AUDIT REPORT

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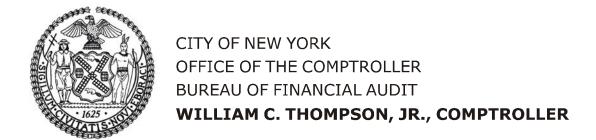BUREAU OF FINANCIAL AUDIT
WILLIAM C. THOMPSON, JR., COMPTROLLER

Audit Report on the Development and Implementation of the S-Elect Project by the New York City Board of Elections

7A06-111

JANUARY 26, 2007

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 done an audit of the New York City Board of Elections development and implementation of the S-Elect Project.

S-Elect Project supports the Board's election and poll-worker activities and provides a framework for the eventual integration of all Board applications. These new systems would replace the Candidate Processing and Rotation/Entry and Certification of Official Election Results (CPR/ENCORE) and Poll Worker Election Administration System (EASY) mainframe applications. We audit systems and technological resources of City agencies such as this to ensure that they are cost-effective, efficient, and operate in the best interest of the public.

The results of our audit, which are presented in this report, have been discussed with officials of the Board of Elections, and their comments have been considered in preparing this report. Their complete written responses are 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,

William C. Thompson, Jr.

WCT/fh

Report: 7A06-111
Filed: January 26, 2007

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

Audit Report on
Development and Implementation of the
S-Elect Project by the New York City
Board of Elections

7A06-111

AUDIT REPORT IN BRIEF

This office performed an audit on the New York City Board of Elections (Board) development and implementation of the S-Elect Project. The objective of the Board's S-Elect Project[1] was to develop and implement new information technology systems to support the Board's election and poll-worker activities and to provide a framework for the eventual integration of all Board applications. These new systems would replace the Candidate Processing and Rotation/Entry and Certification of Official Election Results (CPR/ENCORE)[2] and Poll Worker Election Administration System (EASY)[3] mainframe applications.

Audit Findings and Conclusions

The Board, having successfully handled the 2005 election events using the new systems, has completed the S-Elect Project. Therefore, as a finished product, S-Elect met the overall goals as stated in the system justification. The system also met its initial business and system requirements; and the design of the system allows for enhancements and upgrades. Further, a formal system development methodology was followed in developing the system; S-Elect functions reliably; and information recorded in the database is accurate. The Board procured S-Elect in accordance with the provisions of the City Charter and the PPB rules.

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[1] The S-Elect Project is comprised of two separate systems the Candidate Processing and Election Support System (CPESS) and the Poll Worker Requirements Support System (PWRSS).

[2] CPR maintains a database of all candidates for public office in New York City and is used to create ballots for each election. ENCORE automatically tabulates, verifies, and certifies the results of each election using election night polling machine totals provided by the Police Department and information on affidavit, absentee, military, and federal ballots.

[3] EASY is an inventory system of all registered voters, poll sites, and poll workers in all five boroughs. It has the ability to modify, add, and delete information in all Board sub-systems.

However, the Board has not incorporated written security procedures into the Board's policies and procedure manual for S-Elect. The absence of such policies exposes the system to unauthorized access. Also, the Board has not included S-Elect into its disaster-recovery plan or arranged for an alternate processing site. In that regard, the lack of these policies and plans increases the likelihood that the system will be vulnerable to unauthorized access, abuse, theft of equipment, and the loss of mission-critical information, especially in the case of a disaster.

Audit Recommendations

To address these issues, we recommend that the Board:

- Develop written policies and procedures for tracking system users and terminating user IDs for long-inactive users and for former employees. In addition, the Board should periodically review the status of inactive user accounts and terminate access, when appropriate.

- Ensure that the various duties of the administration of the S-Elect system are segregated and an appropriate backup system is in place in accordance with DOI Directives.

- Create an overall disaster recovery plan that includes S-Elect, conduct a comprehensive test of the plan, and schedule annual tests, as required by DOI Directives.

INTRODUCTION

Background

The New York City Board of Elections (Board) is an administrative body of ten Commissioners, two from each borough appointed by the City Council upon the recommendation of the two major political parties. The Commissioners serve a term of four years. They appoint a bipartisan staff to oversee the daily activities of the Board's main office and five borough offices.

The Board is responsible under New York State Election Law for the following:

- Conducting voter registration, outreach, and processing;
- Maintaining and updating voter records;
- Processing and verifying candidate petitions and documents;
- Overseeing campaign finance disclosures of candidates and campaign committees;
- Recruiting, training, and assigning the Election Day officers to conduct elections;
- Operating polling sites;
- Ensuring each voter the right to vote at the polls or by absentee ballot;

- Canvassing and certifying the vote;
- Conducting voter education and notification;
- Disseminating election information; and
- Preparing maps of political subdivisions.

The objective of the Board's S-Elect Project was to develop and implement new information technology systems to support the Board's election and poll-worker activities and to provide a framework for the eventual integration of all Board applications. These new systems would replace the Candidate Processing and Rotation/Entry and Certification of Official Election Results (CPR/ENCORE) and Poll Worker Election Administration System (EASY) mainframe applications.

The Board contracted with N-Tier Technology in 2002 to develop and implement the S-Elect project. There were two contracts related to this project registered by the New York City Comptroller's Office, specifically, N-Tier, the system integrator[4] and Information Methods, the project manager[5]. In addition, the project would provide a framework for the integration of the Board's remaining application systems (Automated Archival for Voter Information and Data, Poll Site, and Fleet Management). The contracts let for the project were valued at $4.3 million, and system development was under the direction of the Board's Director of Manager of Information Systems (MIS), who had prime management responsibility within the Board for development and implementation of systems projects. The project was conducted in two phases starting in January 2002, with Phase II completed in December 2005, as scheduled. Subsequently, in March, 2006, the Board developed new contracts, with new scope of services, with N-Tier Technology and Information Methods[6] through 2009. The purpose of these new contracts was to begin work on enhancements and to provide maintenance of the S-Elect bringing the overall value of the project to $7.2 million.

Objectives

Concerning the S-Elect system, the audit objectives were to determine whether the system:

- As a finished product, meets overall goals as stated in the system justification;

- Meets the initial business and system requirements;

- Design allows for enhancements and upgrades;

- Functions reliably, and information recorded in the database is accurate and is secure from unauthorized access;

- Was procured by the Board in accordance with City Charter provisions and Procurement Policy Board rules;

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[4] Contract # 00320030004365 was registered on July 31, 2002.
[5] Contract # 00320030009947 was registered on October 22, 2002.
[6] Contract # 00320060025864 and Contract # 00320060031320 were registered on March 13, 2006.

Concerning the Board, the audit objectives were to:

- Evaluate the Board's progress toward implementation of the system;

- Determine whether a formal system development methodology was followed when developing the system; and

- Determine whether a disaster recovery plan has been devised for the system and if so, whether the plan is incorporated in the Board's overall disaster recovery plan.

Scope and Methodology

Our fieldwork was conducted between March 2006 and July 2006. To achieve our audit objectives, we reviewed and analyzed the Board's:

- Organizational structure;

- Performance Highlights as reported in the Mayor's Management Reports from 2000 through 2005;

- Historical documents related to the development of the Candidate Processing and Election Support System and the Poll Worker Requirement Support System, the two systems contained in S-Elect;

- S-Elect system planning, procurement, development, testing, and implementation documentation;

- Filings pursuant to Comptroller's Internal Control and Accountability Directive #1, "Principles of Internal Control," from 2003 to 2005 and other system-related documentation, policies, standards, and procedures;

- Backup procedures;

- Compliance with applicable Procurement Policy Board rules; and

- Disaster recovery and contingency-planning procedures.

In addition, we interviewed members of the Board's staff to clarify the information provided to us; we conducted several walkthroughs at the sites using S-Elect to evaluate the controls at each site. During the walkthroughs, validation mechanisms,[7] error-isolation,[8] and

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[7] Validation mechanisms are system controls that evaluate input based on specified field requirements.
[8] Error-isolation controls prevent users from entering invalid records into the database.

exception reporting[9] features were evaluated. Further, we tested the validity of the information supplied to us (e.g., project specifications, voting system standards, sampling plans) by comparing it to information we gathered from various independent sources (e.g., prior comparable projects, standards, and project management standards).

Fieldwork also included reviewing pertinent sections of the Fiscal Years 2003 and 2004 reports to management provided by the City's external auditors in conjunction with the City's audited financial statements, specifically those sections relating to the internal controls at the Board.

The 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 Department of Investigation's (DOI) *Citywide Information Security Policy*, and the Department of Investigation's *Information Security Directive* were used as criteria for the audit. Since the City has no stated formal system-development methodology, the National Institute of Standards and Technology Special Publication 500-223, *A Framework for the Development and Assurance of High Integrity Software*, was consulted to ascertain whether the Board 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 the Board officials during and at the conclusion of this audit. A preliminary draft report was sent to the Board officials on September 21, 2006 and discussed at an exit conference held on October 13, 2006. On October 26, 2006, we submitted a draft report to the Board officials with a request for comments. We received a written response from the Board on November 14, 2006. In their response, the Board's officials agreed with the three recommendations made in this audit. However, the Board's officials stated "DOI guidelines are not applicable to us as an independent agency and although we would like to restate that position for the record, we accept all the audit's recommended guidelines as principles of best practices to be observed by the Board of Elections where possible."

The full text of the Board's comments is included as an addendum to this report.

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[9] Exception reporting is a system feature that produces a list of reports that show the records that have not been accepted because of invalid data or other inconsistencies.

FINDINGS

The Board, having successfully handled the 2005 election events using the new systems, has completed the S-Elect Project. Therefore, as a finished product, S-Elect met the overall goals as stated in the system justification. The system also met its initial business and system requirements; and the design of the system allows for enhancements and upgrades. Further, a formal system development methodology was followed in developing the system; S-Elect functions reliably; and information recorded in the database is accurate. The Board procured S-Elect in accordance with the provisions of the City Charter and the PPB rules.

However, the Board has no formal security policies for S-Elect. The absence of such policies exposes the system to unauthorized access. Also, the Board has not included S-Elect into its disaster-recovery plan or arranged for an alternate processing site. In that regard, the lack of these policies and plans increases the likelihood that the system will be vulnerable to unauthorized access, abuse, theft of equipment, and the loss of mission-critical information, especially in the case of a disaster.

S-Elect Met Its Stated Business and System Requirements and Goals

S-Elect met all the functional requirements of the applications and their integration into the S-Elect framework, and it established the foundation for integration of future applications. Specifically, Phase I of the implementation was initiated January 2002 and was completed in September 2002; Phase II was initiated in October 2002 and was completed in December 2005, as planned.

Methodology and Implementation

The Board and N-Tier Technology established a process to evaluate and address the needs of the Board when developing the new system. Both entities agreed on a formal systems integration methodology to accomplish these goals. This methodology was logical and included the following 11 milestones:

- Business-process analysis;
- Application selection;
- Software procurement;
- Hardware-software implementation;
- Customizations and integration;
- Data collection;
- Training;
- Completion and acceptance by the Board;
- Production implementation;
- Planning; and
- Warranty and support.

With the successful running of the 2005 election events using S-Elect, the project has been considered successfully implemented. Further, the S-Elect system has been in use during the general elections as well as for the smaller elections, such as the county committee process. S-Elect's Poll Worker Requirement Support System has been used for eight elections, while its Candidate Processing and Election Support System has been used for six elections.

S-Elect Allows for Enhancements and Upgrades

The S-Elect Project continues to evolve, and the Board has begun integrating the following sub-systems into the S-Elect framework:

- Change Management Sub-System;
- Office Holder Sub-System, which will provide the Board with the ability to minimize data entry by having reference to previously submitted names and addresses for direct population of data fields;
- Candidate Financial Disclosure System, which will be used for candidate financial filings; and
- Means to interface with proposed electronic voting machines.

On March 13, 2006, two new contracts were let valued at $2.93 million for enhancements to the S-Elect Project through 2009. The scope of services consists of maintenance to the existing voter registration system, specifically in the areas of support and enhancement, including modification required by the Help America Vote Act legislation.

Safeguarding the Information Processing Environment

Written security procedures have not been incorporated into the Board's policies and procedure manual. The absence of such policies exposes the system to unauthorized access. Also, the Board has not included S-Elect into it disaster-recovery plan or arranged for an alternate processing site. In that regard, the lack of these policies and plans increases the likelihood that the system will be vulnerable to unauthorized access, abuse, theft of equipment, and the loss of mission-critical information, especially in the case of a disaster.

User Accounts Not Adequately Controlled

The Board has not incorporated written policies and procedures to safeguard its information processing environment into its policies and procedure manual. Specifically, the Board does not have a security policy that requires periodic password changes in order for users to access the S-Elect applications. Further, the Board has never reviewed the user permissions allowing access to S-Elect for its 413 users. In addition, deletion of passwords, user authorizations, and user IDs, are the responsibility of the users in the individual departments of the Board. As a consequence, the Board cannot ascertain those users who are inactive for long periods of time or former employees continue to have active user status on the system. Employees who have not accessed the system for long periods of time and former employees

should not have active user profiles. Inactive users and former employees should have their user IDs deleted from the system to avoid the potential for unauthorized access to the system. By not having a security policy that requires regular password changes and periodic review of unused passwords, the system is vulnerable to unauthorized access, abuse, and the loss of mission-critical information.

DOI Directive #2.17, §2, states that "all city agencies must develop and disseminate an agency-specific password policy." In addition, §2.3, states that "City agencies must force password expiration by requiring that all users . . . change the passwords every 30 days." DOI Directive #2, §2, states that "resource- and network-access permissions must be defined so that access or use is granted in accordance with a user's actual work requirement."

Formal policies are useful for communicating management's expectations, requirements, and vision for the agency or division. They are needed to create the framework with which departmental procedures must align. The lack of these basic security measures increases the vulnerability of the system to misuse and increases the potential for goals to be misconstrued, resources misused, and effectiveness diminished.

Duties of System Administration Not Segregated

One individual is responsible for several various related maintenance functions of the system, namely those of Senior Systems Analyst and Security Administrator. We believe, this is a violation of DOI Directives calling for the segregation of duties of the system and poses a risk to the information processing environment.   In addition, the Board has not designated specific backup personnel to administer these roles in the event of illness, termination, retirement, or disaster. Under the current environment, this individual could make changes to the system, could allow system security to be breached; and could manipulate the system's infrastructure without detection since these functions are not segregated.

DOI Directive #5, §3.1, states that "personnel assignments must be delegated" and requires "that all roles are filled and appropriate backup is in place." In addition, §3.2, states that "assignments must be made with the intent of avoiding conflicting duties. . . . For example the same person may not be responsible for network operation and network security."

Incomplete Disaster Recovery Plan

The Board has not included S-Elect in its disaster recovery plan, and during the period covered by this audit, the Board did not have a disaster recovery alternate processing site. However, officials of the Board informed us that such a site is scheduled for completion in 2007. We also noted that the Board does have an interim plan in place, whereby system back-up files are periodically sent out of New York City. The system can be run from these files, if necessary.

RECOMMENDATIONS

The Board should:

1. Develop written policies and procedures for tracking system users and terminating user IDs for long-inactive users and for former employees. In addition, the Board should periodically review the status of inactive user accounts and terminate access, when appropriate.

   Board's Response: [The Board will] "include our operation practices (which are documented as part of the integrated facilities of S-Elect) for tracking systems users, terminating user IDs for inactive users, and reviewing of inactive user accounts in our BOE [Board of Election] Policies and Procedure Manual." Further, the Board will "review some aspects of the DOI guidelines which you have identified in the audit report such as changing of passwords every thirty days, in the context of our ability to manage the level of frequency as w[e]ll as its practical application to our agency requirements and operations."

2. Ensure that the various duties of the administration of the S-Elect system are segregated and an appropriate backup system is in place in accordance with DOI Directives.

   Board's Response: [The Board will] "examine the assignments of our security administrator and assigned backup personnel to insure that the scope of their responsibilities will not interfere or conflict with the proper administration of their security responsibilities. We believe that such conflicts do not exist."

3. Create an overall disaster recovery plan that includes S-Elect, conduct a comprehensive test of the plan, and schedule annual tests, as required by DOI Directives.

   Board's Response: [The Board will] "continue the development of the Disaster Recovery Site [DR], plans of which were presented during the audit. The site is scheduled to be fully operational in 2007 with new hardware and software which are part of our total facilities upgrade program. Until the DR site is fully operational, interim measures are being taken (also outlined during the audit) to insure rapid recovery of S-Elect operations. The formal MIS [Management Information System] disaster recovery plan/procedures will be integrated with the overall BOE plan which is being enhanced."

TERRENCE C. O'CONNOR
PRESIDENT

ANTHONY COMO
SECRETARY

JEANNETTE GADSON
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JAMES J. SAMPEL
NANCY MOTTOLA–SCHACHER
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COMMISSIONERS

JOHN RAVITZ
EXECUTIVE DIRECTOR

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November 14, 2006

Mr. John Graham
Deputy Comptroller
Audits, Accountancy, and Contracts
1 Centre Street
New York, NY 10007

Re: Audit Report on the Development and Implementation of the
     S-Elect Project by the Board of Elections in the City of New York 7A06-111

Dear Mr. Graham:

Attached is the response from the Board of Elections in the City of New York to the above -
captioned **draft** report. We are submitting it to you in advance of the extended deadline for
comment of November 17, 2006. (Deadline for response was November 10, 2006; extended by
Vincent Liquori of your staff due to the November election cycle)

If you have any questions regarding this response, please contact Mr. Elliot B. Borack, ACCO at
(212) 487-7290.

Sincerely,

Terrence C. O'Connor
President

Attachment

Cc: John Ravitz, Executive Director
     George Gonzalez, Deputy Executive Director
     Pamela Perkins, Administrative Manager
     Elliot B. Borack, ACCO
     Steven Ferguson, MIS Director
     Steven H. Richman, General Counsel

Board of Election Reply to the Final Audit Report

At the October 13, 2006 joint meeting between your audit staff and BOE staff, we reviewed the draft report dated September 21, 2006 and made several comments, a number of which have been taken into consideration in the final report. At that meeting our General Counsel Steven H. Richman, made the point that as a Non-Mayoral agency, in fact a hybrid- City/State Agency, DOI guidelines are not applicable to us as an independent agency and although we would like to restate that position for the record, we accept all the audit's recommended guidelines as principles of best practice to be observed by the Board of Elections where possible.

After reviewing the recommendations in the final report the Board will:

1. Include our operation practices (which are documented as part of the integrated facilities in S-Elect) for tracking systems users, terminating user IDs for inactive users, and reviewing of inactive user accounts in our BOE Policies and Procedures Manual.

2. Examine the assignments of our security administrator and assigned backup personnel to insure that the scope of their responsibilities will not interfere or conflict with the proper administration of their security responsibilities. We believe that such conflicts do not exist.

3. Continue the development of the Disaster Recovery Site, plans of which were presented during the audit. The site is scheduled to be fully operational in 2007 with new hardware and software which are part of our total facilities upgrade program. Until the DR site is fully operational, interim measures are being taken (also outlined during the audit) to insure rapid recovery of S-Elect operations. The formal MIS disaster recovery plan/procedures will be integrated with the overall BOE plan which is being enhanced.

4. Review some aspects of the DOI guidelines which you have identified in the audit report such as changing of passwords every thirty days, in the context of our ability to manage this level of frequency as will as its practical application to our agency requirements and operations.

We found the audit process to be constructive and helpful to improving the Boards MIS operations and security administration. We thank you for the professional manner in which this audit was conducted.