CITY OF NEW YORK
OFFICE OF THE COMPTROLLER

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BUREAU OF FINANCIAL AUDIT

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A COMPILATION OF SYSTEM DEVELOPMENT AUDITS AND AN ASSESSMENT OF CITYWIDE SYSTEMS-DEVELOPMENT STRATEGY

FS10-136S

May 13, 2010

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THE CITY OF NEW YORK
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May 13, 2010

To the Residents of the City of New York

My office conducted audits during fiscal years 2005 through 2009 that have documented instances of mismanagement of system-development projects. These instances of mismanagement have included: excessive cost overruns; missed deadlines; systems not developed as planned; and systems that simply did not meet agency needs and were abandoned. In general, based on the results of our audits of IT system development projects, we have determined that the City has not created a successful unified City-wide strategy for developing IT systems. As a consequence, the resources invested in these projects are at risk.

For this compilation report we revisited the lessons learned from the findings of these audits when viewed in total. We focused on the system development process and the costs associated with these projects. Based on our re-evaluation, we conclude that up to $190.7 million of the $299.6 million examined may have been poorly spent, specifically: up to $125.3 million on cost overruns; $50 million on a system that did not meet its initial business and system requirements; and up to $15.4 million on systems that, due to issues of functionality, are at risk of not accomplishing the tasks for which they were developed.

However, we did conclude that there appears to be an improvement in the process of developing IT system projects. Our earlier audit reports identified cost overruns or funds wasted, as well as reservations regarding whether the systems met their original business and systems requirements and overall goals. Our more recent reports disclosed systems that are operational, although they identified instances of deficiencies or incomplete deliverables from which it may be concluded that some portion of the associated investment in the system may be at risk.

If you have any questions concerning this compilation report, please e-mail my audit bureau at audit@Comptroller.nyc.gov.

Sincerely,

John C. Liu

Table of Contents

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

A COMPILATION OF SYSTEMS DEVELOPMENT AUDITS AND AN ASSESSMENT OF CITYWIDE SYSTEMS-DEVELOPMENT STRATEGY

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REPORT IN BRIEF

Given the amount of taxpayer money spent on computer systems, the Comptroller's Office has dedicated a portion of the resources of the Audit Bureaus to conduct audits of computer system-development projects implemented by City agencies.

Audits conducted by the information technology (IT) division during the period of fiscal years 2005 through 2009, have documented instances of mismanagement of system-development projects. These instances of mismanagement have included: excessive cost overruns; missed deadlines; systems not developed as planned; and, systems that simply did not meet agency needs and that were abandoned.

Report Findings and Conclusions

For this compilation report we revisited the lessons learned from these audit reports when viewed in total. We focused on the system development process and the costs associated with these projects. Based on our re-evaluation, we conclude that up to $190.7 million of the $299.6 million IT system-development projects examined may have been poorly spent, specifically: up to $125.3 million on cost overruns; $50 million on a system that did not meet its initial business and system requirements; and, up to $15.4 million on systems that due to issues of functionality are at risk of not accomplishing the intended tasks. In general, based on the results of our audits of IT system development projects, we have determined that the City has not created a successful unified City-wide strategy for developing IT systems. As a consequence, the resources invested in these projects are at risk.

However, we did conclude that there appears to be an improvement in the process of developing IT system projects. Our earlier audit reports identified cost overruns or funds wasted, as well as reservations regarding whether the systems met their original business and systems requirements and overall goals. Our more recent audit reports disclosed systems that are

operational, although they identified instances of deficiencies or incomplete deliverables from which it may be concluded that some portion of the associated investment in the system may be at risk.

Report Recommendations

To address these issues we make seven recommendations for improvement:

1. Management must be realistic about the results they want from the new system and when the system will be fully operational. The use of performance indicators can help identify potential problems early in the development.

2. Requirement planning should include all users that are able to specify the requirements precisely as to what the finished system should include in order for it to be well-designed and effective. These users should be involved in planned tests, adequately trained as testers, and they must be allowed sufficient time to achieve the testing objectives.

3. Project time-frames should be short, which means that large system development projects should be split into separate modules.

4. The consistent use of the System Development Life Cycle as defined by Department of Information Technology and Telecommunications' (DoITT) Project Management Office by all City Agencies.

5. An independent Quality Assurance (QA) consultant must be employed at the outset of project development with specific instructions to objectively evaluate the progress of the development and evaluate the performance of the vendor as defined in VENDEX (Vendor Information Exchange System) to augment the evaluation performed by the specific City Agency.

6. An Oversight Committee comprised of City representatives with technical expertise should be established to review all project plans to see if they are realistic. Participants of the Oversight Committee should be encouraged to challenge the development team as to the viability of the timely completion of the project. Also, this Committee should be empowered to monitor the progress of each technology project undertaken throughout the City with a specific 'go or no go' process. This would thereby help to close the void that currently exists in the development of system projects.

7. A team consisting of agency management, an independent oversight committee, and the QA consultant should evaluate the impact that requested changes (either legal or user specified) will have on system requirements, costs, and it should consider the magnitude of project risks caused by these changes.

INTRODUCTION

Background

In the United States, companies spend billions of dollars each year on IT application development. The average cost of a systems development project ranges from $500,000 for a small company to $2.3 million for a large company.[1]

The United States General Accounting Office (GAO) released testimony in 2009 that identified 87 out of 472 IT projects undertaken by the Federal Government that are classified as "high risk," costing $4.8 billion that had performance shortfalls.[2] Most of the projects cited in this report were categorized as high risk, because delay or failure to complete them would negatively impact the mission of the respective Federal agency overseeing their development.[3] Moreover, the GAO reported that approximately 35 percent of these high risk projects experienced problems in development.[4] The GAO asserted that these problems stemmed from not: establishing system specifications with clear cost, schedule, and performance goals; keeping the project cost and schedule variances within 10 percent; assigning a qualified project manager; and, optimizing investments.

More recently the GAO reported that federal government expenditures for IT have exceeded $60 billion each year since fiscal year 2004, and that the government expects to spend about $71 billion in fiscal year 2009.[5] As a control, 24 major Federal agencies have guidance calling for department-level investment review boards to select and oversee IT investments. The GAO reviewed the investment management guidance of these 24 major agencies to determine the contribution that these review boards made when selecting and overseeing IT projects. About half of the projects the GAO examined did not receive selection or oversight reviews by the respective agency boards. Specifically, 12 of the 24 projects the GAO reviewed that were identified by the federal Office of Management and Budget as being poorly planned did not receive a selection review. These projects accounted for $4.9 billion in the President's fiscal year 2008 budget request or two-thirds of the funding represented by the 24 projects. In addition, thirteen of 28 poorly performing projects the GAO reviewed did not receive an oversight review by a department-level board. These projects accounted for about $4.4 billion or 93 percent of the funding represented by the 28 projects.

New York City has also spent significant taxpayer dollars on maintenance and development information technology systems over the last decade to become more efficient and to more effectively meet the needs of its residents. As such, most City agencies have increased their reliance on computer systems to provide vital services to the public. To support

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[1] *The Chaos Report*, Standish Report 2003

[2] *Information Technology: Management and Oversight of Projects Totaling Billions of Dollars need Attention*, GAO-09-624T, April 28, 2009

[3] *Information Technology: Agencies and OMB Should Strengthen Processes for Identifying and Overseeing High Risk Projects*, GAO-06-647, June 2006

[4] Ibid.

[5] *Information Technology: Federal Agencies Need To Strengthen Investment Board Oversight of Poorly Planned and Performing Projects, GAO-09-566*, June 2009

applications already developed, the City has spent $3.271 billion over fiscal years 2000 through 2009.[6] Moreover, the City anticipates spending $1.82 billion on the maintenance and development of major IT system projects over the period of fiscal years 2010 through 2013.[7]

The development of major computer systems is an expensive, time consuming, and resource-intensive undertaking. System development projects can by their nature be technically and organizationally challenging. They are also prone to a number of risks that can result in: cost overruns; extended development periods; failure to meet initial needs and objectives; and, in the worse cases, outright failure. However, the cost of these failures and overruns may only be a small portion of the wasted resources that companies will experience in system development. Missed opportunities can result in a number of additional costs: lost economies of scale; lost market share; and, lost efficiencies. The cost of these missed opportunities is often times difficult to measure and could easily amount to trillions of dollars.

Why System Development Projects Fail

A successful computer project generally meets the following criteria: 1) it is delivered on time; 2) it is on-or under-budget; and 3) it functions as required. However, in reality few projects meet all three criteria. Many computer systems are delivered that fail on one or more of these criteria. This in turn, as previously stated, has caused a substantial number of system projects to be canceled, or experience extensive delays. A number of factors are involved in any particular project failure, some of which interact with each other. Among the reasons for computer-project system failures are:

- **Poor Project Management:** Project Management is the discipline of defining and achieving targets (developing requirements) while optimizing the use of resources (time, money, people, materials, energy, space, etc.) over the course of a project (a set of activities of finite duration). Project Management is often the responsibility of an individual project manager. This individual seldom participates directly in the activities that result in the finished product. Instead, the project manager strives to maintain the progress and productive mutual interaction of various parties in a way that reduces the overall risk of failure of the entire project. The inability to foster a strong project management function increases the risk of failure.

- **Lack of User Involvement:** If a project is to be successful, senior management and end-users must be involved from the start of development and throughout the entire development process. Therefore, senior management must continuously communicate the importance of the project to subordinate staff and they must ensure that staff supports the project management team. Without user involvement, personnel cannot feel committed to a new system and they can even be hostile to its introduction and use.

[6] *Comprehensive Annual Financial Report of the Comptroller*, Fiscal Years 2000 – 2009.
[7] *The City of New York Ten-Year Capital Strategy Fiscal Years 2010-2019, Office of Management and Budget and Department of City Planning*, May 2009.

- **Poor System Requirements or None:** There have been instances in which developers produced systems they thought would meet the requirements of end-users, but the systems they developed actually failed to do so. This condition occurs when: management does not adequately identify the needs and requirements of the system to be developed; vendors do not ascertain from management adequate system specifications; or, the vendor has no real knowledge of the entity's mission and the critical functions the entity must perform to be successful in its mission. Therefore, poorly designed system requirements or even worse, none at all, can result in the failure to develop vital user functions. The consequence will be delays in implementing a complete, automated system that satisfy end-users and enhance productivity.

- **Long or Unrealistic Time-Frames:** The size and complexity of a project have led to many systems being delivered late or with only some fraction of the components initially envisioned. The result being that systems are either obsolete or of no use to an organization when delivered. Many managers are well aware that timely delivery is a key to a successful system. Therefore, care must be taken when establishing schedules. Realistic scheduling considers the volume of work that needs to be done to ensure timely delivery.

- **Enlarging the Scope of Development:** Many projects can experience a growth in magnitude during their development. At the outset of any development project, management must be realistic as to what type of system is to be developed, and then they must remain within a specific timeframe as to when development is to be completed. Enhancement to the system should be addressed only after the system is developed. Major change orders to the specifications of a system should generally not occur during development. Enlarging the scope of a project after it has begun can lead to major project delays and cost overruns.

- **No System of Change Control:** Over time the way in which entities conduct their business alters. With the advent of better and faster technology, the rate of this change is happening at a faster rate than ever before. Therefore, it is realistic to expect modifications to be made in system specifications while a system is being developed. Any changes to system requirements must be evaluated in terms of the effects on the project schedule, costs, and added risks. Changes must be managed to ensure efficient and timely completion of the system. Uncontrolled changes to a system under development have resulted in many project failures.

How the City Has Tried to Address These Issues

On October 6, 1998, New York City Mayor Rudy Giuliani signed Executive Order No. 43 entitled, "The Establishment of the City of New York Technology Steering Committee." Among other directives, the Order required that "the annual technology plans of all mayoral agencies shall be submitted by each agency to the Committee on such date as the Committee

shall determine, and in accordance with guidelines prescribed by the Committee." The Order further stipulates that the Technology Steering Committee (created by the same Order) "must approve all annual technology plans of all mayoral agencies, including their plans for the procurement and deployment of major technology initiatives. . . . approve agency reports will be published at the beginning of each fiscal year as an annual addendum to the City's Technology Strategy." The Technology Strategy is a document required by the Order and was published once in March 1999. In 2008, the City published PlanIT, New York City's Technology Plan, which portrays the vision and framework for how the City will use IT in the years ahead to improve New Yorkers lives.

In June 2004, Mayor Bloomberg focused his administration's efforts on using business strategies and relevant technology to make government more accessible, responsive, and accountable to its citizens. DoITT was directed to work closely with City agencies to manage and assist in this initiative. Three initiatives were established: (1) leveraging the City's strategic technology infrastructure and investments to ensure high availability and resiliency of resources; (2) the secure, efficient use of resources; and, (3) the monitoring of the management of large and complex IT projects to ensure their delivery was on-time and within budget, thus mitigating the risk associated with maintaining those projects.

The DoITT Program Management Office (PMO) was established to provide project management standards, guidance, and services for Citywide and cross-functional technology programs and initiatives. The PMO defined a common methodology for managing technology projects in the City of New York. This methodology includes templates for the different processes that are part of the Project Management Life Cycle (for deliverables described as "specific to project"). Currently, the Systems Development Life Cycle (SDLC) is covered as part of Project Delivery with more delivery processes to be added in the future.

DoITT also issued its Security Accreditation Process policy in July 2007. This policy requires that all City-wide applications must be built in a secure fashion. In order to ensure this goal, the policy requires that all applications "must be reviewed and approved by the Citywide Chief Information Security Officer. Accreditation must be achieved prior to migrating to the production environment." The DoITT Accreditation Process is a key control in ensuring the integrity of the City's data processing systems environment and the security, reliability and validity of the data contained therein.

Finally, system development controls are also addressed in Comptroller's Directive 1 *Principles of Internal Control* (revised January 18, 2005). Per this directive, City agencies are required to annually file a Financial Integrity Statement (FIS) with the New York City Office of the Comptroller. A completed copy is also sent to the Mayor's Office of Operations. The basis of this annual filing is an extensive updated internal control checklist, most recently completed for calendar year 2009. The questions in the FIS the Office of the Comptroller considers to represent basic internal control criteria that agency management should follow in a best practices environment. Several sections of this checklist address IT controls, including systems development. The Audit Bureaus of the Office of the Comptroller may audit the individual agency annual FIS responses, including the checklists, required attachments, and supporting documentation available at agency sites.

IT Audits Completed by the New York City Comptroller's Office

Given the amount of taxpayer money spent on computer systems, the Comptroller's Office has dedicated a portion of the resources of the Audit Bureaus to conduct audits of computer system-development projects implemented by City agencies.

Audits conducted by the IT Division during the period of fiscal years 2005 through 2009, have documented instances of mismanagement of system-development projects. These instances of mismanagement have included: excessive cost overruns; missed deadlines; systems not developed as planned; and, systems that simply were abandoned after development, because they simply did not meet agency needs. For this compilation we revisited the lessons learned from these audit reports when viewed in total. We focused on the system development process and the costs associated with these projects. Based on our re-evaluation, we conclude that up to $190.7 million of the $299.6 million IT system-development projects examined may have been poorly spent. Specifically, we noted: up to $125.3 million on cost overruns; $50 million on a system that did not meet its initial business and system requirements; and, up to $15.4 million on systems that due to issues of functionality are at risk of not accomplishing the tasks for which they were intended. In general, based on the results of our audits of IT system development projects, we have determined that the City has not created a successful unified City-wide strategy for developing IT systems. As a consequence, the resources invested in these projects are at risk.

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The balance of this report consists of: extracts from some of our original audit reports with updates as to the current status of each project; our overall recommendations from the conclusions based in this compilation report; and, the funds associated with these projects, which are listed in Table 1.

SYSTEM DEVELOPMENT SUMMARIES
EXTRACTED FROM THE ORIGINAL AUDIT REPORTS

Department of Citywide Administrative Services (DCAS)
New York City Automated Personnel System
Audit #7A04-064 (issued May 19, 2005)

The goal of New York City Automated Personnel System (NYCAPS) was to make available to users more accurate and accessible personnel-related information. The development of NYCAPS was to commence in January 2000 and continue over a four-year period until 2004. The original budget for NYCAPS was $66 million.

DCAS was charged with overseeing the development of NYCAPS. In that regard, DCAS hired a vendor in July 2000 to analyze user needs, and to define and to develop business and system requirements for NYCAPS. This vendor was also engaged to develop a technical design and test plan for the system. By June 2001, the vendor's analysis of user needs at six City agencies applicable to the human resources component of NYCAPS had been completed. However, in February 2001 the project manager directed the vendor to develop sample prototype screens. At that time he also chose to enlarge the project's scope by directing the requirements vendor to develop two additional applications exclusively for the Administration for Children's Services and the New York City Police Department. It should be noted that ideally project time-frames should be short; which means that large systems should be split into separate modules, thus increasing the probability of a successful implementation. Yet, this was not the case with the development of NYCAPS. Finally, in July 2002, a security breach was discovered in an operational component of the system, and, as a result, use of this application was halted and the NYCAPS development was suspended.

In April 2003, DCAS presented a new plan to City officials to complete NYCAPS. The plan was approved in August 2003. In November 2003, DCAS resumed development of NYCAPS. As of January 2004, the City had already spent $50 million on NYCAPS development. However, at that point the development of NYCAPS was still far from being completed.

City officials estimate that it will cost another $70 million to complete the system. If the City decides to include the Department of Education and all enhancements in the development of NYCAPS, it will cost an additional $35 million to complete the project. This brings future development costs to at least $105 million, which is in addition to the $50 million already expended on NYCAPS development. When completed, the cost of the NYCAPS development is estimated to be $155 million.

We are unable to determine whether: NYCAPS as a finished product meets the overall goals stated in the system justification; the NYCAPS system design allows for future enhancements and upgrades, and; NYCAPS meets initial DCAS business and system requirements. We did find, however, that DCAS did not adequately define the business and system requirements for the four NYCAPS applications that were completed. Specifically, the

requirements did not contain: definitions of each phase of the development or definitions of the standards for determining whether the system met the objectives of the applications; safety and security requirements; user-interface requirements; and, performance requirements. In addition, each application's test plans lacked essential details. Requirement planning should include all users in order to precisely specify what requirements the system should include as a finished product.

Although DCAS followed a formal system development methodology when it began developing NYCAPS, it did not successfully implement that methodology. Moreover, while NYCAPS was generally procured in accordance with City Procurement Policy Board (PPB) Rules and City Charter provisions, deficiencies in the procurement process led to DCAS' failure to complete NYCAPS in a timely manner and within its original budget. In addition, DCAS has not incorporated the completed NYCAPS applications into its disaster recovery plan.

In November 2004, DCAS transferred the NYCAPS project to the Financial Information Services Agency of the City of New York (FISA) for completion. In its role as project manager, FISA employed a system implementation methodology and CTG, Inc was engaged by DoITT as a quality assurance vendor. FISA amended the agreement with the system integrator. The amended agreement permits work to be done in modules and sets fixed-price deliverables. This allows the City to make considered decisions at strategic points in time during the project's development. In response to the Comptroller's 2008 Directive 1 checklist, DCAS stated that NYCAPS is operational but is still in process of being fully developed.

Human Resources Administration (HRA)
Paperless Office System
Audit #7A04-099 (issued May 2, 2005)

In 1993, HRA reviewed its benefit application process and it found the process to be labor-intensive, inefficient, and error-prone. To address these problems and to prepare for an anticipated increase in service demand, HRA decided to develop the Paperless Office System (POS). HRA's goal for POS was to be a single data-entry point for several programs and for POS to automate the process of determining and re-certifying public assistance eligibility. POS was supposed to be implemented Citywide by April 1998, according to the Fiscal Year 1996 Mayor's Management Report (MMR).

Despite HRA following formal systems development methodologies and spending more than $47 million on system design and development, POS was not complete as of our initial report's issuance in May of 2005. Moreover, we found that it did not meet the Department's initial business and operating requirements. We found the design of POS allows for future enhancements and upgrades. However, the system was not complete, with 24 of 106 system functions were not operational, we could not determine whether POS as a finished product, met the overall goals stated in the system justification.

The reasons for the project delays are directly attributable to the Department's decision: not to employ a quality-assurance consultant at the start of the project; not to assign a full-time manager to the project until one year after it first recognized the need for one; and, to change the system-

development methodology it was following during the third quarter of 1998—at least two years after the advanced planning document for the system was prepared.

It was impossible to attest to the total amount that the Department has expended to develop POS. HRA asserted that it expended approximately $47 million on the development of POS. Subsequently, we found 17 other contracts totaling $15.9 million under which HRA spent money on POS development. Since those 17 contracts also included other system development projects and did not allocate costs by project, we could not ascertain the amounts directly attributable to POS. In addition, although we found these 17 additional contracts through sources independent of HRA, it is not reasonable to conclude that we were able to identify all contracts related to the development of POS. For these reasons, we could not determine the total amount that the HRA expended on the development of POS.

In March 2010, this office did a follow-up and we found that while HRA instituted most of the recommendations included in our prior report, it did not engage an independent quality-assurance consultant for a later system development (Medical Assistance Tracking Information System), which we discuss later in this report.

Administration for Children's Services (ACS)
Legal Tracking System
Audit #7A05-085 (issued May 23, 2006)

The ACS Division of Legal Services (DLS) provides legal representation and advice to the agency and consists of two divisions. Prior to 2000, many of these units had their own computer system to handle daily operations. The populations and cases served by the various systems often overlapped, resulting in complications and redundancies. Consequently, ACS decided to create the Legal Tracking System (LTS)—a comprehensive, integrated system for DLS, with one shared database and separate modules for each unit.

The procurement process for LTS generally complied with the existing practices in effect at that time, and the design of LTS allows for future enhancement and upgrades. However, because the system was not complete as of the date of the audit, we could not determine whether LTS, as a finished product, met the initial business and operating requirements or the overall goals as stated in the system justification description. ACS has spent $9.2 million on this project and LTS should have been operational by April 2005. Yet, as of the date of the audit report, ACS had completed only Phase 1 and 2 of a three-phase development. According to ACS, as of March 20, 2009 the system is in operation.

LTS was designed and developed according to a formal system development methodology. However deficiencies in following that methodology led to delays in development and to increased project costs—the cost increased from an estimated $5.6 million to $9.2 million as of March 2005. ACS indicated that in Fiscal Year 2006 it needed to spend an additional $718,853 on LTS development. Yet, ACS officials could not provide us with an estimate of the amount needed to complete Phase 3, since, some Phase 3 components have been indefinitely put on hold.

LTS generally functions reliably and contains accurate current information; however, access controls need improvement, and data converted from a prior system were often found to be inaccurate and lacking certain data. ACS has also not incorporated LTS into its disaster recovery plan. Finally, our survey of LTS users disclosed that 33 percent of the users who responded to the survey were happy with LTS. Sixty-seven (67) percent of the survey respondents were somewhat satisfied with LTS. But they would like to see changes made to the system, such as to enhance user screens, and to improve the accuracy of the data processed in the system.

Department of Finance (DOF)
Automated City Register Information System
Audit #7A05-084 (issued January 27, 2006)

The Automated City Register Information System (ACRIS) is a large-scale electronic document management system. It was designed to improve access to information about real and personal property, to improve the processing and recording of property documents and related fees and taxes. DOF 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. The project was to be developed in 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 (Gigabyte) of data downloaded from the site every month. Through February 2005, DOF expended $56,687,429 of the $71,141,671 value of the Bearing Point contract.

ACRIS is operational and generally meets the initial business and system requirements of Phases 1 and 2 of development. 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 it 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, DOF did not hire an independent quality-assurance consultant. Accordingly, our user survey revealed that users consider ACRIS to be labor intensive, and therefore not user-friendly. In addition, our testing disclosed weaknesses in the system's access controls. Had the Department employed an independent quality-assurance consultant during the system's development, these problems might have been addressed during the development process.

New York City Fire Department (FDNY)
Enterprise Asset Management System
Audit #7A06-095 (issued: June 30, 2006)

Enterprise Asset Management System (EAMS) is an asset-management application that contains numerous modules, including assets, asset-hierarchy management, audit trails, commercial services, depreciation, key performance indicators, linear assets, messenger, usage

monitoring, calibration, and advanced reporting. EAMS was purchased by FDNY to address their need to achieve a comprehensive asset-management system for the Building Maintenance Division (BMD) process. BMD is responsible for the repair and maintenance of FDNY buildings and for the design and construction of new facilities. BMD responds to routine repairs and maintenance of FDNY facilities through demand for service requests.

A formal system methodology was agreed to by both the vendor (ICICI) and FDNY. This methodology was adhered to during the course of the system's integration. Thus, EAMS met the overall asset and inventory management goals and the business and system requirements established by FDNY. The design of EAMS also allows for future enhancement and upgrades. EAMS generally functions reliably, and it contains accurate information. Reasonable controls are in place to keep it secure from unauthorized access.

However, in October 2003 after only five months into the project, ICICI discontinued its government services practice. But it continued to work on the EAMS project. Although, between December 2003 and February 2004, ICICI dismissed many of the key personnel it assigned to the EAMS project. As a result, the FDNY did not receive the level of service that was agreed upon in its contract with ICICI. Thus, a dispute arose over the scope of service provided by ICICI and the FDNY withheld $207,587 from the vendor. In May 2005, ICICI agreed to withdraw from providing any future services on the contract. In total, ICICI was paid $1.1 million for the development of EAMS. In order to complete the project, in January 2006, the FDNY issued a purchase order for an additional $48,542 to Global PTM, Inc., for product service, support, maintenance, and consultant services for EAMS, which was not originally planned. Fortunately, despite the decision not to hire a different integrator earlier, EAMS has been fully incorporated into BMD process, is considered complete, and FDNY is in the process of fine-tuning it.

Department of Citywide Administration Services (DCAS)
Capital Asset Management System
Audit # 7A06-112 (issued June 29, 2007)

This audit examined the development and implementation of the Capital Asset Management System (CAMS) to provide a Web-based capital planning and management software system. On September 1, 2003, DCAS contracted with Aramark Facility Services, Inc., (Aramark) to provide CAMS, an off-the-shelf product that has been in use in the business world for several years. As part of the contract, DCAS agreed that Aramark could use Vanderweil Facility Advisors, Inc., (VFA) as its subcontractor. VFA was responsible for installing, and maintaining CAMS in accordance with the contract.

Specifically, VFA was to provide a detailed and comprehensive facility and infrastructure condition assessment of the 53 public buildings that were under the custodianship of DCAS. This was to result in a Web-based database comprising all data collected during the assessment, and a fully operational capital planning and management software system. CAMS is Web-based, and at the time of the completion of the audit it was installed and maintained by VFA at the AT&T Internet Data Center in Boston, Massachusetts. DCAS personnel can access and update information on CAMS only through the CAMS Internet Web site. DCAS procured CAMS

through a New York State Office of General Services, Building Commissioning and Asset Management Services contract, a procedure that is in accordance with the PPB rules.

The audit found that DCAS did not review VFA operational procedures and controls to ensure they were in accord with acceptable City standards. VFA's disaster-recovery plan is also not specific, and documentation of a comprehensive test for disaster recovery was not provided. Moreover, security assessments have not been performed and DCAS representatives did not review the access privileges of individuals employed by VFA who had access to CAMS. As of this report, CAMS has been accepted as operational by DCAS.

Human Resources Administration (HRA)
Medical Assistance Tracking Information System
Audit #7A07-066 (issued: September 17, 2007)

In April 1999, HRA undertook a project to implement a new system to replace the existing systems of the Home Care Service Program (HCSP) and to provide improved efficiency at HCSP. The first step in the project was the replacement of the Home Attendant Line Operating system, which was designed in the early 1970s, and by 1998 it had become obsolete. A replacement system known as the Medical Assistance Tracking Information System (MATIS) was designed and developed by a vendor (Computer Horizons Corporation) in conjunction with HRA employees. The objective of the MATIS system was to fully automate the business processes carried out by the HCSP staff. In the advanced planning document, dated July 23, 1998, the projected five-year cost of the project was $3,437,357, and it was anticipated that the project would realize savings and cost avoidance of $12.3 million.

Our audit found that HRA followed a formal system development methodology when developing MATIS. HRA generally complied with the City Charter and relevant Procurement Policy Board rules when procuring services, equipment, and software for the system. However, we could not ascertain whether MATIS met the overall goals as stated in the original system justification, although the system is operational and the system design allowed for future enhancements and upgrades.

We found issues when we performed sample testing and created test cases to review and analyze the data stored in the system. Based on the test results, MATIS contained inaccurate, outdated, and unreliable data. These problems were caused in part by the lack of a formal approval signifying that the system was fully reviewed by an independent quality assurance (QA) unit prior to MATIS being released into production. HRA also did not have an acceptance-testing certificate for each of the deliverables for the initial business and system requirements. There also were security weaknesses in MATIS. MATIS does not require that users change their passwords on regular basis; MATIS is also not equipped with an automatic lockout feature. Moreover, HRA does not have procedures in place to ensure that security violations are recorded, documented, and reviewed. Finally, HRA did not incorporate MATIS into its agency-wide disaster-recovery plan.

The results of our user satisfaction survey revealed that 75 percent of the respondents stated that they would like to see changes made to MATIS. Of those surveyed, 71 percent of the respondents stated that the data in the system was occasionally incorrect, and 52 percent of the

respondents stated that MATIS is not user friendly. Further, the respondents of the survey noted concerns, which included the entering of repetitive data; problems with generating reports; inaccurate data on the system; and difficulty in navigating through MATIS. HRA was planning to integrate MATIS and the other subsystems into a new system, Long Term Care Web (LTCWeb), which was scheduled to be completed in May 2008. As of February 2009, LTCWeb was still being developed.

Department of Sanitation (DSNY)
Notice of Violation Administration System
Audit #7A08-056 (issued: June 27, 2008)

The objective of the Notice of Violation Administrative System (NOVAS) was to automate the summons-issuance and management process. Prior to the advent of NOVAS, the entire summons-issuance process, from the issuance of paper summonses to the creation of management reports, was performed manually using paper. However, in 2004, DSNY contracted with ICICI InfoTech, Inc., to develop a computerized system that would use a mobile handheld device that allows DSNY agents to enter and print violations. The handheld device also had the ability to transmit these summonses to a central server. As such, the advent of NOVAS would streamline the entire summons issuance and management process. The contract with ICICI InfoTech, Inc. was valued at approximately $4.5 million.

NOVAS met the overall goals as stated in the original system justification. The system design allowed for future enhancements and upgrades and DSNY followed a formal system development methodology when developing NOVAS. Also, DSNY has a network architecture configuration for NOVAS that was approved by DoITT. The system complies with Electronic Signature and Records Act Federal guidelines, and the handheld devices are physically secure when not in use. However, the results of our user surveys indicated that the users have problems or concerns that DSNY must address to improve the system's functionality and productivity. Also, our data integrity tests indicate that DSNY must address specific issues to improve the reliability of the system.

Specifically, we found that NOVAS has problems in data reliability, such as the presence of inaccurate dates that is an indicator of weak edit checks, and some security weaknesses. For instance, DSNY does not require that users regularly change their passwords on the handheld devices and to access the system. Also, the computer system does not restrict or control log-in access of inactive users. Finally, DSNY has not fully developed and tested the disaster-recovery plan of NOVAS.

Department of Health and Mental Hygiene (DoHMH)
Electronic Death Registration System
Audit # 7A09-083 (issued: November 24, 2009)

In 1998, the Department of Health (as it was then known) began a system development initiative known as the Electronic Death Registration System (EDRS) to automate the functions of the Registration Unit. The initial effort was developed by IBM at a cost of $3.2 million, but

did not achieve the level of stability and functionality for deployment required by DoHMH number of underlying reasons.

In 2002, the Social Security Administration released a grant to Public Health Solutions to fund a national team whose purpose was to develop standards for the implementation of a nation-wide EDRS. In April 2002, DoHMH started the second EDRS implementation effort. Dynamic Services International, Inc., in partnership with VitalChek Network, Inc., (VitalChek) was selected as the vendor, procured through a bid solicitation process via a New York State Office of General Services (NYS OGS) requirements contract at a total fixed cost of $1.3 million.

The audit determined that EDRS functions reliably, and information recorded in the database is accurate and secure from unauthorized access. However, there were reporting and performance-monitoring issues that should be resolved to improve the usefulness of the system. In terms of reporting, we noted that the EDRS capability to generate ad-hoc reports needs improvement, and that existing EDRS standard reports have not been fully tested for elimination of errors. With regard to performance monitoring, we noted that the system could not produce a systems performance report showing daily scheduled maintenance, unscheduled maintenance, and downtime. In the absence of a systems performance report, there is no assurance that DoHMH can determine actual EDRS availability so its staff can monitor system performance and address any problems with the application as they arise. Moreover, because of the lack of such a report, we also could not confirm that EDRS is operational 24 hours a day, 7 days a week.

In addition, DoHMH needs to develop a policy and procedures for handling future EDRS enhancements or upgrades, and it should review all open items previously recorded in Web Tracker for problem resolution.

Recommendations

Based on the findings contained in the above audits of systems development projects conducted by City agencies, we offer the following recommendations for improvement. If these recommendations are implemented on a City-wide basis they would assist in establishing a unified strategy to more effectively and efficiently develop IT applications. The results of following a consistent methodology and practice in developing IT systems by the City would culminate in: significant cost savings; systems that users can operate correctly; and, most importantly, enhanced services to the public.

1. Management must be realistic about the results they want from the new system, when the system will be fully operational. The use of performance indicators can identify potential problems early in the development.

2. Requirement planning should include all users that are able to specify the requirements precisely as to what the finished system should include in order for it to be well-designed and effective. These users should be involved in planned tests, adequately trained as testers, and they must be allowed sufficient time to achieve the testing objectives.

3. Project time-frames should be short, which means that large system development projects should be split into separate modules.

4. The consistent use of the System Development Life Cycle as defined by DoITT's Project Management Office by all City Agencies.

5. An independent Quality Assurance (QA) consultant must be employed at the outset of project development with specific instructions to objectively evaluate the progress of the development and evaluate the performance of the vendor as defined in VENDEX (Vendor Information Exchange System) to augment the evaluation performed by the specific City Agency.

6. An Oversight Committee comprised of City representatives with technical expertise should be established to review all project plans to see if they are realistic. Participants of the Oversight Committee should be encouraged to challenge the development team as to the viability of the timely completion of the project. Also, this Committee should be empowered to monitor the progress of each technology project undertaken throughout the City with a specific 'go or no go' process. This would thereby help to close the void that currently exists in the development of system projects.

7. A team consisting of agency management, an independent oversight committee, and the QA consultant should evaluate the impact that requested changes (either legal or user specified) will have on system requirements, costs, and it should consider the magnitude of project risks caused by these changes.

Table 1
Summary Analysis of IT Audit Reports
May 19, 2005 to November 24, 2009

Audit # - Date Issued	System Cost	Funds That May be at Risk[8]	Funds Wasted	Cost Overruns	Comments
Citywide Administrative Services NYC Automated Personnel System 7A04-064 – May 19, 2005	$155,000,000		$ 50,000,000	$ 105,000,000	Unable to determine whether NYCAPS meets: initial business and systems requirements, overall goals and whether the design allows for future enhancements. Business and system requirements were not adequately defined. Procurement process deficiencies led to failure to complete in a timely manner and within budget. Due to security issues and user dissatisfaction it is being re-engineered.
Human Resources Administration Paperless Office Systems 7A04-099 - May 2, 2005	$47,000,000			$ 15,900,000	Followed system development methodology but made decisions that caused delays that eventually prevented system completion. 24 of 106 system functions were not operational. Could not determine whether POS as a finished project meets overall goals.
Admin. For Children's Services Legal Tracking System 7A05-085 - May 23, 2006	$9,918,853			$4,318,853	Could not determine whether LTS as a finished product meets initial requirements and overall goals because the system in not complete. Deficiencies in following the system development methodology led to delays in development and increased project costs.
Department of Finance Automated City Register Info Systems 7A05-084 - January 27, 2006	$71,141,671				Used a formal system development methodology, functions reliably, is generally secure from unauthorized access, and contains accurate information. However, did not hire an independent quality-assurance consultant
New York City Fire Department Enterprise Asset Management System 7A06-095 - June 29, 2006	$1,100,000			$48,542	Used a formal system development methodology. Generally functions reliably and contains accurate information. A dispute arose over scope issues and an additional support contract was let.
Citywide Administrative Services Capital Asset Management System 7A06-112 – June 29, 2007	$3,000,000	$3,000,000			Could not conclude that CAMS as a finished product met the overall goals per the system justification, however the system is operational. DCAS has not formally accepted the system.
Human Resources Administration Medical Assistance Tracking Information System 7A07-066 – September 17, 2007	$3,400,000	$3,400,000			Could not ascertain whether MATIS met the overall goals per the original system justification, although the system is operational. Contains inaccurate, outdated, and unreliable data. There are also security weaknesses. No formal approval or acceptance-testing certificates for the deliverables.
Department of Sanitation Notice of Violation Administration System 7A08-056 – June 27, 2008	$4,500,000	$4,500,000			Met the overall goals, and the system design allowed for future enhancements and upgrades. However, users have issues that DSNY must address to improve the system's functionality and productivity; there are data reliability problems and security weaknesses.
Dept. of Health and Mental Hygiene Electronic Death Registration System 7A09-083 – November 24, 2009	$4,500,000	$4,500,000			Functions reliably and information is accurate and secure from unauthorized access; however, there were reporting and performance-monitoring issues that need to be resolved to improve system usefulness.
Total	$299,560,524	$15,400,000	$50,000.000	$125,267,395	

[8] Represents total costs associated with the system according to the original audit reports. Some portion of these amounts may be at risk due to the issues noted in the Comments column of this table and more fully disclosed in the report text (e.g., lack of formal acceptance, data reliability, and security issues).