’s internal security as well as the Department of Investigation (DOI) staff.

Recommendation 3:

Terminate inactive accounts identified in this audit. (Periodically identify and terminate inactive user accounts).

Finance Response:

The agency disagrees. All internal Finance users of ACRIS must first be authenticated at Finance’s network level, which is managed and controlled by Finance technical staff who are responsible for the Finance domain. Authenticated users then log on to ACRIS. ACRIS manages their permissions to limit their access to perform specific authorized business functions. To ensure high standards of data accuracy, audit trailing of all user activity, and supporting management reporting needs, user accounts are never deleted. They are maintained perpetually in one of two states: active or inactive. For example, a historical trail of each and every document that flows through ACRIS is maintained by the system. Part of that historical record is the user account of the individual who accessed the record through the entire workflow, from Intake, through Scan, QC, and Examine. The deletion or purging of inactive user accounts would render this history invalid. Although user accounts are never deleted, a user in an inactive state is unable to logon to ACRIS and will always be denied access. Procedurally, if an employee is terminated, quits, or no longer needs access to the system, the City Register deactivates that employee’s account or privileges as appropriate.

Recommendation 4:

Ensure that ACRIS is more user-friendly by addressing concerns identified in the report. In that regards, the Department should improve the timeliness of the help desk response; simplify data entry; provide additional training to users; standardize user screens; and improve response times for completing multiple actions.

Finance Response:

The Department agrees that all software applications can be improved and made user-friendlier over their operating life cycles and it is continuously making improvements to the system. Finance maintains an on-going dialogue with the community of users as a means of identification of issues that need to be addressed.

Recommendation 5:

Conduct periodic surveys of users to ensure that their concerns are addressed.

Finance Response:

The agency agrees. As indicated in the above response, the agency is committed to maintaining an on-going dialogue with the user community as a means of improving the system.

If you have any questions regarding this response, please call me at (212) 669-4878.

Sincerely,



Michael Koslow
Sr. Advisor-Management Policy
(& External Audits)

cc: Martha E. Stark, Commissioner, Department of Finance
Rochelle Patricof, First Deputy Commissioner, Department of Finance
Albert H. Stratton, Office of Technology Solutions
Annette Hill, City Register