

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 Housing Preservation and Development Information System

7A03-112

June 17, 2003



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 Comptroller's responsibilities contained in Chapter 5, § 93, of the New York City Charter, my office has performed an audit of the development and implementation of the Housing Preservation and Development Information System. The results of our audit, which are presented in this report, have been discussed with officials from the Department of Housing Preservation and Development, and their comments have been considered in preparing this report.

Audits such as this provide a means of ensuring that City agencies are developing computer systems in an efficient, timely, and cost-effective manner.

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

Very truly yours,

William C. Thompson, Jr.

William C. Thompson, Jr.

Report: 7A03-12
Filed: June 17, 2003

Table of Contents

AUDIT REPORT IN BRIEF	1
INTRODUCTION	3
Background	3
Objectives	3
Scope and Methodology	4
Agency Response	4
FINDINGS AND RECOMMENDATIONS	5
Recommendations	7
ADDENDUM: Department Response	

***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
Housing Preservation and Development
Information System**

7A03-112

AUDIT REPORT IN BRIEF

We performed an audit on the development and implementation of the Housing Preservation and Development Information System (HPDInfo). The system has become a multi-module system with a central repository of information on private and City-owned residential properties and registered property owners, as well as information on tenant correspondence and complaints, violations, repair work, demolitions, and vendor payment status. Our audit also covered enhancements to the initial system.

Audit Findings and Conclusions

HPDInfo met the Department's initial business and system requirements; the system design allowed for future enhancements and upgrades, and the Department generally complied with the City Charter and relevant Procurement Policy Board Rules when procuring services, equipment, and software for the system. In addition, the system met the overall goals as stated in the original system justification. However, the Department did not follow a formal system methodology. Moreover, since development and implementation of the system's expanded scope is not complete, we do not know whether the revised goals in the system justification will be met.

In addition, our user satisfaction survey revealed that 57 percent of the respondents stated that they would like to see changes made to HPDInfo. Moreover, the Department provided no acceptance-testing certificates for any of the completed modules, and it used the same individuals both to develop the system and to serve as quality assurance consultants. Also, the system does not control log-in access of inactive users, it does not require that users change their access passwords, and it is not equipped with an automatic lockout feature. Finally, the Department does not have procedures in place to ensure that security violations are recorded, documented, and reviewed.

Audit Recommendations

To address these issues, we recommend that the Department:

- Develop and follow a formal systems development methodology for the completion of HPDInfo and for all future system development projects.
- Develop formal acceptance-sign-off procedures.
- Engage an independent quality-assurance consultant to monitor and review development work and any system enhancements or subsequent work on HPDInfo.
- Ensure that user concerns are addressed.
- Develop written policies and procedures to terminate inactive user identifications (IDs). In addition, the Department should immediately terminate the access of those individuals who are no longer employed by the agency. Furthermore, the Department should review the status of the inactive users and terminate access as appropriate.
- Have its personnel department immediately advise the Technology and Strategic Development Division (Division) of those employees leaving or terminated from the Department. The Division should promptly delete those accounts from the system.
- Develop written policies and procedures for password-security control.
- Install a lockout feature that automatically disables access to the system after a predetermined number of unsuccessful log-in attempts.
- Establish formal procedures to document and report system-access violations, and review and follow up on all reported access violations.

INTRODUCTION

Background

The Department of Housing Preservation and Development (Department) works to maximize the production of affordable housing in New York City by encouraging cost-effective development. The Department also promotes the preservation and improvement of the existing housing stock by providing loan assistance, education, and code enforcement. In conjunction with those housing objectives, the Department supports a comprehensive community development agenda by conveying City-owned properties, both occupied and vacant, to responsible private owners, and promoting retail development, home-ownership initiatives and productive community partnerships.

The Technology and Strategic Development Division (Division) is responsible for managing the Department's technology infrastructure, supporting the Department's network, and developing and maintaining the Department's computer applications.

In 1996, the Department began developing the Integrated Property Management Information System and the Preservation Enforcement Maintenance Information System. The Department subsequently merged the two projects into an integrated information system, known as IPMIS/PREMISYS. One of the purposes of the integrated system was to eliminate redundant data entry and inconsistent data. The Department retained consultants to provide design and programming services necessary for the development of IPMIS/PREMISYS. In 1999, the Department modified its plans for IPMIS/PREMISYS and renamed the system to HPDInfo. Since that time, the Department has continued to expand the scope of HPDInfo by adding new sub-systems (modules). In the process, HPDInfo has become a multi-module system with a central repository of information on private and City-owned residential properties and registered property owners, as well as information on tenant correspondence and complaints, violations, repair work, demolitions, and vendor payment status.

As of March 2003, the Office of Management and Budget and the City Council approved a total of \$24.6 million for the development, implementation, and support of the complete HPDInfo system, of which \$15.5 million has been spent.

Objectives

The audit's objectives were to determine whether:

- The Department followed a structured methodology when developing HPDInfo;
- HPDInfo meets the Department's initial business and system requirements;
- The system design allows for future enhancements and upgrades;
- HPDInfo, as a finished product, will meet overall goals as stated in the system justification; and

- The Department complied with all relevant Procurement Policy Board (PPB) Rules.

Scope and Methodology

Our fieldwork was conducted from September 2002 through April 2003. To achieve our audit objectives we: (1) interviewed Department officials; (2) observed various system entries and inquires while they were being made; (3) conducted a user satisfaction survey, in which we randomly selected 150 out of 1,771 system users to be surveyed on HPDInfo (76 users responded to our survey); (4) reviewed system specifications documents, contracts, purchase orders, and other system-related documentation.

We used Comptroller's Internal Control and Accountability Directive 18, *Guidelines for the Management, Protection and Control of Agency Information and Information Processing Systems*, New York City Procurement Policy Board (PPB) Rules, and the City Charter as criteria for this audit. As the City does not have a formal system-development methodology, we also used the National Institute of Standards and Technology Special Publication #500-233, *A Framework for the Development and Assurance of High Integrity Software*, to assess whether a system development methodology had been followed.

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.

Department Response

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 May 19, 2003. On May 22, 2003, we submitted a draft report to Department officials with a request for comments. We received a written response from the Department on June 6, 2003. In its response, the Department indicated the actions it has taken and will take to comply with the recommendations contained in the report. However, the Department contended that its use of in-house staff as quality assurance reviewers was sufficient and that it calculated a higher level of user satisfaction than was stated in the report.

The full text of the Department comments is included as an Addendum to this final report.

FINDINGS AND RECOMMENDATIONS

HPDInfo met the Department's initial business and system requirements; the system design allowed for future enhancements and upgrades; and the Department generally complied with the City Charter and relevant PPB Rules when procuring services, equipment, and software for the system. In addition, the system met the overall goals as stated in the original system justification. However, the Department did not follow a formal system methodology. Moreover, since development and implementation of the system's expanded scope is not complete, we do not know whether the revised goals in the system justification will be met.

In addition, our user satisfaction survey revealed that 57 percent of the respondents stated that they would like to see changes made to HPDInfo. Fifty percent of the users reported that the data in the system are occasionally incorrect. Thirty-five percent of the users stated that HPDInfo is not user friendly.

Moreover, the Department provided no acceptance-testing certificates for any of the completed modules and it used the same individuals both to develop the system and to serve as quality assurance consultants. Furthermore, the system does not control log-in access of inactive users, it does not require that users change their access passwords, and it is not equipped with an automatic lockout feature. Finally, the Department does not have procedures in place to ensure that security violations are recorded, documented, and reviewed.

These issues are discussed in the following sections of the report.

System Development Methodology

The Department did not develop a formal system development methodology. Although the Department has not encountered significant problems in the development of HPDInfo, our user satisfaction survey (discussed later in this report) disclosed that 57 percent of the users would like to see changes made to HPDInfo. Directive 18 states that a formal systems development methodology should "involve end users in the specification of system requirements." Thus, the issues raised by the users surveyed could have been addressed during the development of the system had the Department followed a formal system development methodology.

Acceptance Testing Certificates

Although 10 of the 18 HPDInfo modules are complete, the Department did not have acceptance-testing certificates on file for the completed modules. Acceptance-testing certificates would document whether system tasks and requirements were accomplished. In addition, acceptance-testing certificates would show that Department users acknowledge that the modules function properly and that they are satisfied with the system's performance.

Quality Assurance Consultants

The Department considers HPDInfo a mission-critical system and hired consultants to conduct quality assurance reviews. However, the same consultants hired by the Department to perform the reviews also performed design, development, implementation, and support services

for the system. While we did not find significant problems with the development of HPDInfo, Directive 18 recommends that agencies hire “an *independent* [emphasis added] quality assurance consultant to assist the agency monitor and review the work of the development and integration team.” Directive 18 also states: “Monitoring and compliance assurance activities are independent of operations and development.” Therefore, the quality assurance consultants who monitor and review all changes made to HPDInfo should not be involved with system design or developmental work.

User Satisfaction

Our user satisfaction survey revealed that 57 percent of the users would like to see changes made to HPDInfo. Some of these changes include providing an online manual, developing more user-friendly screens and formats, and modifying and creating new query capabilities. Also, 50 percent of the users reported that the data in the system are occasionally incorrect. Finally, 35 percent of the users stated that HPDInfo is not user friendly.

Other Issues

Access Control Weaknesses

Directive 18 states that “there are many software based controls that can be employed to help protect the information processing environment.” One of these controls is to restrict access only to those users who are authorized to access the system’s information. User identification (ID) and passwords are among the most widely used forms of access control. Our review revealed the following weaknesses in the Department’s access controls for HPDInfo:

- **Inactive user IDs and log-in access are not adequately controlled.** Comptroller’s Directive 18, § 8.1.2, states that: “Active password management includes deactivation of inactive user accounts and accounts for employees whose services have terminated.” However, we found that 392 out of 1,771 HPDInfo user IDs had never initially logged onto HPDInfo. Those inactive user IDs were not deleted from the system or disabled. We also found that 64 former employees still had active HPDInfo access after leaving the Department. Those individuals were listed on the City Payroll Management System database as no longer employed, on worker’s compensation, or on leave.
- **HPDInfo does not require that users change their passwords.** Comptroller’s Directive 18, § 8.1.2, states that “active password management includes insuring that users are forced to change passwords periodically.”
- **HPDInfo is not equipped with an automatic lockout feature.** HPDInfo is not equipped with a feature that automatically locks out or disables a user’s access to the system after a predetermined number of unsuccessful log-in attempts. In fact, we were able to make numerous attempts to log-in to the system using a valid user ID with an invalid password without the system denying us more log-in attempts.

Security Violations Not Adequately Monitored

The Department has no procedure in place to ensure that system security violations are recorded, documented, and reviewed. Directive 18, § 11.5, states that:

“A record of the physical and logical security violations detected by software controls and other monitoring procedures must be reported to senior management. The most serious security violations should be reported to executive management. A review of security violations will highlight unresolved problems or weaknesses in internal controls and may show patterns of failure and abuse requiring remedial action.”

Such procedures would help the Department to identify patterns of security violations and to ensure that proper controls are instituted to prevent unauthorized access to HPDInfo.

Recommendations

The Department should:

1. Develop and follow a formal systems development methodology for the completion of HPDInfo and for all future system development projects.

Department Response: “HPD substantively followed industry standards in terms of the SDLC methodology actually followed. We will enhance the methodology to include items identified in the audit recommendations.”

2. Develop formal acceptance-sign-off procedures.

Department Response: “HPD substantively followed industry standards in terms of the acceptance testing procedures. In addition to the current rigorous testing procedures, HPD’s acceptance testing will be enhanced to include testing certificates.”

3. Engage an independent quality-assurance consultant to monitor and review development work and any system enhancements or subsequent work on HPDInfo.

Department Response: “HPD consultants are not hired to perform system QA reviews. As programmers, their testing responsibilities are limited to testing their program code and to make certain that it runs correctly, efficiently, according to specification and, without interruption.

“In-house TSD staff as well as representatives from the client department conduct the more comprehensive system tests and have final approval prior to production release.

“We believe this testing methodology does provide for an independent review of the system.”

Auditor Comment: Directive 18 stipulates that management should “...engage an independent quality assurance consultant to assist the agency monitor and review the work of the development and integration team.” In this regard, OMB provided the funding for the Department to hire an independent quality assurance consultant for the project. Clearly, the use of in-house staff to serve as quality assurance reviewers does not satisfy the requirement in Directive 18.

4. Ensure that user concerns are addressed.

Department Response: “Question #9, ‘How satisfied are you with the system?’ is the basis for the finding. After reviewing the responses, we determined that 57% finding is comprised of 33 category ‘B’ responses, 2 in category ‘C’, and 1 in category ‘D.’

“Upon further review of the 33 responses in category ‘B’ ‘I am somewhat happy with the system . . .’ 10 respondents did not articulate what improvements they would like to see nor what they were dissatisfied with; 12 recommendations were not applicable to HPDInfo or showed a clear lack of understanding such as ‘I feel that all HPD employees should have E-mail . . .’ and ‘retyping information could be faster’ to name a few.

“Of the remaining 11 respondents who articulated their understanding of how HPDInfo supports their business needs, efforts are underway to assess the applicability of their requests.

“Therefore, recalculating the percentage of users who would like to see changes to HPDInfo based on the aforementioned we believe the number is 17% or, an 83% satisfaction rating.”

Auditor Comment: The Department did not directly address this recommendation. Instead, the Department took issue with how we calculated the percentages reported.

5. Develop written policies and procedures to terminate inactive user IDs. In addition, the Department should immediately terminate the access of those individuals who are no longer employed by the agency. Furthermore the Department should review the status of the inactive users and terminate access as appropriate.

Department Response: “This past year HPD has instituted a practice that requires HR [Human Resources] to notify TSD [Technology and Strategic Development Division] in writing whenever an employee leaves the Agency. The user’s network account is disabled and the HPDInfo account is reviewed to determine if any open items are in the user’s HPDInfo mailbox. If there are open items, the HPDInfo account remains open until all the items in the person’s mailbox have been addressed. The account is then deleted.”

6. Have its personnel department immediately advise the Division of those employees leaving or terminated from the Department. The Division should promptly delete those accounts from the system.

Department Response: “See response #5 above.”

7. Develop written policies and procedures for password-security control.

Department Response: “HPD will assess this recommendation.”

8. Install a lockout feature that automatically disables access to the system after a predetermined number of unsuccessful log-in attempts.

Department Response: “Network accounts have an automatic lockout feature and substantively comply with the City’s standard. Once a user is locked out of the network, access to HPDInfo cannot occur.

“At the launch of the Central Complaint Bureau (CCB) module of HPDInfo in 1999, it was decided that locking out HPDInfo users could be problematic since CCB is a 24x7 operation and unlocking an account requires network administration rights. Since CCB activity may involve emergency response situations it was decided that, in the interest of public safety, HPDInfo account lockouts would not be appropriate.

“This recommendation will be discussed with DoITT since CCB is now part of the City’s 311 operation.”

9. Establish formal procedures to document and report system-access violations, and review and follow up on all reported access violations.

Department Response: “Network lockouts are recorded as Helpdesk events and reviewed as lockouts occur. We will review the recommendations with DoITT and, if adopted, a formal procedure will be implemented.”



City of New York
DEPARTMENT OF
HOUSING PRESERVATION AND DEVELOPMENT
100 GOLD STREET, NEW YORK, N.Y. 10038

JERILYN PERINE
Commissioner

June 6, 2003

Mr. Greg Brooks, Deputy Comptroller for Policy
Audits, Accountancy & Contracts
Office of the New York City Comptroller
1 Centre Street, Room 530 South
New York, New York 10007-2341

**Re: Audit on the Development and Implementation of the Housing
Preservation and Development's Information
Audit Number: 7A03-112**

Dear Mr. Brooks:

The following represents the Department of Housing Preservation and Development's response to the recommendations made in your audit on the Development and Implementation of the Housing Preservation and Development's Information System.

If you have any additional questions please call Deputy Commissioner Bernard Schwarz at 863-6610.

Thank you.

Sincerely,


Jerilyn Perine



AUDIT RESPONSE
NEW YORK CITY COMPTROLLERS AUDIT
NEW YORK CITY DEPARTMENT OF HOUSING PRESERVATION AND DEVELOPMENT
DEVELOPMENT AND IMPLEMENTATION OF HPD INFO
REPORT 7A03-112

Finding

HPD did not develop a formal System Development Methodology

Recommendation 1

HPD should develop and follow a formal systems development methodology for the completion of HPDInfo and for all future system development projects.

Response 1

HPD substantively followed industry standards in terms of the SDLC methodology actually followed. We will enhance the methodology to include items identified in the audit recommendations.

Finding

HPD did not have acceptance-testing Certificates on file for the completed modules.

Recommendation 2

HPD should develop formal acceptance sign-off procedures.

Response 2

HPD substantively followed industry standards in terms of the acceptance testing procedures. In addition to the current rigorous testing procedures, HPD's acceptance testing will be enhanced to include testing certificates.

Finding

The same consultants hired by HPD to perform the Quality Assurance reviews also perform design, development, implementation, and support services for the system.

Recommendation 3

HPD should engage an independent quality-assurance consultant to monitor and review development work and any system enhancements or subsequent work on HPDInfo.

Response 3

HPD consultants are not hired to perform system QA reviews. As programmers, their testing responsibilities are limited to testing their program code and to make certain that it runs correctly, efficiently, according to specification and, without interruption.

In-house TSD staff as well as representatives from the client department conduct the more comprehensive system tests and have final approval prior to production release.

We believe this testing methodology does provide for an independent review of the system.



AUDIT RESPONSE
NEW YORK CITY COMPTROLLERS AUDIT
NEW YORK CITY DEPARTMENT OF HOUSING PRESERVATION AND DEVELOPMENT
DEVELOPMENT AND IMPLEMENTATION OF HPD INFO
REPORT 7A03-112

ADDENDUM
Page 3 of 5

Finding

57% of the users would like to see changes made to HPD Info.

Recommendation 4

HPD should ensure that user concerns are addressed.

Response 4

Question #9, "How satisfied are you with the system?" is the basis for the finding. After reviewing the responses, we determined that the 57% finding is comprised of 33 category "B" responses, 2 in category "C", and 1 in category "D"

Upon further review of the 33 responses in category "B" "I am somewhat happy with the system..." 10 respondents did not articulate what improvements they would like to see nor what they were dissatisfied with; 12 recommendations were not applicable to HPDInfo or showed a clear lack of understanding such as "I feel that all HPD employees should have E-mail..." and "retyping information could be faster" to name a few.

Of the remaining 11 respondents who articulated their understanding of how HPDInfo supports their business needs, efforts are underway to assess the applicability of their requests.

Therefore, recalculating the percentage of users who would like to see changes to HPDInfo based on the aforementioned we believe the number is 17% or, an 83% satisfaction rating.

Finding

HPD has access controls weaknesses such as:

inactive user ID's and log-in access are not adequately controlled.

Recommendation 5

HPD should develop written policies and procedures to terminate inactive user ID's. In addition, HPD should immediately terminate the access of those individuals who are no longer employed by the agency. Furthermore HPD should review the status of the

Response 5

This past year HPD has instituted a practice that requires HR to notify TSD in writing whenever an employee leaves the Agency. The user's network account is disabled and the HPDInfo account is reviewed to determine if any open items are in the user's HPDInfo mailbox. If there are open items, the HPDInfo account remains open until all the items in the person's mailbox have been addressed. The account is then deleted.



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ADDENDUM
Page 4 of 5

AUDIT RESPONSE
NEW YORK CITY COMPTROLLERS AUDIT
NEW YORK CITY DEPARTMENT OF HOUSING PRESERVATION AND DEVELOPMENT
DEVELOPMENT AND IMPLEMENTATION OF HPD INFO
REPORT 7A03-112

inactive users and
terminate access as
appropriate.

Recommendation 6
HPD should have its
personnel department
immediately advise
the Division of those
employees leaving or
terminated from HPD.
The Division should
promptly delete those
accounts from the
system.

Response 6
See response #5 above

Finding
HPDInfo does
not require that
users change
their passwords.

Recommendation 7
HPD should develop
written policies and
procedures for
password-security
control.

Response 7
HPD will assess this recommendation.

Finding
HPDInfo is not
equipped with an
automatic
lockout feature.

Recommendation 8
HPD should install a
lockout feature that
automatically disables
access to the system
after a predetermined
number of
unsuccessful log-in
attempts.

Response 8
Network accounts have an automatic lockout feature
and substantively comply with the City's standard.
Once a user is locked out of the network, access to
HPDInfo cannot occur.

At the launch of the Central Complaint Bureau
(CCB) module of HPDInfo in 1999, it was decided,
that locking out HPDInfo users could be problematic
since CCB is a 24X7 operation and unlocking an
account requires network administration rights.
Since CCB activity may involve emergency response
situations it was decided that, in the interest of public
safety, HPDInfo account lockouts would not be
appropriate.

This recommendation will be discussed with DoITT
since CCB is now part of the City's 311 operation.



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DEVELOPMENT AND IMPLEMENTATION OF HPD INFO
REPORT 7A03-112

ADDENDUM
Page 5 of 5

Finding

HPD has no procedure in place to ensure that system security violations are recorded, documented and reviewed.

Recommendation 9

HPD should establish formal procedures to document and report system-access violations, and review and follow-up on all reported access violations.

Response 9

Network lockouts are recorded as Helpdesk events and reviewed as lockouts occur.

We will review the recommendations with DoITT and, if adopted, a formal procedure will be implemented.



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TOTAL P. 06