City of Berkeley

FUND$ Change Management Audit

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I. OBJECTIVE OF THE AUDIT

The objective of this performance audit was to determine whether program change controls over the City's financial system, FUND$, were adequate.

This audit was scheduled to be performed in the Auditor's fiscal year 2004 audit plan. The audit plan was presented to City Council on June 10, 2003.

II. SCOPE AND METHODOLOGY

The audit focused on internal controls over program changes to the City's financial system (FUND$). Program changes include system upgrades, Program Temporary Fixes (PTFs), user and vendor initiated changes, and changes made directly by software vendors or consultants. The period under review was fiscal year 2004. The last day of fieldwork was February 11, 2004.

The information used to complete this audit was obtained primarily through:

- Discussion with staff in the Information Technology (IT) and Finance Departments.
- Review of written policies and procedures pertaining to program change management.
- Review of data and records pertaining to program change management.
- Identifying what experts deemed to be best practices.
- Reviewing prior period audit reports.
- Surveying other jurisdictions on program change controls and governance over IT resources allocated to financial software.

There were 19 respondents to our survey. Eight respondents, including the City of Berkeley, use the financial software provided by H.T.E. Inc. Eleven respondents use financial software provided by other vendors. The survey results are summarized in findings where applicable and presented in Appendix A.

Audit work was performed in accordance with Generally Accepted Government Auditing Standards and was limited to those areas specified in the scope and methodology section of this report.

III. BACKGROUND

The Department of Information Technology (IT) has a fiscal year 2003 adopted budget of $2,563,922 and a fiscal year 2004 proposed budget of $2,957,464. Each year about 1% of the City's total proposed expenses is allocated to IT.

The City's financial system, FUND$, was acquired from H.T.E. Inc. in 1991. The system includes the

following 15 modules:

Finance Department

- Accounts Receivable
- GMBA (General Ledger)
- Purchasing/Inventory
- Business Licenses
- Cash Receipts
- Customer Information Systems (refuse billing)
- Land & Parcel Management
- Fixed Assets

Other departments

- Building Permits
- Code Enforcement
- Payroll/Personnel
- Planning/Zoning
- Fleet Management
- Work Orders/Facilities Management
- Document Management Systems

The responsibility for supporting and maintaining these modules is shared among two Application Programmer/Analysts and the Applications Development Manager. All three work in the City's Application Development Division in IT. The Applications Development Manager indicated that roughly 75% of the Application Development Division staff's time is spent on supporting and maintaining FUND$ and FUND$ related applications.

In addition to the Application Development Division staff, one module leader is designated for each FUND$ module by the user departments. Finance manages seven financial modules and one land/parcel module. The module leaders act as a liaison between the Application Development Division and the FUND$ users to ensure that the system meets the City's business needs. Each module leader is also responsible for coordinating user testing for upgrades and program temporary fixes (PTFs). The Systems Accountant in Finance is the module leader for GMBA. She assumes a lead role among the Finance module leaders. She provides overall support to Finance module leaders, budget analysts, accounting staff, and general City users. She is the primary liaison between Finance module leaders/users and H.T.E. for some system problems. Her responsibilities extend beyond support of the Finance modules and interfaces, and also include working jointly with IT and module leaders to develop and maintain user access security policies and procedures.

The City contracts with H.T.E. to provide 24-hour technical support service for these modules. The one-year contract, signed on January 28, 2003 (late), expired on June 30, 2003. A new three-year

contract/agreement is currently undergoing the final phase of review and is awaiting the approval signatures from the City and H.T.E.

Program modifications are generally initiated by either the vendor or the users. Vendor modifications are generally software upgrades or PTFs. Software upgrades and PTFs are provided by the vendor based on the service agreement and are implemented by the Application Development Division. User modifications include application enhancements, corrections, and changes to meet regulatory requirements or other requirements. There are about 1,800 custom modifications initiated by the City in the system.

FUND$ users may contact H.T.E. directly for technical assistance or submit a service request to the Application Development Division by telephone, e-mail, or an internally developed automated service request tracking system for in-house support. Minor user modifications are generally handled by a programmer. Major user modifications usually take a longer time to complete and may involve the users, senior staff or managers from the user department, the programmers, and senior staff from the IT department. Major modifications are separately tracked as projects by the Application Development Division.

According to the Application Development Division staff, major program changes to FUND$ are made and tested in the test libraries by the programmers, followed by user testing. Once the user accepts the proposed changes, the accepted changes are migrated into production.

IV. RESULTS OF AUDIT

The audit found that internal controls over program changes to the City's financial system, FUND$, were not adequate. There is no consistent application of methodologies in prioritizing projects due to the lack of citywide IT governance or formalized IT strategic goals. Concerns with program change controls over FUND$ include the following:

1. There are no formal written policies and procedures for making program changes to FUND$.
2. Inadequate segregation of duties:
    a. The functions of making software modifications and migrating changes to production are not properly segregated.
    b. Programmers have unrestricted access to the production environment.
3. Controls over H.T.E.'s remote access to FUND$ are inadequate.

The audit also found that:

4. Not all FUND$ related service requests were formally logged or documented to facilitate effective tracking, reviewing, and auditing.
5. FUND$ modules continue to lack assigned module leaders due to difficulties in identifying employees with the appropriate skills and the available time needed to be an effective "module

leader".

6. There continues to be concerns with FUND$ upgrades.
7. Project management methodology and IT governance are not formalized.

The survey results found that:

1. H.T.E. users appeared less likely to follow formal written procedures to implement program changes than non-H.T.E. users.
2. The "Annual IT Budget / Population" ratio for the City of Berkeley is $23.50, the seventh lowest of the surveyed respondents, and 19% below the survey average of $29.00.
3. Twelve (63%; eight H.T.E. users and four non-H.T.E. users) of the 19 respondents indicated that they allow their vendors to access their production environment.
4. H.T.E. users appeared less likely to have a multi-departmental IT governing body compared to non-H.T.E. users.
5. Non-H.T.E. users appeared to be more satisfied with their vendors' support of the test environment than H.T.E. users.
6. A higher number of non-H.T.E. users appeared to be satisfied with upgrade and PTF documentation provided by their vendors compared to H.T.E. users.

It should be noted that these results were drawn from a small sample of 19 respondents consisting of eight H.T.E. users and eleven users of other financial systems. It should also be noted that of the 19 jurisdictions responding to the survey, users of H.T.E. software, generally speaking, had significantly smaller populations and a smaller number of employees than non-H.T.E. users. This may be a factor in the results for certain questions, such as existence of a multi-departmental IT governing body.

V. FINDINGS AND RECOMMENDATIONS

Finding 1: No formal written policies and procedures for implementing program changes to FUND$.

According to the Applications Development Manager, there are no written procedures for making changes to the financial software. Requirements for approving, testing, and documenting program changes are informally communicated and enforced.

The FUND$ modules are supported and maintained by two programmers and the Applications Development Manager. Each one is responsible for, or specializes in, modules that are assigned to him or her. Methodologies used for testing and documenting program changes vary depending on each programmer's expertise or preference. Based on the auditor's discussion with the programmers, it appears that informal procedures are consistently followed.

The only available written procedures related to FUND$ change management are on acceptance testing.

The purpose of these procedures is to provide module leaders with a planning guideline for performing acceptance testing during upgrades. However, the procedures do not require module leaders to formally sign off on test results, and there is no requirement that the results be reviewed by IT prior to implementing the upgrade. User acceptance is generally obtained through e-mail and is not systematically organized to facilitate review or audit.

Formal procedures should cover the processes of approving change requests, implementing a test and production environment, user testing, documenting results, reviewing results, migrating changes, and handling emergencies. Since there is no formal policy in place, requirements for critical procedures related to FUND$ change management may be fragmented or not consistently followed, increasing the risk of undesirable results and inefficiency. There are no formal written procedures that provide standard guidelines of what and how things should be done.

Survey Results:

It appears that H.T.E. users are less likely to follow formal written procedures to implement program changes compared to non-H.T.E. users.

Of the seven respondents that follow formal written procedures to implement program changes to their financial systems, only one (14%) is an H.T.E. user. Of the eight respondents that consistently follow informal procedures, five (63%) are H.T.E. users. The remaining four respondents (two H.T.E. users and two non-H.T.E. users) do not have any formal procedures and simply do whatever is necessary to meet deadlines (Appendix A, p. 23).

Recommendation for Information Technology:

1.0 Develop formal written policies and procedures for implementing program changes to FUND$. The procedures should cover the processes of approving change requests, implementing a test and production environment, user testing, documenting results, reviewing results, migrating changes, and handling emergencies.

City Manager's Response:
IT agrees with the finding and recommendation. A change management protocol has already been implemented for upgrades. We will expand that protocol to cover all changes. In addition, we will develop a formalized process for documenting and approving all future program changes. While detailed testing procedures should be developed for each module by the user department(s), IT will produce guidelines for developing those procedures and documenting the results. IT will have drafts of all procedures prepared by August 15, 2004 and will finalize and make available to City staff those drafts by October 31, 2004.

Finding 2: Lack of segregation of functions and duties.

2a. The functions of making software modifications and migrating changes into production are not properly segregated.

Currently, the functions of modifying and migrating program changes are not segregated. There are only three programmers (including the manager) involved in the FUND$ change process. Each programmer is responsible for maintaining the modules that are assigned to him or her and each programmer appears to have developed a level of expertise in his or her assigned modules. The functions of making program changes and migrating program changes into production are performed by the same programmer. The vendor's approach to migrating custom codes into production is cumbersome. Codes that were changed and tested have to be copied into production and recompiled; therefore, the programmer who is not familiar with the module's program changes is more likely to make mistakes during the migration process.

2b. Programmers have unrestricted access to the production environment.

Two programmers and the Applications Development Manager have unrestricted access to the production libraries and data in order to carry out their functions of modifying, testing, migrating, and recompiling program codes. They can also alter the jobcards of scheduled production. This capability allows them to run or cancel any job as desired. The IT Director stated that the controls in the change process heavily rely on employees' honesty.

One key element in a control related procedure is segregating incompatible duties to prevent one individual from subverting a critical process and concealing it. When incompatible duties are not properly segregated and when compensating controls are absent, the risk of unauthorized changes and undetected irregularities in the City's financial system increases. One probable scenario is that a programmer could go into the system and change his, her, or another employee's pay rate without being detected. In an environment where incompatible duties are not adequately segregated, a compensating control to reduce risk would be to document the process of periodic random reviews of programmers' work by the appropriate level of management.

In addition to the risk of fraud, since each FUND$ module is primarily maintained and supported by one programmer, there is the added risk that business continuity may be vulnerable when unexpected incidents occur which prevent the programmer from carrying out critical duties. According to the Applications Development Manager, the two programmers and himself are backups for each other. However, if an unexpected event were to occur to either one of them (for example, one of them has to terminate his or her relationship with the City without prior notice), FUND$ may have to be operated at a reduced service level.

Survey Results:

The "Annual IT Budget / Population" ratio for the City of Berkeley is $23.50, the seventh lowest, and 19% below the survey average of $29.00.

We used the "Annual IT Budget/FTE" and "Annual IT Budget / Population" ratios as indicators to compare IT resources among respondents. Only 17 (10 non-H.T.E. users and 7 H.T.E. users) of the 19 respondents provided their IT annual budget amounts (Appendix A, p. 29). The average "Annual IT Budget/ FTE" for the 17 respondents was $3,279. The average ratio for the seven H.T.E. users was slightly higher at $3,300. The City of Berkeley has the lowest ratio, at $1,508, 54% below the survey average (Appendix A, p. 29).

Recommendations for Information Technology:

2.1 A programmer who modifies programs should not have access to production files and data. This is a preventive measure to mitigate the risk of unauthorized modifications that threaten application and data integrity. IT should develop a long-term plan to expand resources in the Application Development Division by either adding staff, implementing a policy of job rotation, or cross training to segregate incompatible functions as well as to reduce reliance on one single individual for performing critical tasks in the change process.

City Manager's Response:
IT agrees with the finding and recommendation. The current situation represents a significant risk. However, the Application Development Division staff cannot maintain their current level of service and productivity if such measures to mitigate the risk are implemented; it would require adding a minimum of two full time employees (one senior system analyst and one programmer analyst). Cross training has been and will continue to be performed on a limited basis, but complete cross training and/or job rotation would comminute productivity to an unacceptable level.

2.2 Access to production by the programmers should be restricted and subject to supervisory review and approval.

City Manager's Response:
IT agrees with the finding and agrees in principle with the recommendation. Due to the factors stated in response to 2.1, it is not feasible for the Application Development Manager to either supervise all activities in the production environment or approve them in advance. IT will include the procedures for documenting such activities in the overall change management documentation per response 2.1. by the end of October 2004.

2.3 Require programmers to log and document program changes using a standardized format to facilitate ease of review and monitoring by the manager. When managerial review cannot be performed, peer review between the programmers should be in place. The bottom line is that all program changes should be subject to some form of review.

City Manager's Response:
IT agrees with the finding and recommendation. A database has been developed for

upgrades and will be expanded to include all program changes. While it is not feasible for the division manager to review all program changes, it is reasonable that he review changes to critical programs (such as payroll) and that he conduct a periodic, random review of other changes. The database developed to record program changes should also have a capacity to record information related to such a review. The database will be completed by the end of October 2004.

2.4 Consider installing a change control software package to facilitate the change process and to reduce reliance on human efforts.

City Manager's Response:
IT agrees with the finding and recommendation. IT will investigate the possibility of acquiring and implementing such software, provided funding can be obtained. IT will make a recommendation to the City Manager by the end of December 2004.

Finding 3: Inadequate Controls over H.T.E.'s remote access to FUND$.

The City contracts with H.T.E. to provide FUND$ users and programmers 24-hour technical support service. According to the Finance Director, 24-hour support service is needed because updates for certain modules are run at night. H.T.E. must be contacted if problems occur during an update. The Finance Director raised the concern that there are no controls over user requests made to H.T.E., since users are allowed to contact H.T.E. directly for technical assistance without notifying IT or Finance. Finance does not know how many or what type of requests are made to H.T.E. The Finance Director is also concerned that there are no control points in IT or Finance to funnel user requests to H.T.E.

Currently, H.T.E. has access to both production and test libraries in FUND$. H.T.E. accesses FUND$ through a virtual private network (VPN), the use of a public telecommunication infrastructure to provide remote access to an organization's network. Access is authenticated by a common userID with passwords assigned by IT. According to staff in the Application Development Division, the passwords are not changed regularly and the access line can be switched on by authorized FUND$ users, the programmers or Help Desk at any time. Once the line is switched on, other H.T.E. support staff can also login without making a separate request. The line is turned off only when all support staff are logged off. This arrangement allows H.T.E. employees to login without proper authorization once the line has been turned on.

The City has not established formal written internal procedures to define or require controls over the remote access. Exception or activity reports are not set up to monitor H.T.E.'s activities in FUND$. One control implemented by H.T.E. is that when their employees login to FUND$, an access log is automatically created recording the login time and duration of the login. The log is accessible by authorized IT personnel. However, IT does not appear to regularly review the log, nor is there a procedure in place that requires a regular review of the log.

According to H.T.E., their support staff is also required to enter their names and reasons for the access in the access log. However, since the two fields are not required fields, the support persons may enter the information according to their preferences. In addition, the access log created by H.T.E. does not correctly reflect login duration. Given these conditions, coupled with the conditions that H.T.E. employees, according to the Applications Development Manager, do not always explain or document their access clearly, and if users continue to call H.T.E. directly for support services without prior authorization, it will be difficult to trace who, when, why and how changes were made when such changes are made without notifying IT or Finance.

Remote access by vendors poses an inherent risk in an organization's computer system. The risk may involve intentional tampering, inadvertent mistakes, unauthorized changes, or unfriendly intrusion. In order to mitigate the risk, vendor access should be restricted to the test environment. Access to the production environment should be separately approved and monitored to ensure that unauthorized changes cannot be made to production.

Survey Results:

Twelve (63%; eight H.T.E. users and four non-H.T.E. users) of the 19 respondents indicated that they allow their vendors to access their production environment (Appendix A, p. 27).

Six (50%) H.T.E. users indicated that the access was needed for ongoing support. The other six respondents gave remote access for emergency reasons or upon request by the vendors (Appendix A, p. 28). According to the IT Director, H.T.E. users generally are smaller agencies that lack in-house technical support. They tend to rely on H.T.E. to provide the support. He also felt that it was part of H.T.E.'s corporate culture to have unrestricted access to its customers' systems.

Recommendations for Information Technology:

3.1 Change H.T.E. account passwords at least every three months.

City Manager's Response:
IT agrees with the finding and recommendation. IT will implement this policy immediately.

3.2 Periodically review the access log. Work with H.T.E. to ensure that information reflected on the access log is accurate and complete.

City Manager's Response:
IT agrees with the finding and partially agrees with the recommendation. This recommendation represents a considerable amount of IT's time and requires H.T.E.'s

complete cooperation to implement. IT will negotiate with H.T.E. to improve the quality of the logs but, due to staffing levels, cannot commit to being vigilant in monitoring the logs on a frequent basis. IT will start the negotiation with H.T.E. in July 2004.

3.3 Develop and formalize procedures to improve controls over vendor remote access. The procedures should provide an auditable and internally controlled method of granting access to the vendor and monitoring vendor activities.

City Manager's Response:
IT agrees with the finding and partially agrees with the recommendation. IT will investigate possible solutions to this problem. While the process of granting access to the vendor can be improved, monitoring vendor activities would involve either having someone observing the vendor as they work or developing software to monitor the activities. Both methods would require more resources than IT can reasonably spare. IT will report to Council on the status of the finding and possible solutions in December 2004.

3.4 Consider requiring City staff to notify Finance and IT and to explain the problems needing support prior to contacting H.T.E.

City Manager's Response:
IT agrees with the finding and recommendation. IT will convene a meeting of application experts by June 30, 2004, and make them aware of this recommendation and encourage users who call H.T.E. directly to send notification to the Application Development Manager. H.T.E. also provides a log of "support cases" on their website, MyH.T.E., that provides details about all service requests opened by City staff.

3.5 IT should consider negotiating with H.T.E. to restrict H.T.E.'s access to the test machine. IT should also consider limiting H.T.E.'s access to the production machine to emergencies only.

City Manager's Response:
IT agrees with the finding and partially agrees with the recommendation. IT has aggressively encouraged users to contact the vendor directly to augment overall user support capacity. Limiting H.T.E.'s access to the production machine would have a detrimental effect on that strategy. H.T.E. staff have a more intimate knowledge of their software and are better equipped to assist users in many situations. With all those conditions in mind, IT will explore the possibility of reducing H.T.E.'s access to the production machine while minimizing the negative impact of doing so. IT will report to Council on the status of this finding and recommendation in December 2004.

Finding 4: Not all FUND$ related service requests are formally logged or documented.

Not all FUND$ related service requests are formally logged or documented. Service requests are

submitted to the Help Desk through an internally developed automated desktop service request tracking system. Although it is not designed for managing complicated projects, it provides a systematic and consistent method to log service requests and facilitates effective tracking, reviewing, and auditing. The service request tracking system should be fully utilized to maximize its value. The tracking system allows analysts/programmers, IT managers, and requestors to query the current status of a service request. Reports can also be generated for IT management review to evaluate staff resources.

During our interview with the Finance Director, she expressed the opinion that the service request tracking system may not be adequate to provide FUND$ problem resolution information and the system is not widely used or accessible by management. Statistical information such as the number of service requests related to a specific module is not available.

According to the Applications Development Manager, some FUND$ related service requests continue to be sent directly to the Application Development Division by e-mail or phone call. One of the shortfalls of the tracking system is that it cannot separately store supervisory approval. In some cases, according to the Applications Development Manager, some managers are unwilling to fill out a service request form for their staff on-line. When requests are submitted by e-mail or phone call, they are tracked individually by the programmer who handles or receives the requests. As a result, information on these requests cannot be readily retrieved to facilitate effective management oversight or audit. Both the Applications Development Manager and a programmer indicated that they are gradually educating the users to submit their requests through the tracking system.

Recommendations for Information Technology:

4.1 Since the service request tracking system provides a consistent mechanism for tracking service requests, the Application Development Division should require departments to enter all FUND$ service requests in the system. The electronic service request should serve as a base document for user initiated program changes requiring in-house support. No user initiated program change should be implemented without an authorized service request.

City Manager's Response:
IT agrees with the finding and recommendation. IT will implement this recommendation immediately. When a formalize program change procedure is adopted, a reference to the original service request will be retained.

4.2 Consider enhancing the service request tracking system so that it can be accessed directly and used by management in IT and Finance to manage and to analyze FUND$ related requests or problems.

City Manager's Response:
IT agrees with the finding and recommendation. IT has a number of enhancements planned for the service request system and will include these considerations in that effort. IT will report to Council the progress of the enhancement effort in December 2004.

4.3 Management should analyze patterns in end user complaints and requests and discuss them with the vendor on a regular basis.

City Manager's Response:
IT agrees with the finding and recommendation. An enhancement request process allowing users to suggest and register their support for specific improvements to the system is already in place. H.T.E. implements the request receiving the largest number of votes across their entire customer base. IT, along with key departmental users, coordinates request submission and voting. IT will continue to coordinate this process and to encourage users, particularly module leaders, to participate in the process. Further, IT staff regularly attends H.T.E. User Group (HUG) meetings where they discuss H.T.E.'s products with the company's senior management.

Finding 5: FUND$ modules continues to not have module leaders.

No module leader has been formally assigned to the Work Order/Facilities Maintenance module. In addition, one of the programmers in IT is acting as the Building Permits module leader, according to the Applications Development Manager, because of disagreements with the user department regarding module leader duties.

It appears that the City has difficulty identifying employees with the appropriate skills and the available time to be effective module leaders. Additional barriers to identifying module leaders were noted by Finance in the "Customer Service – Cash Receipts/Cash Handling Audit" report presented to Council on September 16, 2003. The following concerns were documented:

- *There is no formal structure or authority that IT or another department has to require module leaders to follow a testing protocol and timetable. There is also no accountability for those that fail to carry out the testing protocol.*
- *Some module leaders are not qualified to be module leaders (lack the technical skills and qualifications). Minimum module leader qualifications do not exist. The module leader is a person who has responsibility over a software application or module.*
- *There are no minimum training requirements for module leaders.*
- *Module leaders are often not correctly positioned within the organizational structure to properly perform module leader duties. Two modules do not have a module leader.*
- *Module leader duties are not acknowledged in applicable employee job descriptions. There is also a concern that the employees that perform significant module leader duties are not being adequately compensated for performing these duties.*

The Director of Finance stated that the City's lack of a formal module leader structure is one of the contributing factors to why the City has difficulties with FUND$ upgrades. The module leader acts as a liaison between the Application Development Division and the users to ensure that the system meets the City's business needs. The module leader is also responsible for coordinating user testing for upgrades,

PTFs, and other changes made to FUND$. The testing functions are critical to the change process because when user testing is not carefully planned and implemented, faulty program codes or logics will not be caught in time before they are moved into production. This can potentially cause corruption to application files as well as to data files.

Less then a year ago, the IT Director drafted an Administrative Regulation (A.R.) to document policies and procedures for the appointment, duties, and responsibilities of an "Application Expert". The title of "Application Expert" is to replace the title of "Module Leader" once the new A.R. is approved and adopted. However, this A.R. has not been approved by the City Manager's Office.

According to the draft A.R., the definition of an "Application Expert" is: *"an individual who plays a key role in ensuring that a particular application works well and fulfils the business needs of the City. The Expert will not be a member of the I.T. staff – typically they will be a user who is a member of the team that employs the Application on a day-to-day basis and who understand the business requirements and transactional flow of the system, and who has some familiarity with citywide issues and policies.*"

Recommendations for City Manager and Information Technology:

5.1 The City Manager, Human Resources, Finance and IT together should perform a final review of the A.R. on "Application Expert". Once the review is completed, the updated A.R. should be issued and distributed to City staff.

City Manager's Response:
IT agrees with the finding and recommendation. IT will coordinate the effort to move this recommendation forward. IT will report to Council on the status of this finding and recommendation in December 2004. Human Resources management states that implementing this recommendation, and the following recommendations, regarding the duties of the "Application Expert" will result in additional workload in those departments which are assigned responsibility for the various FUND$ modules.

5.2 Direct the user department directors to officially designate a qualified "Application Expert" for each FUND$ module.

City Manager's Response:
IT agrees with the finding and recommendation. IT will issue a memo to all department directors explaining the concept and requesting their cooperation immediately upon the finalization of the A.R. on "Application Expert".

5.3 Direct the Application Experts to coordinate with the users to develop a screen operation manual for each FUND$ module. The responsible Application Expert should also update the manual regularly as changes occur. The manual will serve as a quick reference for the day-to-day module operation. In addition, the process of compiling a manual will help the module leaders become

familiar with the FUND$ modules to which they are assigned.

City Manager's Response:
IT agrees with the finding and recommendation. IT will convene a meeting of application experts in June 2004 and make them aware of this recommendation. Effectively immediately, IT will assist the users when necessary in preparing the documentation.

5.4 When substantial technical changes are made to FUND$, IT should provide application experts with appropriate training as needed.

City Manager's Response:
IT agrees with the finding and partially agrees with the recommendation. The current upgrade methodology dictates that IT will provide users with as much information as possible regarding changes to H.T.E.'s software but the individual application experts are more qualified to conduct the actual training. However, effective immediately, IT will act in an advisory capacity when appropriate. If the changes are developed in-house rather than by H.T.E., IT will conduct the training.

Finding 6: Concerns with FUND$ version upgrade.

Custom Programs
The City maintains a large number (approximately 1,800) of custom programs/objects. Some of these custom programs/objects may be obsolete or not used. These are programs in FUND$ that are modified or created by City staff. Custom programs have significantly increased the complexity of upgrading the financial software. According to the Applications Development Manager, because of the large number of custom programs, a major upgrade installation can take up to two or three months to complete.

According to the Finance Director, one contributing factor to the large number of custom programs is that FUND$ was not designed to fit the City's needs when it was acquired in 1991. Furthermore, the City did not modify its functions to fit into the system's design. As a result, a lot of rebuilding and patching was done to the system after the software was installed.

Once a licensed program is modified or customized in-house, H.T.E. no longer supports the program. When H.T.E. modifies its base codes, IT has to incorporate the changes into the affected custom programs. Recurring costs and effort are required to maintain custom programs.

Converting Test Environment into Production
Another challenge with version upgrades is that H.T.E.'s approach to implementing a test environment does not allow a direct conversion of the test environment into production. Custom programs that have been changed and tested in test libraries have to be copied into production libraries one by one and recompiled. This tedious manual process is highly susceptible to human errors and may cause significant delays and problems, such as system and data errors during an upgrade.

Inadequate Vendor Documentation and Poor Coordination Among City Departments

The change process becomes more difficult and susceptible to errors when the vendor does not clearly document the changes made. Inadequate documentation and testing by the vendor reportedly caused significant problems during the V6.1 upgrade in 2002. The concerns were documented in the "Customer Services – Cash Receipts / Cash Handling Audit".

IT began planning for the V6.0 upgrade late in 2001. IT staff planned to allow three months for retrofitting modifications, testing, and training. In January 2002, the first tape to load into the test environment was obtained. Shortly after IT tested V6.0 (a major upgrade), IT found that the upgrade tape provided by H.T.E. was faulty. In addition, there were a number of disputes among City departments, about schedule and payment responsibilities, which contributed to the 10-months installation delay. In May 2002, H.T.E. released V6.1 with some additional software fixes, but was not able to reissue a V6.0 tape without the new fixes. Because there were critical deadlines that had to be met and the service agreement demanded that service support was subject to installation of all "distributed corrective codes", IT faced the dilemma of either implementing V6.1 without fully testing it or missing the critical deadlines. A decision was made to implement the second version without fully testing the new fixes. After V6.1 was installed, some significant system problems were found. The problems were partially caused by H.T.E.'s failure to provide complete documentation and the existence of programming bugs in the new version. According to the Applications Development Manager, it is a frequent complaint made by H.T.E. users that clear documentation is not provided by the vendor. Also contributing to the problem was a lack of effective planning and coordination among City departments.

The City has installed a new AS/400 machine which provides for two separate virtual machines, one for production and one for test. The Application Division is working with the vendor to determine if it is feasible to switch to a more efficient approach of implementing a test environment so that the test environment can be converted into production directly without copying and recompiling.

Maintaining custom programs for an application is often problematic, as experienced by many organizations. During 1998, the Virginia Department of Transportation (VDOT) implemented a commercial off-the-shelf financial system that was highly customized. Since substantial alterations were made to the original software, VDOT has not been able to implement version upgrades provided by its vendor. Consequently, fourteen full-time employees were hired to maintain the system in-house. The VDOT director for IT applications said with frustration: "*But I vowed never to do it again. Under my leadership, we do not customize applications*." [3] In fact, IT experts recommend customization be kept at a minimum once a software package is purchased.

Survey Results:

Survey results suggest that non-H.T.E. users are more satisfied with their vendors' support of the test environment than H.T.E. users.

Survey results suggest that a higher number of non-H.T.E. users are satisfied with

upgrade and PTF documentation provided by their vendors compared to H.T.E. users.

- Seventeen (89%; six H.T.E. users and eleven non-H.T.E. users) of the 19 respondents maintain custom codes, modifications, or enhancement for their financial systems (Appendix A, p. 20).
- Only seven (37%; two H.T.E. users and five non-H.T.E. users) of the 19 respondents indicated their test environment is supported by their vendors (Appendix A, p. 26). Four of the five non-H.T.E. users rated the effectiveness of their vendors' approach to implementing a test environment as excellent or good and the other one did not respond. On the other hand, the two H.T.E. users rated H.T.E.'s approach fair or poor (Appendix A, p. 26). Three of the five non-H.T.E. users rated their vendor support of the test environment as excellent or good, one rated poor, and one did not respond. However, both H.T.E. users rated the support poor (Appendix A, p. 27). Seven of the eleven non-H.T.E. users indicated that their software vendors provide clear documentation on upgrades and PTFs. On the other hand, only three of the eight H.T.E. users indicated that their vendors, H.T.E., provide clear documentation (Appendix A, p. 25).

Recommendations for City Manager and Information Technology

6.1 The Application Development Division should develop an action plan that clearly defines the methodology for implementing software upgrades. The plan should lay out critical deadlines and available resources that are needed during an upgrade. Conflicts that cannot be resolved by the departments should be referred to the planning group for resolution.

City Manager's Response:
IT agrees with the finding and recommendation. A documented methodology has been instituted internally within IT as stated in response to recommendation 1.0. That effort will be expanded to include a methodology for the entire process and all participants. That methodology will be completed by the end of October 2004.

6.2 IT should consider including in the service support agreement a provision requiring H.T.E. to provide complete documentation of their changes and to be responsible for timely correcting problems resulting from incomplete documentation.

City Manager's Response:
IT agrees with the finding and recommendation. IT will discuss this option with H.T.E. when the next service support agreement is executed in 2007.

6.3 IT should reduce the number of custom programs by eliminating programs that are obsolete or not used.

City Manager's Response:

IT agrees with the finding and recommendation. Reducing the number of custom programs is already underway. The upgrade methodology also includes provisions for identifying modifications that are no longer necessary due to changes in H.T.E.'s software. IT will report to Council on the progress of this implementation in December 2004.

6.4 Since recurring costs and efforts are required to maintain custom programs, a cost and benefit justification should be required for all program change requests submitted by user departments. When a reasonable justification cannot be provided, IT should retain the right to deny the request.

City Manager's Response:
IT agrees with the finding and recommendation. This requirement will be included in the formalized change request process which is expected to be drafted by the end of August 2004, and finalized by the end of October 2004.

Finding 7: Project management methodology and IT governance are not formalized.

Today, organizations are increasingly relying on IT resources to meet their business objectives. Determining how to allocate IT resource and how to map IT functions to business objectives becomes more important in an organization's operation strategy. At the beginning of the audit, IT asked the auditors to look at IT governance in other jurisdictions. Accordingly, the auditor included questions related to IT governance in the survey. Of the respondents, 58% indicated they have a multi-department committee in place for making decision on allocating resources for financial software and support; and 47% of the respondents utilize a multi-department committee to prioritize major program changes to the financial system.

The current City practice requires the Application Development Division to meet with departments on a one-to-one basis to prioritize system related projects and to determine resource allocation. This practice causes IT staff to often limit their focus to immediate problems and service delivery issues, resulting in inconsistent reallocation of resources and excessive overload in the division. As of November 2003, the Application Development Division had a backlog of approximately 66 projects. The backlogged projects were not prioritized by the user departments, nor were project initiation dates systematically documented. According to the Applications Development Manager, IT constantly encounters competing and conflicting demands for limited IT resources. This may be linked to the lack of Citywide IT governance and formalized IT strategic goals. As a result, IT resources may not be allocated to serve the best interests of the City.

Some time ago the City established the Financial Software Policy Committee (FSPC) to oversee and govern major new financial application deployment. To date the committee has not established a formal mission, and some committee members fail to attend meetings regularly. A financial software policy committee could be an appropriate vehicle for prioritizing requests for IT resources for financial system projects.

Control Objectives for Information and related Technology (COBIT)[2] released by the COBIT Steering

Committee and the IT Governance Institute (ITGI) defines "IT governance" as: " *A structure of relationships and processes to direct and control the enterprise in order to achieve the enterprise's goals by adding value while balancing risk versus return over IT and its processes*."

In September 2003, IT drafted a Master Plan for fiscal year 2003 in an attempt to formalize IT strategic goals for the year. To date the plan has not undergone the process of a final review or approval. A well thought out Master Plan would provide for planning ahead, resulting in minimizing spending excessive time and resources to resolve problems.

A Project Plan for 2004 was also drafted by the Applications Development Manager who indicated that the work plan would be presented to each department individually and the "recommendations" from the departments would be consolidated based on project priority. Not only is this process time consuming and inefficient, it may also result in project delays. Additionally, it would allow IT the final decision regarding which projects are high priority.

Survey Results:
H.T.E. users are less likely to have a multi-departmental governing body compared to non-H.T.E. users.

This may be due to the fact that H.T.E. users are smaller agencies as indicated by the IT Director and; therefore, their IT management frameworks tend to be less formal or structured.

- Nine (47%) of the 19 respondents utilize a multi-departmental committee to prioritize major program change requests from users. Only two of the nine respondents are H.T.E. users. The other six H.T.E. users indicated that major program change requests are governed by the IT Director and/or IT staff. It appears that governance is less formal among H.T.E. users (Appendix A, p. 20).
- Eleven (58%) of the 19 respondents indicated that a multi-departmental committee makes the decision for allocating resources for financial software and support. Only two of the eleven respondents are H.T.E. users. The other seven H.T.E. users indicated that the decision is made by the City Manager, Council (in one case), Finance Director and/or IT Director (Appendix A, p. 22).

Recommendations for City Manager:

7.1 An executive policy group should be formed to align IT resources with the City's mission, strategies, and priorities. The City Manager should delegate to the executive policy group the authority to recommend to the City Manager, on behalf of the Deputy City Manager and department directors, how IT resources should be allocated. This group should be convened and staffed by the City Manager. Other sub-committees, established to deal with specific system issues or needs, could include the existing Financial Software Policy Committee's current charge governing major new financial application deployment. The sub-committees should report in writing to the governance group. These groups should actively work on ongoing improvements to the City's systems and technical issues, including training needs.

City Manager's Response:
IT agrees with the finding and recommendation. IT will present a status report to Council in December 2004.

7.2 The draft IT Master Plan should undergo a thorough review process by the appropriate group. After recommended changes have been considered and incorporated, as appropriate, the IT Master Plan should undergo final review and approval by the City's policy group and the City Manager.

City Manager's Response:
IT agrees with the finding and recommendation. The Master Plan should also be reviewed by the citizens Technical Advisory Group. IT plans to publish the Plan by the end of July 2004.

VI. CONCLUSION

"Many organizations recognize the potential benefits that technology can yield. Successful organizations, however, understand and manage the risks associated with implementing new techniques." *2*

"Successful organizations require an appreciation for and a basic understanding of the risks and constraints of IT at all levels within the enterprise in order to achieve effective direction and adequate controls." *2*

Adequate change management controls are an inherent part of a reliable financial system. Changes to financial software must be part of a formal managed process that incorporates controls aimed at preventing and detecting unauthorized changes in a timely manner. These controls should include proper authorization, segregation of incompatible duties, technical review, testing, and clear documentation. A formal change process serves as a roadmap to identify what needs to be done and as a standard for assuring quality, in contrast to the use of informal procedures of which only a few people are aware. The process should also be monitored and subjected to active management and oversight to ensure that the financial system is properly safeguarded against the risk of unauthorized changes and irregularities, and that application and data integrity are not compromised.

REFERENCE:

1 The CPA Journal, April 2002. "Worst Information Technology Practices in Small to Mid-Size Organizations" by Joel Lanz.

2 COBIT, 3rd Edition, Control Objectives. COBIT Steering Committee and IT Governance Institute.
"The IT Governance Institute (ITGI) exists to assist enterprise leaders in their responsibility to ensure that IT goals align with those of the business, it delivers value, its performance is measured, its resources properly allocated and its risks mitigated."
"COBIT Mission: To research, develop, publicize and promote an authoritative, up-to-date, international set of generally accepted information technology control objectives for day-to-day use by business managers and auditors."

3 CDW.G State Tech, Winter 2004. "If You Build It…. " by Melissa Solomon.

City of Berkeley **Appendix A**
Program Change Controls Survey Results
As of February 11, 2004

1. Who is your current major financial systems software provider/s?

	Total	%
No. of HTE Users	8	42%
No. of Other Financial System Users (Non-HTE users)	11	58%
Total No. of Respondents	19	100%

Name of Other Financial System:

PeopleSoft
Tier Techologies
FASBE converting to Oracle
Kayanta
EDEN & CSA
JD Edwards
In House Customized System
Geac
JD Edwards

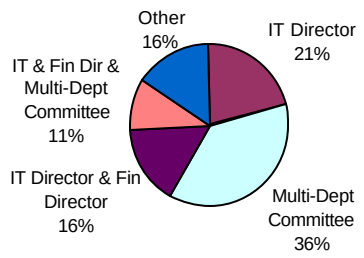
2. Does your jurisdiction create and maintain custom codes, modifications or enhancements to the financial systems?

	Total	%	Other	HTE User
Yes	17	89%	11	6
No	2	11%	0	2
	19	100%	11	8

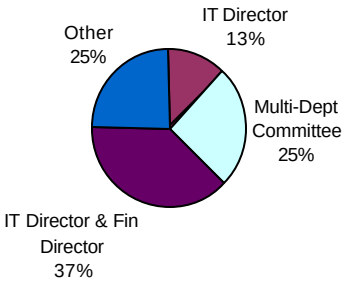
3. Who is responsible for prioritizing major IT program changes (over 80 hours per project) to the financial systems?
User Request:

	Total	%	Other	HTE User
City Manager (CM)	0	0%	0	0
IT Director	4	21%	3	1
Finance Director	0	0%	0	0
Multi-Dept Committee	7	36%	5	2
IT Director & Fin Director	3	16%	0	3
IT & Fin Dir & Multi-Dept Committee	2	11%	2	0
Other	3	16%	1	2
	19	100%	11	8

All Respondents: Prioritize Major User Request



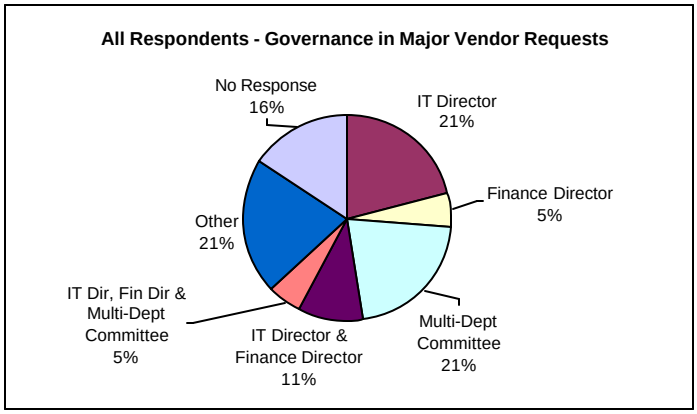
HTE Users - Prioritize Major user Request

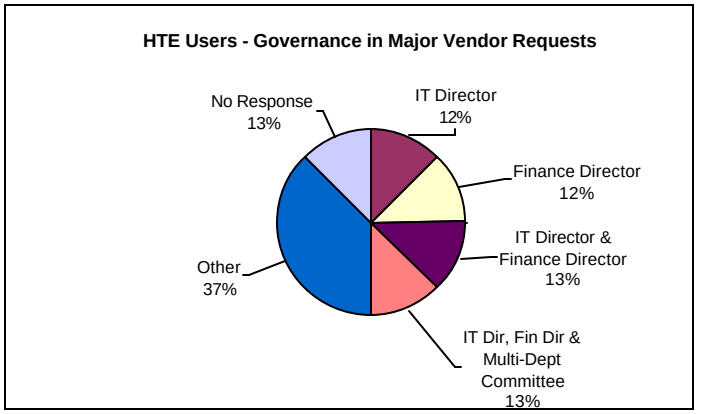


City of Berkeley **Appendix A**
Program Change Controls Survey Results
As of February 11, 2004

Vendor Request:

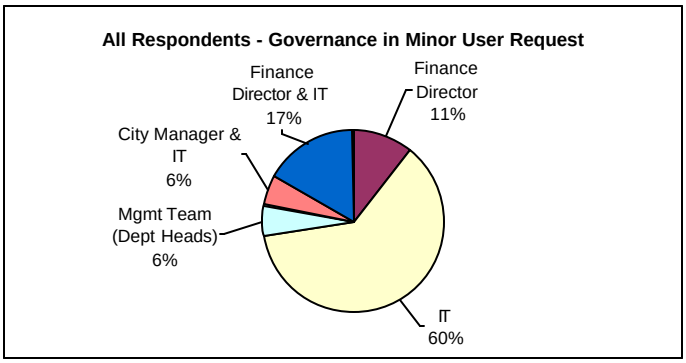
	Total	%	Other	HTE User
City Manager	0	0%	0	0
IT Director	4	21%	3	1
Finance Director	1	5%	0	1
Multi-Dept Committee	4	21%	4	0
IT Director & Finance Director	2	11%	1	1
IT Dir, Fin Dir & Multi-Dept Committee	1	5%	0	1
Other	4	21%	1	3
No Response	3	16%	2	1
	19	100%	11	8

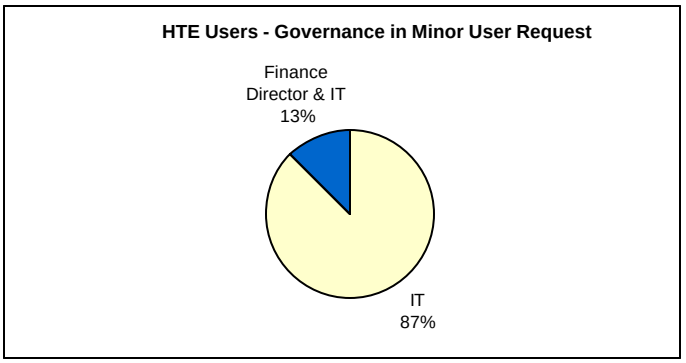




4. Who is responsible for prioritizing IT minor program changes (under 80 hours per project) to the financial systems?
User Request:

	Total	%	Other	HTE User
City Manager	0	0%	0	0
Finance Director	2	11%	2	0
IT	11	58%	4	7
Mgmt Team (Dept Heads)	1	5%	1	0
End Users (Mgmt & staff)	0	0%	0	0
City Manager & IT	1	5%	1	0
Finance Director & IT	3	16%	2	1
End User	0	0%	0	0
Other	1	5%	1	0
	19	100%	11	8

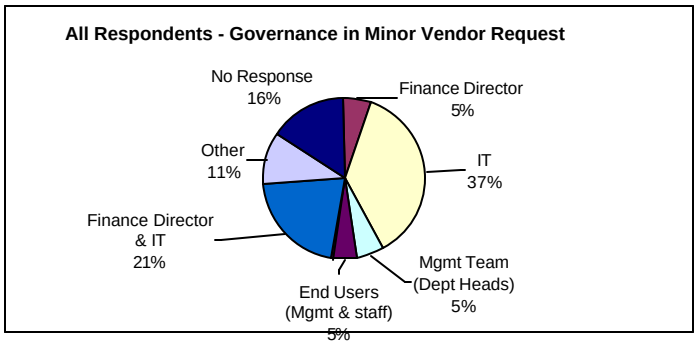


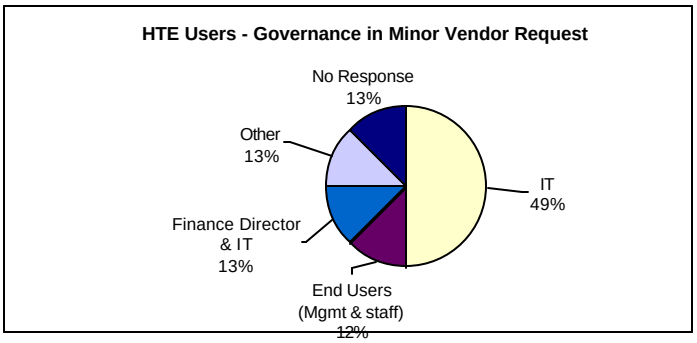


City of Berkeley **Appendix A**
Program Change Controls Survey Results
As of February 11, 2004

Vendor Request:

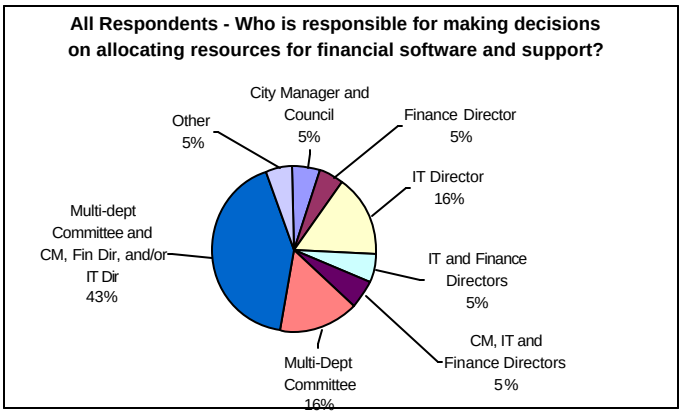
	Total	%	Other	HTE User
City Manager	0	0%	0	0
Finance Director	1	5%	1	0
IT	7	37%	3	4
Mgmt Team (Dept Heads)	1	5%	1	0
End Users (Mgmt & staff)	1	5%	0	1
City Manager & IT	0	0%	0	0
Finance Director & IT	4	21%	3	1
Other	2	11%	1	1
No Response	3	16%	2	1
	19	100%	11	8

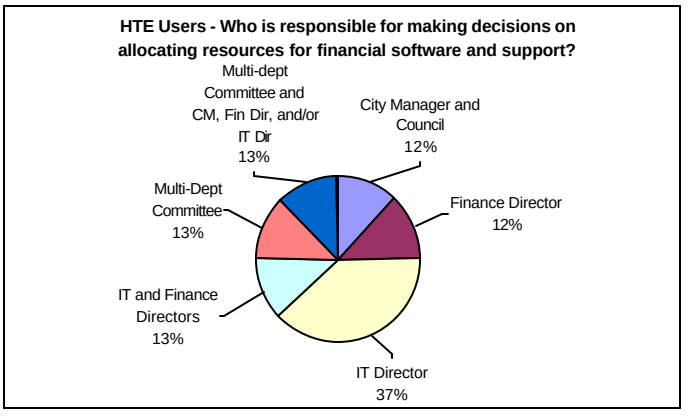




5. Who is responsible for making decisions on allocating resources for financial software and support?

	All	%	Other	HTE User
City Manager and Council	1	5%	0	1
Finance Director	1	5%	0	1
IT Director	3	16%	0	3
IT and Finance Directors	1	5%	0	1
CM, IT and Finance Directors	1	5%	1	0
Multi-Dept Committee	3	16%	2	1
Multi-dept Committee and CM, Fin Dir, and/or IT Dir	8	42%	7	1
Other	1	5%	1	0
	19	100%	11	8





City of Berkeley **Appendix A**

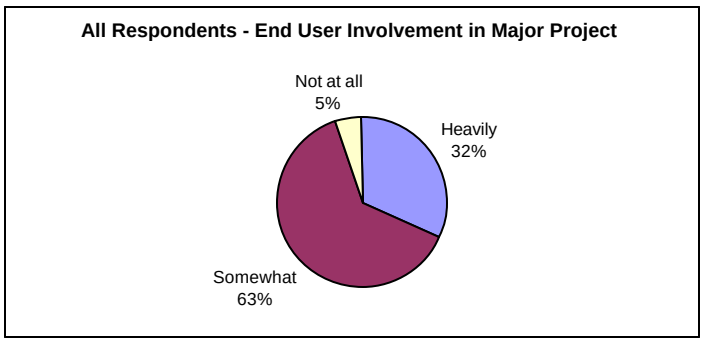
Program Change Controls Survey Results

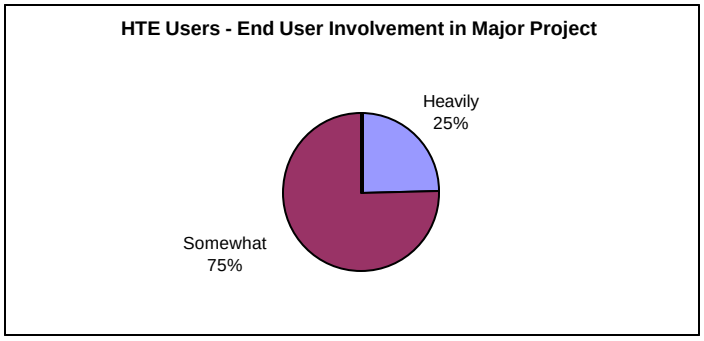
As of February 11, 2004

6. How involved are the department end users in prioritizing change requests?

Major Project:

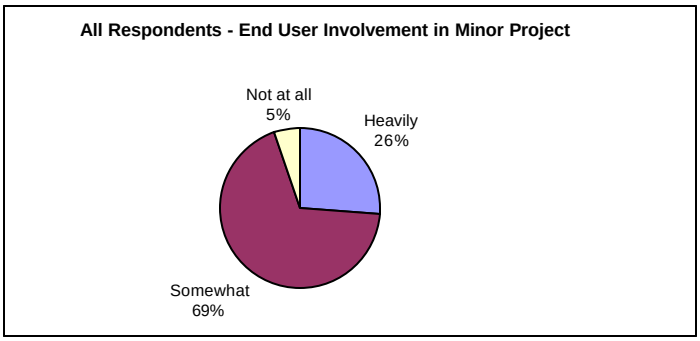
	Total	%	Other	HTE User
Heavily	6	32%	4	2
Somewhat	12	63%	6	6
Not at all	1	5%	1	0
	19	100%	11	8

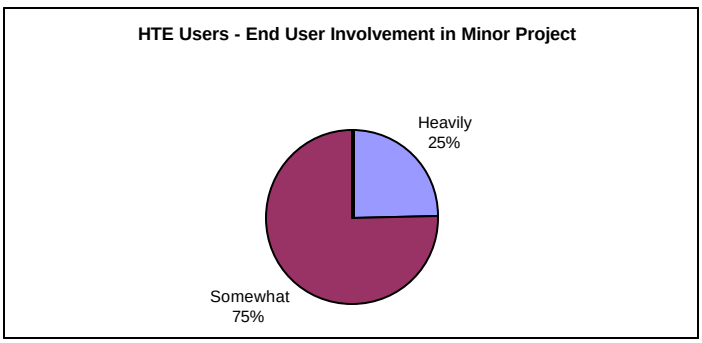




Minor Project:

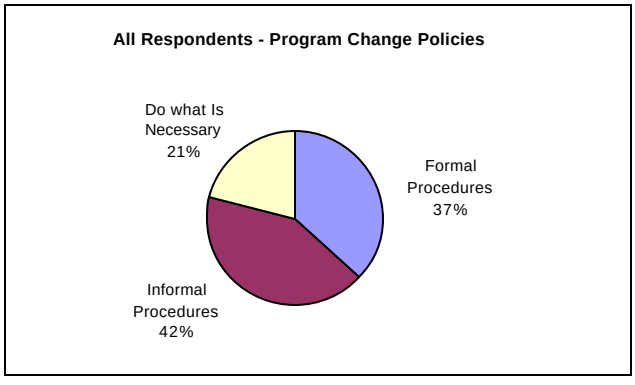
	Total	%	Other	HTE User
Heavily	5	26%	3	2
Somewhat	13	68%	7	6
Not at all	1	5%	1	0
	19	100%	11	8

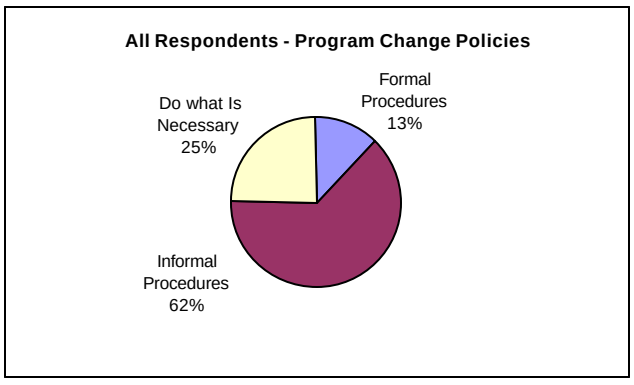




7. Which one of the following most closely describes how your jurisdiction implement program changes to the financial systems?

	Total	%	Other	HTE User
Formal Procedures	7	37%	6	1
Informal Procedures	8	42%	3	5
Do what Is Necessary	4	21%	2	2
	19	100%	11	8





City of Berkeley **Appendix A**
Program Change Controls Survey Results
As of February 11, 2004

8. Does your jurisdiction keep track of all program change requests and their status?

Change requests from the vendor such as system upgrade and Program Temporary Fixes PTFs):

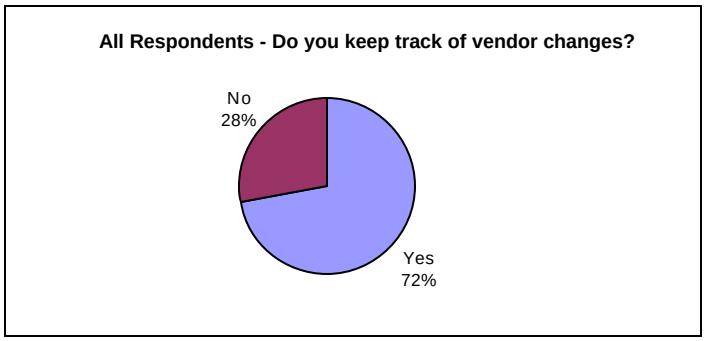
	Total	%	Other	HTE User
Yes	17	89%	10	7
No	1	5%	0	1
No Response	1	5%	1	0
	19	100%	11	8

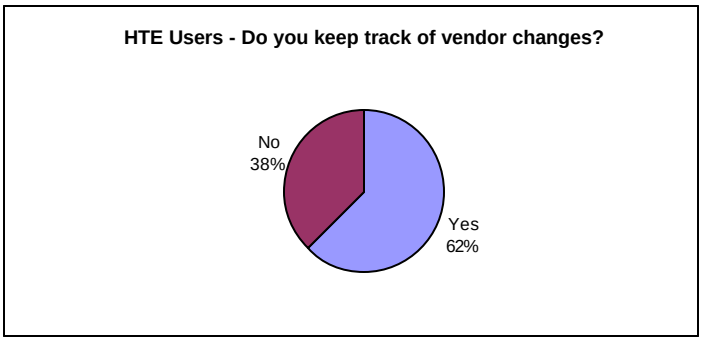
Change requests from the department end users:

	Total	%	Other	HTE User
Yes	18	95%	11	7
No	1	5%	0	1
	19	100%	11	8

Changes made directly by the vendor or consultant:

	Total	%	Other	HTE User
Yes	13	69%	8	5
No	5	26%	2	3
No Response	1	5%	1	0
	19	100%	11	8



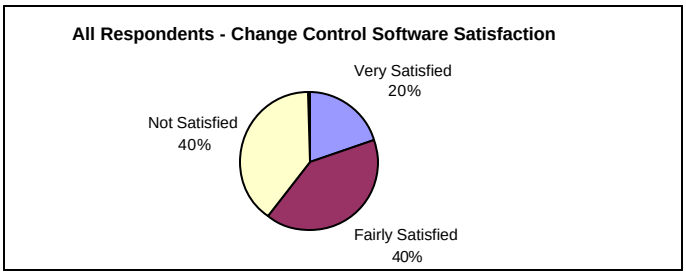


9. (A) Does your jurisdiction use change control software?

	Total	%	Other	HTE User
Yes	6	32%	4	2
No	12	63%	6	6
No Response	1	5%	1	0
	19	100%	11	8

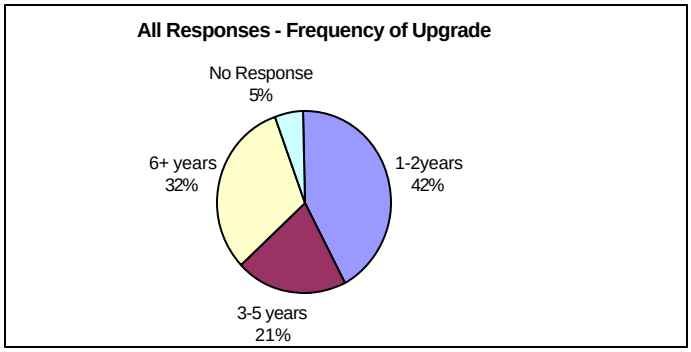
10. What is your level of satisfaction with the change control software?

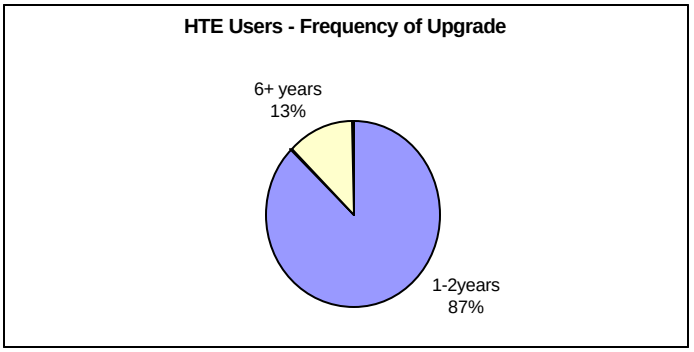
	Total	%	Other	HTE User
Very Satisfied	1	20%	1	0
Fairly Satisfied	2	40%	1	1
Not Satisfied	2	40%	2	0
N/A	0	0%	0	0
	5	100%	4	1



11. How often does your jurisdiction upgrade the financial software?

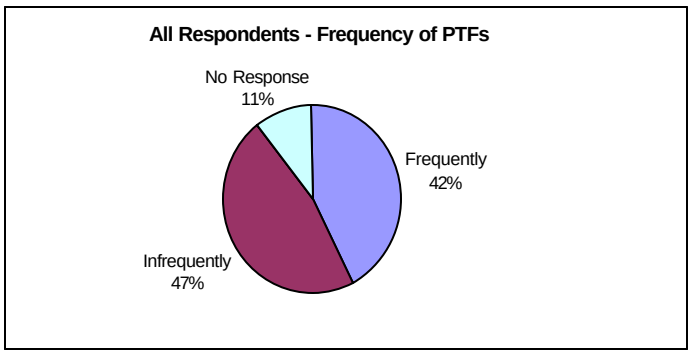
	Total	%	Other	HTE User
1-2years	8	42%	1	7
3-5 years	4	21%	4	0
6+ years	6	32%	5	1
No Response	1	5%	1	0
	19	100%	11	8

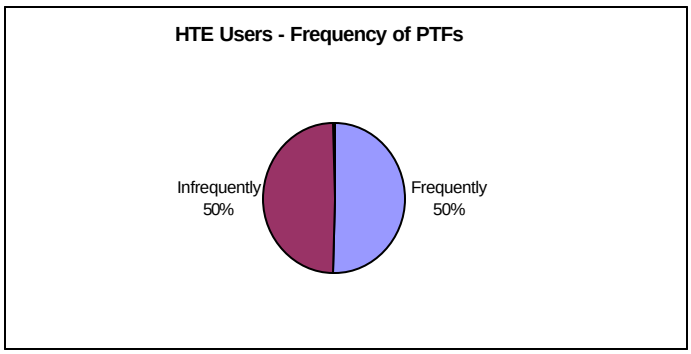




12. How often does your software provider send you a PTF?

	Total	%	Other	HTE User
Frequently	8	42%	4	4
Infrequently	9	47%	5	4
Never	0	0%	0	0
No Response	2	11%	2	0
	19	100%	11	8





13. Does your software vendor provide the following related to upgrades and PTFs?

Clear and detailed written documentation:

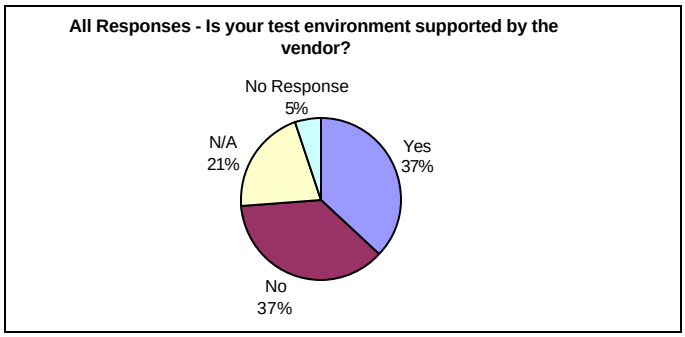
	Total	%	Other	HTE User
Yes	10	53%	7	3
No	8	42%	3	5
No Response	1	5%	1	0
	19	100%	11	8

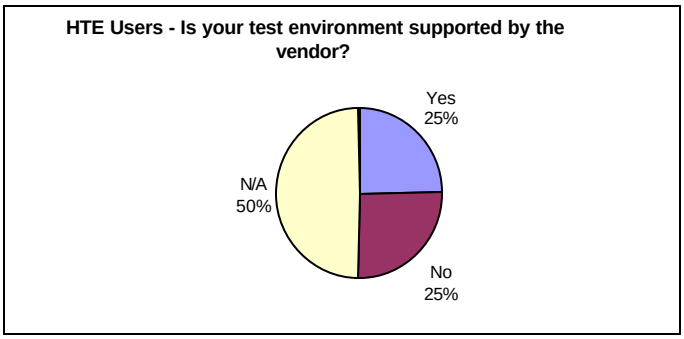
Training:

	Total	%	Other	HTE User
Yes	4	21%	4	0
No	14	74%	6	8
No Response	1	5%	1	0
	19	100%	11	8

14. (A) Is your test environment supported by the vendor?

	Total	%	Other	HTE User
Yes	7	37%	5	2
No	7	37%	5	2
N/A	4	21%	0	4
No Response	1	5%	1	0
	19	100%	11	8



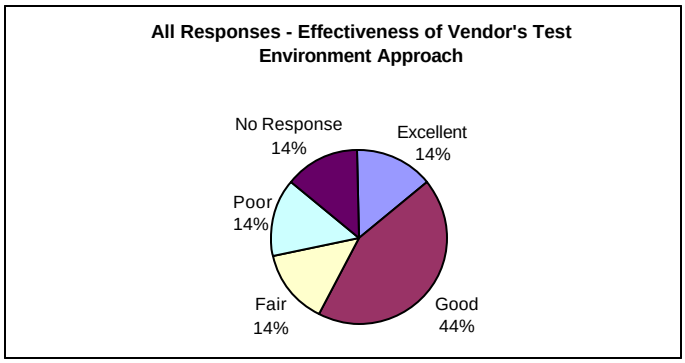


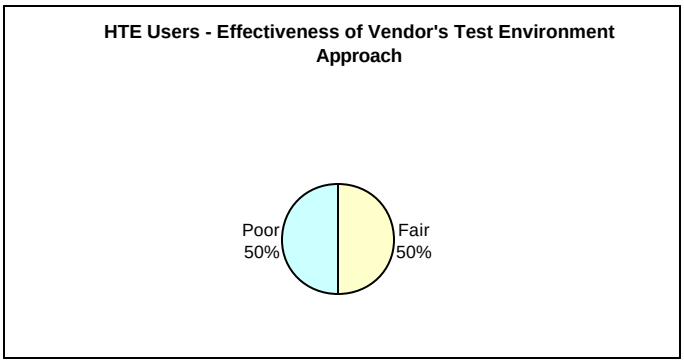
(B) If the answer to (A) is "No" or "N/A", proceed to #15. If the answer is "Yes", which approach does the vendor take in implementing a test environment?

	Total	%	Other	HTE User
Test environment can be directly converted or migrated to production:	3	43%	3	0
Upgrade or changes in test environment must be reapplied to production and recompiled:	3	43%	1	2
Other:	1	14%	1	0
	7	100%	5	2

(C) Please rate the level of effectiveness of the vendor's current approach in implementing a test environment.

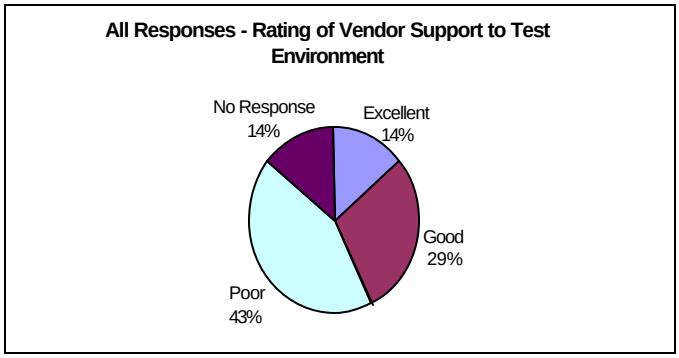
	Total	%	Other	HTE User
Excellent	1	14%	1	0
Good	3	43%	3	0
Fair	1	14%	0	1
Poor	1	14%	0	1
No Response	1	14%	1	0
	7	100%	5	2

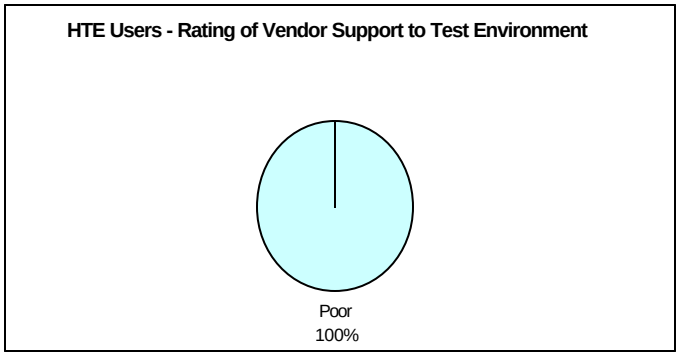




(D) Please rate the level of vendor support for your test environment.

	Total	%	Other	HTE User
Excellent	1	14%	1	0
Good	2	29%	2	0
Fair	0	0%	0	0
Poor	3	43%	1	2
No Response	1	14%	1	0
	7	100%	5	2





15. (A) Does your jurisdiction always test major program changes in a test environment before migrating them to production?

	Total	%	Other	HTE User
Yes	13	68%	10	3
No	6	32%	1	5
	19	100%	11	8

(B) If the answer to (A) is "No", please briefly identify why changes are not tested:

	Total	%	Other	HTE User
Cost	0	0%	0	0
No Time	0	0%	0	0
Lack Staff	1	17%	0	1
No Time & Lack of Staff	3	50%	1	2
Other	2	33%	0	2
	6	100%	1	5

16. Are all program changes traceable by user ID, date and type of activities?

	Total	%	Other	HTE User
System	11	58%	6	5
Manual	5	27%	4	1
Can't beTraced	1	5%	1	0
Other	1	5%	0	1
No Response	1	5%	0	1
	19	100%	11	8

17. Does your software provider or independent consultant have remote access to the production environment with the capability to make program changes?

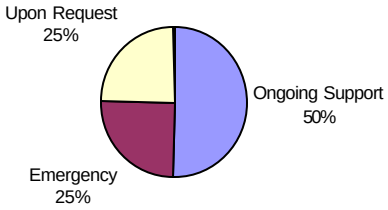
	Total	%	Other	HTE User
Yes	12	63%	4	8
No	6	32%	6	0
No Response	1	5%	1	0
	19	100%	11	8

18. If the answer to #17 is "No", proceed to #19. If the answer is "Yes":

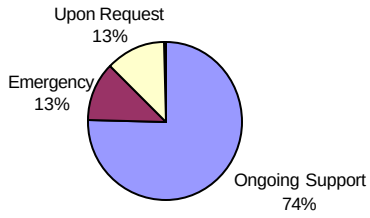
(A) Under what circumstances does the software provider or independent consultant make changes to the production environment?

	Total	%	Other	HTE User
Ongoing Support	6	50%	0	6
Emergency	3	25%	2	1
Upon Request	3	25%	2	1
Never	0	0%	0	0
	12	100%	4	8

All Respondents - Software provider has access to production because:



HTE Users - Software provider has access to production because:



(B) Do they obtain authorization prior to making changes?

	Total	%	Other	HTE User
Yes	10	83%	4	6
No	2	17%	0	2
	12	100%	4	8

(C) If the answer to (B) is "Yes", how do you obtain authorization?

At least 24 hours prior to changes:

	Total	%	Other	HTE User
Written	1	8%	0	1
Verbal	4	30%	2	2

Less than 24 hours prior to changes:

Written	1	8%	0	1
Verbal	7	54%	3	4
	13	100%	5	8

(D) Do they provide you with clear and complete documentation of the changes that they made directly to the production environment?

	Total	%	Other	HTE User
Always	2	17%	1	1
Sometimes	6	50%	2	4
Upon Request	1	8%	0	1
Unclear/Incomplete	0	0%	0	0
No Documentation	3	25%	1	2
	12	100%	4	8

19. Population Lowest= 35,000 Highest= 900,001

			Total	%	Other	HTE User		
<100,000			7	37%	3	4		
100,000	to	300,000	7	37%	3	4	<--City of Berkeley	109,000
300,001	to	500,000	2	11%	2	0		
500,001	to	700,000	1	5%	1	0		
700,001	to	900,000	1	5%	1	0		
900,001	to	1,000,000	1	5%	1	0		
>1,000,000			0	0%	0	0		
			19	100%	11	8		

FTE Lowest = 250 Highest = 8,000

			Total	%	Other	HTE User		
<500			4	21%	1	3		
500	to	1,000	3	16%	2	1		
1,001	to	2,000	6	31%	2	4	<--City of Berkeley	1,700
2,001	to	3,000	2	11%	2	0		
3,001	to	4,000	1	5%	1	0		
4,001	to	6,000	1	5%	1	0		
6,001	to	8,000	2	11%	2	0		
8,001	to	10,000	0	0%	0	0		
>10,000			0	0%	0	0		
			19	100%	11	8		

IT Budget Lowest = $1,500,000 Highest = $34,874,987

			Total	%	Other	HTE User		
$1,000,000	to	$2,000,000	3	18%	1	2		
2,000,001	to	3,000,000	2	12%	0	2	<--City of Berkeley	$2,563,922
3,000,001	to	4,000,000	3	17%	1	2		
4,000,001	to	8,000,000	1	6%	1	0		
8,000,001	to	12,000,000	5	29%	4	1		
12,000,001	to	16,000,000	1	6%	1	0		
16,000,001	to	20,000,000	1	6%	1	0		
20,000,001	to	25,000,000	0	0%	0	0		
25,000,001	to	30,000,000	0	0%	0	0		
30,000,001	to	35,000,000	1	6%	1	0		
35,000,001	to	40,000,000	0	0%	0	0		
>$40,000,000			0	0%	0	0		
			17	100%	10	7		
No Response			2					

IT Budget/FTE Lowest = $1,508 Highest = $6,120

			Total	%	Other	HTE User		
<$1,500			0	0%	0	0		
$1,500	to	$2,000	2	12%	1	1	<--City of Berkeley	$1,508
2,001	to	2,500	3	17%	2	1		
2,501	to	3,000	2	12%	2	0		
3,001	to	3,500	3	18%	0	3		
3,501	to	4,000	0	0%	0	0		
4,001	to	4,500	3	17%	3	0		
4,501	to	5,000	2	12%	1	1		
>$5,000			2	12%	1	1		
			17	100%	10	7		

Total IT Budget: all respondents (A)	136,587,602	112,550,530	24,037,072
Total FTE: all respondents (B)	41,657	34,373	7,284
Average IT Budget/FTE (A)/(B)	$3,279	$3,274	$3,300

City of Berkeley **Appendix A**
Program Change Controls Survey Results
As of February 11, 2004

IT Budget/Population Lowest = $12 Highest = $86

			Total	%	Other	HTE User		
<$10			0	0%	0	0		
$10	to	$20	5	29%	4	1		
21	to	30	4	24%	1	3	<--City of Berkeley	$23.5
31	to	40	3	18%	2	1		
41	to	50	2	12%	0	2		
51	to	60	1	6%	1	0		
61	to	70	0	0%	0	0		
71	to	80	0	0%	0	0		
81	to	90	2	12%	2	0		
91	to	100	0	0%	0	0		
>$100			0	0%	0	0		
			17	100%	10	7		
Total Population: all respondents (C)			4,718,370		3,884,099	834,271		
Average IT Budget/Capita (A)/(C)			$29.0		$29.0	$28.8		