John W. Lainhart IV
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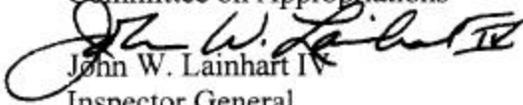
MEMORANDUM

TO: The Honorable Bill Thomas, Chairman
          Committee on House Oversight

          The Honorable Sam Gejdenson, Ranking Minority Member
          Committee on House Oversight

          The Honorable Bob Livingston, Chairman
          Committee on Appropriations

          The Honorable David Obey, Ranking Minority Member
          Committee on Appropriations

FROM: John W. Lainhart IV
          Inspector General

DATE: April 6, 1998

SUBJECT: Management Advisory Report – Mainframe Migration Options Study For Mission-
          Critical Application Systems At The U.S. House Of Representatives
          (Report No. 98-HOC-03)

This is our final report on the results of our Study of the options for the migration of the U.S. House of Representatives' (House) mission-critical application systems running on the House Information Resources' (HIR) mainframe computer. The Study was initiated pursuant to the request of the Committee on House Oversight and Committee on Appropriations (House Report 105-196, Legislative Branch Appropriations Bill, 1998). The objective of the Study was to identify and recommend options for the migration of the House's eight mission-critical, mainframe-based applications. In this report, we summarized the results of the Mainframe Migration Options Study and presented the alternatives for offloading the House's eight applications from the HIR mainframe computer. We also recommended actions for planning, including steps for validating the information used in this Study, the migration of these applications.

In response to our January 28, 1998 draft report, the Chief Administrative Officer (CAO) agreed that the results of the Mainframe Migration Options Study provided a good foundation to begin further analysis and detailed planning for the migration of the House's mission-critical application systems. While the CAO's response included comments regarding issues, such as Year 2000 readiness of a Legislative Branch mainframe environment and funding issues, the CAO indicated his intent to begin developing a mainframe migration implementation plan. The CAO's formal written response is incorporated in this report and included in its entirety as an appendix.

While we agree that the CAO's comments on the various migration issues are valid and could impact the final selection of alternatives, if left unaddressed, we strongly believe that the detailed planning and validation steps of the mainframe migration planning process should provide additional information to sufficiently address the issues raised by the CAO.

Should you wish to discuss this matter further, I am available at your convenience.

cc: Speaker of the House
       Majority Leader of the House
       Minority Leader of the House
       Chairman, Subcommittee on Legislative
       Ranking Minority Member, Subcommittee on Legislative
       Chief Administrative Officer

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MAINFRAME MIGRATION OPTIONS STUDY

I.   INTRODUCTION

Through House Report 105-196 (Legislative Branch Appropriations Bill, 1998), the Committee on Appropriations' requested that the Office of Inspector General (OIG) study the House's mainframe migration options and report its findings to the Committee on House Oversight (CHO) and Committee on Appropriations. The House Report specifically called for the OIG to "study whether the House could be better served in the future by either outsourcing the operation of the mainframe computer to a vendor or relocating the final mainframe systems[1] to another legislative branch agency."

This report presents the results of our Study of the options for the migration of the U.S. House of Representatives (House) mission-critical application systems running on House Information Resources' (HIR) mainframe computer and recommended actions for planning for the migration of these applications. The report includes the following: (1) identification of viable options for the migration of mission-critical applications off the mainframe computer, (2) recommended options for the mainframe migration as well as the detailed technical solution, and (3) guidelines for planning the migration of the mainframe-based applications.

This Study was conducted by Price Waterhouse LLP (Price Waterhouse) under contract with the OIG. HIR assisted Price Waterhouse by providing mainframe computer and application information and support to facilitate completion of this Study.

Background

At the start of the 104th Congress, the Speaker established a CyberCongress vision. This vision involved transforming the House from its reliance on cumbersome, paper-based information to an institution supported by universally available electronic information. Once implemented, it would remove restrictions of time and space for Members, Committees, and staff, allowing them the flexibility to perform their work at the best time and place. At the same time and using the same technologies, timely access to House information and activities would be available.

At the request of the Speaker, the CHO formed the Computer and Information Services Work Group (CISWG). This Group, which was comprised of three Members, concentrated its efforts on computer technology and infrastructure issues and reported directly to the CHO. On November 15, 1995, the CHO approved, in concept, the House Information Systems Program Plan (ISPP) presented by the CISWG. The ISPP, and the accompanying resolution, were intended to provide HIR the impetus for translating the Speaker's CyberCongress vision into reality. Through the ISPP, the CHO requested HIR to identify the elements surrounding the retirement of the existing mainframe computer, including the legacy systems it supports.

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[1]The final mainframe systems refer to a specific group of mainframe-based applications identified in the House Information Resource's Year 2000 plan to remain on its mainframe computer (see section entitled *Objective, Scope and Methodology* of this report). HIR had not addressed the migration of these applications. However, the Year 2000 plan did identify key applications and associated migration approaches, such as Commercial-off-the-Shelf products or desktop systems, for all other applications residing on HIR's mainframe computer.

In April 1997, HIR prepared a high level Year 2000 plan. This plan projected the disposition of the mainframe-based applications as either (1) remaining on the mainframe (Group A), (2) being replaced with a Commercial-off-the-Shelf (COTS) client/server system, outsourced or retired (Group B); (3) migrating to a desktop system (Group C), or (4) those servicing outside client systems, such as Congressional Budget Office (CBO), General Accounting Office (GAO), and ProPAC[2]. (See OIG Report No. 97-CAO-15, entitled *Despite CHO And CAO Mandates HIR Has Not Begun Development of A Mainframe Migration Plan*, dated December 12, 1997). This plan called for several mainframe-based legacy applications to be migrated to a client/server[3] architecture based on a network-centric[4] approach to information creation, storage, access, and delivery. However, eight mission critical applications remained on the mainframe computer and no solutions had been identified for addressing the migration of these systems, despite the ISPP directive for assessing options for retiring the existing mainframe computer.

HIR further stipulated that a migration strategy had to be adopted prior to retirement of the mainframe computer. The ISPP called for the House to begin planning for the retirement of the mainframe-based legacy systems several years in advance of actual replacement. A migration plan outlines the retirement of the mainframe computer as well as placing a high priority on the retirement of legacy application systems, and outdated desktop systems that would otherwise continue to drain resources needed for new programs. It also answers key questions and identifies critical decision points relating to the establishment of a client/server network in order to ensure support for the new client/server systems. This planning effort is especially crucial for HIR's International Business Machines' (IBM) mainframe computer, since it is not expected to run any mission-critical applications once MIN (Member Information Network), ISIS (Integrated Systems and Information Services), LIMS (Legislative Information Management System), and FMS (Financial Management System) are replaced.

A well-conceived migration plan is especially important for the House since it addresses the continuity of service for its mission-critical systems until they can be replaced, as well as, the retirement of formal agreements with outside clients, such as the GAO and CBO. In addition, the plan considers the alternative services for those systems, such as the National Change Of Address (NCOA), that are not regarded as mission-critical.

Objective, Scope, And Methodology

The objective of the Study was to identify and recommend options for the migration of several of the House's mainframe-based applications. This included determining whether the House could be better served in the future by either outsourcing the operation of the mainframe computer to a vendor or relocating the remaining mainframe-based application systems to another Legislative agency.

The scope of the Study focused only on a total of eight applications (listed below) that were identified as mission-critical to the House in the House's Year 2000 plan. The first seven were identified by HIR as the House's final mainframe-based systems[5]. The eighth application (i.e., the Financial Disclosure System) is a mission-critical system

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[2]The Prospective Payment Assessment Commission (ProPAC) is a Congressional Commission that provides recommendations to Congress for Medicare funding.

[3]Client/server is an architecture in which a system's functionality and its processing are divided between the client's personal computers (the front end) and a database server (the back end). System functionality, such as programming logic, business rules, and data management, is segregated between the client and the server machines. The end user uses the front-end application to request information from the database server. The database server receives these requests, processes them, and sends the results back to the client to be displayed.

[4]Network-centric, or what is now known as distributed client/server computing, can be defined as all clients, servers, and Local Area Networks (LAN) being connected and controlled through the network backbone.

[5]The Year 2000 plan had listed HIR's Inventory System among eight applications to remain on the mainframe. The CAO has since decided to replace HIR's Inventory System with a House-wide Fixed Asset and Inventory system.

owned by the Office of the Clerk and needs to be considered for migration off HIR's mainframe computer. This application was identified by Price Waterhouse for inclusion in this Study.

- ## LIMS,

- Management of Network Income Expense Services (MONIES),

- NCOA,

- Photography (FOTO),

- Recording Studio (Studio),

- Parking (POPS),

- Lobby Act, and

- Financial Disclosure System.

To identify viable options for migrating these applications off HIR's mainframe computer, the following steps were performed, followed by a summary of the methodology applied:

- **Identified and Developed Application Profiles.** Data was collected on hardware, software, and peripherals related to the mainframe computer. Profiles of the eight applications were developed that included information, such as technical environment, inputs, outputs, and interfaces. The detailed methodology and results of this task are discussed in Exhibit A, *Application Profiles*.

- **Analysis of Application Requirements.** Data was collected to gain an understanding of the functionality, business processes, user preferences, and the organizations that use and support the eight applications within the scope of this study. The detailed methodology and results of this task are discussed in Exhibit B, *Application Requirements and Alternatives Analysis*.

- **Analysis of Each Application Alternatives.** Based on the analysis of application requirements, an alternatives analysis was performed for each application. The alternatives analysis included a survey of available COTS software and similar applications used by other organizations. Alternatives for each application were selected and prioritized based on criteria developed through interviews with application users, HIR, and the OIG. The detailed methodology and results of this task are discussed in Exhibit B, *Application Requirements and Alternatives Analysis*.

- **Analysis of System-Wide Alternatives and Definition of Technical Environment.** The scope of this study included a cost-benefit analysis of up to four global alternatives for the eight applications. Therefore, application alternatives were grouped into four viable system-wide alternatives for comparison through a cost-benefit analysis. The system-wide alternatives selected for the study were (1) re-platforming the applications to an RS/6000 platform, (2) relocating the applications to a Legislative Branch mainframe computer, (3) replacing the applications with COTS software, and (4) a Top-Ranked alternative that comprised the highest-ranked application alternative for each application from the three system-wide alternatives. We also developed a projected baseline scenario for FY 1999 to represent the option to continue to host the remaining eight applications on HIR's mainframe computer. The detailed methodology and results of this task are discussed in Exhibit C, *System-Wide Alternatives*, and Exhibit D, *Technical Environments Definition of System-Wide Alternatives*.

- **Analysis of Costs and Benefits of the System-Wide Alternatives.** A cost-benefit analysis was performed on the four system-wide alternatives for the purpose of recommending a specific alternative. Data was collected on the primary cost factors of each system-wide alternative. An analysis of qualitative factors for each system-wide alternative was also conducted. The detailed methodology and results of this task are discussed in Exhibit E, *Cost-Benefit Analysis of System-Wide Alternatives*.

Consequently, migration options were no longer necessary for this system. We therefore eliminated HIR's Inventory System from the scope of our Study.

- **Guidelines for Planning the Mainframe Migration.** The final task was to develop guidelines for planning the mainframe migration. This included identifying key planning tasks as well advice on the development of a migration implementation plan. In addition, this task included recommending how to proceed with the results of the Study. The results of this task are discussed in Exhibit F, *Guidelines for Planning the Mainframe Migration.*

The work completed in the Study was based on the following overall assumptions and constraints identified through interviews and discussions with users, HIR, and key House management officials:

- The mainframe-based applications need to be expeditiously migrated by the third quarter of FY 1999.

- The use of client-server COTS software is the preferred solution. A custom developed solution as a mainframe migration alternative is not acceptable.

- The internal controls related to mainframe migration alternatives will be assessed as part of executing the mainframe migration implementation plan.

- The data collected during the Study was not independently validated.

- The Study does not include the analysis of options for the House's external client (i.e., GAO and CBO) applications.

II.   RESULTS OF STUDY

In this section, we summarized the results of the Mainframe Migration Options Study and present the alternatives for offloading the last of the House's applications (i.e., eight applications) from HIR's mainframe computer. The summary includes the following: (1) an overview of the eight mainframe-based applications addressed in this Study, (2) identification of viable alternatives for the application migration, (3) cost-benefit analysis of alternatives, and (4) recommended alternative for the mainframe migration. Lastly, we present guidelines, including steps for validating the information used in this Study, for planning the mainframe migration.

Overview of the Mainframe-based Applications

Presently, the House's IBM CMOS[6] mainframe computer, housed in HIR's data center located in the Ford Building, supports the workload of approximately 80 applications, including the eight mainframe-based applications addressed in this Study.[7] In terms of processing power, the mainframe computer is relatively small, running at 77 millions of instructions per second (MIPS). The applications hosted on the mainframe computer are maintained, operated, and supported by HIR. Users typically access their applications on the mainframe computer through the House's extensive LAN and BUDNET, the House's network backbone.

The Study addressed eight applications (i.e., LIMS, MONIES, NCOA, Financial Disclosure, Lobby Act, Studio, FOTO and POPS) for migration. (See Exhibit A, *Application Profiles*, for a detailed discussion.) The applications are mission critical to the House. Among these applications, LIMS

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[6]CMOS--Complementary Metal Oxide Semiconductor IBM Multiprise 2000 Model 135 enterprise server.

[7] HIR also provides timesharing services to GAO and CBO for hosting applications on a fee-for service basis. These services are expected to generate $1.2 million in revenues for FY 1999. However, this revenue was not included in the FY 1999 baseline because these HIR-provided services are not mission-critical to the House.

and MONIES are significant systems with respect to the legislative process and recording expenses of Member, Committee, and other House offices' telecommunications services, respectively. The remaining six applications are also essential to House operations, but are smaller systems. While these applications are owned by one of the House Officers (i.e., Chief Administrative Officer, Clerk, or Sergeant at Arms), the applications impact both House and non-House individuals (referred to as Stakeholders) ranging from Members and Committees to the general public. Figure 1 provides a summary of key functional characteristics, the complexity ranking[8], application owner, number of users, and stakeholders for each of the eight applications.

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[8]The complexity ranking is a high-level ranking of the applications considering their functionality, input and output requirements, and interfaces.

Figure 1 - Summary of Mainframe-based Application Functionality

Application	Functionality	Complexity	Owner	No. of Users	Stakeholders
LIMS	LIMS is used to record, and track bills and actions, and report on the highly complex legislative process at the House.	High	Office of Clerk	60	Clerk's Office, Members, Committees, Senate, and Library of Congress
MONIES	The MONIES application is a telecommunications cost accounting and billing system that tracks telecommunications voice equipment and lines for the House Washington D.C. and district offices. It also provides the overall telecommunications utilization and service expense information for generating monthly charge-backs to Member, Committee, and other House offices.	High	HIR	20	Members' Washington D.C. offices, District Offices, House Committees, and other House offices
NCOA	The NCOA file, developed by the United States Postal Service (U.S. Postal Service), consists of 36 months of permanent change-of-address information taken from the 42 million change-of-address orders filed annually with the USPS. HIR runs custom programs for media conversion and file formatting, and a COTS application for address standardization, before and after NCOA processing.	Medium	HIR	6	120-125 Members (approx. 30%) use NCOA each year
Financial Disclosure	The Financial Disclosure application records financial disclosure reports submitted by Members and certain Legislative Branch staff, generates queries, and records data for image indexing and processing.	Low	Office of the Clerk	7	House employees General public
Lobby Act	The Lobby Act application records lobbyist registrations and semi-annual Lobbying Reports submitted by lobbyists pursuant to the Lobbying Disclosure Act of 1995. It is also used to scan hard-copy reports, accept query criteria for viewing by the general public, display the report images, and record data for image indexing and processing and reporting.	Low	Office of the Clerk and	7	Lobbyists General Public
Studio	The Recording Studio application tracks the use of the House radio and video facilities by Member, Committee, and other House offices.	Low	Office of the CAO, Office of Communication Media	1	Members Committees
FOTO	The FOTO application tracks the use of photographic services by Members, Committees, and other House offices.	Low	Office of the CAO, Office of Photography	4	Members Committees
POPS	The POPS application tracks parking permits issued by the House Garage and Parking Security Office (Parking Office).	Low	Office of the Sergeant at Arms, Parking Office	10	Members, Member staff, Committee staff, House office staff, Legislative agency staff, Contractors, and Visitors

Identification of Viable Alternatives

To identify viable migration alternatives for the mainframe-based applications, we first identified application requirements primarily based on a series of interviews and discussions with users and application owners. As part of this process, we also identified migration criteria, such as time restrictions and relocation constraints, for each application. The migration criteria was supplemented through discussion with other key House management officials as well as information outlined in key House information technology documents.[9]

Using the application requirements and migration criteria information, we researched application and system alternatives available in the market place as well as alternatives successfully employed in other public and private entities. See Exhibit B, *Application Requirements and Alternatives Analysis*. Based upon the information collected on the alternatives available in the marketplace, we analyzed each potential alternative to assess and rank the ability of the application to meet the House's requirements while considering the migration criteria. The methodology and results of the application alternatives are discussion in Exhibit B, *Application Requirements and Alternatives Analysis*.

The results of the individual application analyses enabled us to identify a group of common viable alternatives (i.e., "system-wide" alternatives) for further analyses of the viability of the migration options. The common alternatives for the applications resulted in the alternative categories listed below.

- **Re-Platform to RS/6000**. This system-wide alternative provides for the re-platforming of the eight mainframe-based applications to RS/6000 R/390 Server-On-Board platforms. The platform would be located at the House and used to emulate a mainframe computer environment for processing the essentially unmodified applications, their support utilities and third party software, such as ADABAS. The RS/6000 would function as a client to a host server or as a server for clients on a LAN.

- **Relocation to Legislative Branch**. This system-wide alternative involves relocating the majority of the eight mainframe-based applications, except MONIES and NCOA, to a Legislative Branch service provider. The service provider would accommodate batch and on-line support via Time Sharing Option and Customer Information Control System for transactions and furnish third party software requirements, such as ADABAS, and system utilities for supporting applications. Due to the sensitivity of data, the MONIES applications would be provided by an RS/6000 R/390 (VSE operating system) platform, hosting an essentially unmodified MONIES application in a mainframe environment with the server located at HIR. As a result of the software licensing restrictions for relocating NCOA, the pre- and post-processing and address standardization and management services associated with application processing would be provided by a vendor on a fee-for-service basis.

- **Replace with Client-Server COTS**. This system-wide alternative involves replacing all mainframe-based applications, except LIMS, with client-server applications. The applications

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[9]These documents include the *Information Systems Program Plan,* dated November 15, 1995 and the *Management Policy for Systems Development Life Cycle*, dated June 28, 1996.

would be converted to COTS, client-server versions software running on PC servers. The unique transaction requirements of LIMS limits the solution to relocating the application to a Legislative Branch mainframe computer.

- **Top-Ranked Alternative.** This alternative is comprised of the top ranked, viable application alternatives identified in Exhibit B, *Application Requirements and Alternatives Analysis*. The top ranked alternative for each application was selected based on factors such as satisfaction of user requirements, cost-effectiveness, and the ability to enable an expeditious migration. A Legislative Branch mainframe computer would host LIMS, STUDIO, FOTO, Financial Disclosure, and Lobby Act applications and their transactions as well as provide all application support. The MONIES application would be supported by an IBM RS/6000 R/390 (VSE operating system), hosting an essentially unmodified application in a mainframe environment with the server located at HIR. The NCOA file would be replaced by the U.S. Postal Service's FastForward file and a front-end processing COTS, client-server application. All equipment associated with the Input/Output operations of this application would be relocated to the Office of Mailing Services. POPS would be replaced by a COTS, client-server solution.

We also developed a baseline scenario to represent the projected personnel resources, mainframe, hardware, and software required to support the remaining eight mainframe-based applications.[10]

Figure 2 highlights how we mapped each application to the system-wide alternatives. The specific methodology and detailed results of the system-wide analyses are addressed in Exhibit C, *System-wide Alternatives*. The detailed technical environments of each of the system-wide alternatives is addressed in Exhibit D, *Technical Environments Definition of System-Wide Alternatives*.

Figure 2: Summary of System-Wide Alternatives Application Solutions

Application	Baseline (Current Platform)	Re-Platform to RS/6000	Relocation to Legislative Branch	Replacement with Client-Server COTS	Top Ranked
LIMS	HIR Mainframe	RS/6000	LB Mainframe	LB Mainframe	LB Mainframe
NCOA	HIR Mainframe	RS/6000	Outsource to SB	C/S COTS	C/S COTS
MONIES	HIR Mainframe	RS/6000	LB Mainframe	C/S COTS	RS/6000
Fin. Disclosure	HIR Mainframe	RS/6000	LB Mainframe	C/S COTS	LB Mainframe
Lobby Act	HIR Mainframe	RS/6000	LB Mainframe	C/S COTS	LB Mainframe
STUDIO	HIR Mainframe	RS/6000	LB Mainframe	C/S COTS	LB Mainframe
FOTO	HIR Mainframe	RS/6000	LB Mainframe	C/S COTS	LB Mainframe
POPS	HIR Mainframe	RS/6000	LB Mainframe	C/S COTS	C/S COTS

Legend: HIR Mainframe: House Information Resources Mainframe   Outsource to SB: Outsource to Service Bureau

RS/6000: An RS/6000 R/390 platform   C/S COTS: Client-Server COTS software
LB Mainframe: Legislative Branch mainframe computer

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[10]HIR indicated that if only the eight applications in this Study remain on the mainframe, the technical solution selected to continue to support the applications would not necessarily be an HIR operated mainframe. Accordingly, the characteristics of the baseline are not intended to necessarily represent HIR's plans or intentions to support only the eight applications. However, no specific plans were identified by HIR to support a non-mainframe technical solution in the near future.

<u>**Cost-Benefit Analysis of Alternatives**</u>

We performed a cost-benefit analysis of the system-wide alternatives to assess the cost differences between the system-wide alternatives and the baseline, and to develop a recommended alternative. The cost-benefit analysis comprised of a multi-step process: (1) cost comparison analysis, (2) cost sensitivity analysis, and (3) qualitative analysis for implementing the viable system-wide alternatives. Included in the cost-benefit analysis are projected costs of using an HIR "right-sized" mainframe computer to host the eight applications in this Study. These projected baseline costs, in particular, served as the baseline for performing a cost comparison analysis of the system-wide alternatives. (See Exhibit E, *Cost-Benefit Analysis of System-Wide Alternatives*.)

The cost comparison analysis enabled us to identify the alternative, which provides the most cost savings compared to the baseline costs. The analysis further provides a perspective of the cost effectiveness of the other system-wide alternatives. Figure 3 below presents the results of the cost comparison analysis. As shown, the total cost associated with each of the system-wide alternatives is lower than the baseline and, thus, would result in cost savings to the House. The Top-Ranked alternative represents the lowest cost alternative to the House.

Figure 3: Summary Results of Cost-Benefit Analysis

		System-Wide Alternatives			
		Re-Platform	Relocation to	Replacment with	Top-Ranked
Cost Factor	**Baseline**	**to RS/6000**	**Legis. Branch**	**C/S COTS**	**Alternative**
1. Non-Recurring Costs					
Installation/Conversion	$5,500	$301,458	$252,458	$380,708	$266,458
Software Customization	$0	$0	$0	$1,127,500	$11,000
Hardware Purchase	$0	$1,010,480	$215,000	$161,391	$255,300
Software Purchase	$0	$349,480	$0	$513,230	$103,000
Training	$0	$24,000	$7,000	$71,000	$22,000
Year 2000 Software Renovation	$573,000	$573,000	$573,000	$423,000	$463,000
Total Non-Recurring Costs	**$578,500**	**$2,258,418**	**$1,047,458**	**$2,676,829**	**$1,120,758**
2. Recurring Costs					
Personnel Salaries and Fringe	$7,584,393	$7,584,393	$6,320,327	$6,004,310	$6,320,327
Hardware (Lease and Maintenance)	$3,009,800	$1,403,975	$1,026,247	$746,853	$1,045,383
Software (License and Maintenance)	$3,226,850	$1,672,752	$256,438	$246,383	$352,386
External Vendor Services	$82,004	$82,004	$1,855,811	$1,025,049	$1,162,816
Total Recurring Costs	**$13,903,047**	**$10,743,124**	**$9,458,823**	**$8,022,595**	**$8,880,912**
Total Estimated Costs	**$14,481,547**	**$13,001,542**	**$10,506,281**	**$10,699,424**	**$10,001,670**

Next, we substantiated the results of the cost comparison analysis by conducting a cost sensitivity analysis to determine if changes to any of the assumptions and cost factors would affect the conclusions. The results of this analysis enabled us to substantiate the results of the cost comparison analysis. That is, the Top Ranked alternative is still more cost effective even when we used a 50 percent reduction in mainframe hardware and software costs in the FY 1999 baseline.

Lastly, we identified and assessed various qualitative factors for each system-wide alternative. The qualitative analysis methodology required the identification and analysis of qualitative (or non-quantifiable) factors, such as performance, management control, and system flexibility, attributes of each application and system-wide alternative. The qualitative analysis was intended to be used as a "tie-breaker" in the event that the cost analysis resulted in insignificant differences in the costs between the baseline and the system-wide alternatives. However, the qualitative analysis did not present significant evidence to justify a reevaluation of our conclusions from the cost comparison and sensitivity analysis.

From the results of the qualitative analysis, the primary issues indicated for the Top-Ranked, or recommended, alternative are management control and security issues as a result of outsourcing the data processing of applications to an outside vendor. These factors can be mitigated by proper planning and contracting (management control) and information systems risk management planning (security).

Recommended Alternative

Based on the information collected in this Study and the results of the cost-benefit analysis of alternatives, each of the system-wide alternatives is more cost effective than the baseline, and the Top-Ranked (or Recommended) alternative is the most cost effective. Figure 4 presents a high level illustration of the Recommended alternative environment, including the stakeholders and their relationship to the eight applications for this alternative.

The selection of the recommended alternative was based on high-level requirements and estimated costs and benefits and provided the most expeditious solution. However, each of the alternatives presented in this Study are technically viable. A more detailed analysis, considering such factors as application security, network security, internal controls, and life-cycle costs, is required to validate and select the most technically and cost-effective solution for migrating the eight applications before HIR's mainframe computer can be retired. Consequently, it is possible that the assumptions used to determine the recommended alternative may change during the validation phase of the migration effort. For example, the FOTO and STUDIO applications could be migrated to COTS rather than a Legislative Branch mainframe computer. Ultimately, this may be the most cost-effective long term solution for these applications. One important factor affecting the ranking of one alternative over the other is the ability of the House-wide financial management system to meet the FOTO and STUDIO application requirements. The Top-Ranked alternative takes into consideration the current expectation that the House-wide financial management system could be implemented to accommodate the application needs. However, should that expectation be ruled out, the recommended alternative for the FOTO and STUDIO applications would be to replace them with COTS. These COTS solutions should be able to be processed on much lower cost platforms.

In the following section, we present information to assist HIR in conducting the detailed analysis and implementation planning required to migrate the eight applications from the

HIR mainframe.

Guidelines For Planning The Mainframe Migration

The results of this Study are intended as input to the CAO to begin the planning process for the migration of the mainframe systems. As indicated in this Study, there are many viable alternatives for the mainframe-based applications. However, the CAO will need to take additional steps in order to determine the most technically and cost-effective alternative. To assist the CAO in moving toward the determination of the migration alternative and planning for the migration of the mainframe-based applications, we have identified key planning tools and advice regarding how to
proceed with the results of this Study. (See Exhibit F, *Guidelines for Planning the Mainframe Migration.*) The key planning items that need to be addressed immediately to expedite the migration of the mainframe-based applications involve:

- **Establishment Of A Project Manager And Migration Implementation Team** to plan and execute the migration. The success of implementing the migration solution for the eight mainframe-based applications will greatly depend on the qualifications of individuals assigned and the amount of time they devote to this project. Without a fully-devoted, qualified implementation team, the implementation tasks may not be thoroughly completed or completed in a timely manner.

Figure 4: Overview of Recommended Alternative Environment
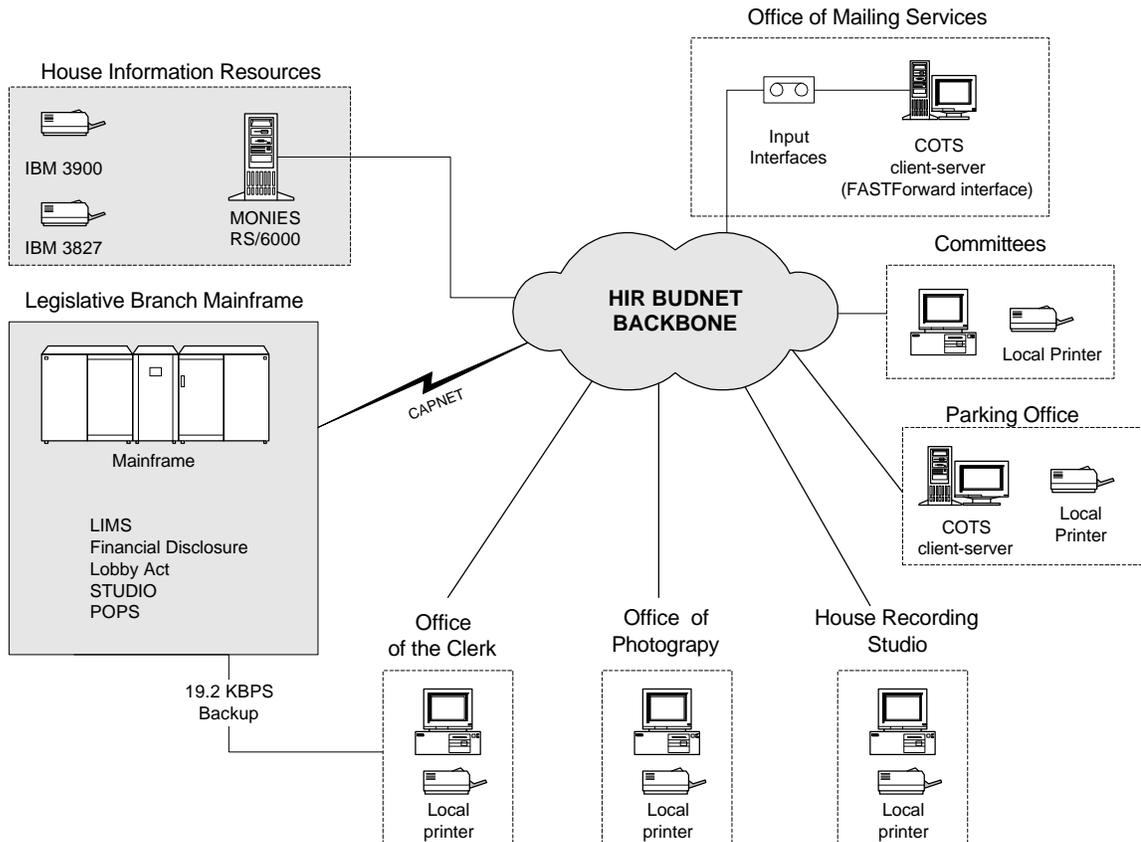
- **Development Of Work Plan And Milestones** to identify all tasks that need to be completed in order to migrate the eight applications. The tasks should encompass planning the overall migration effort. This would include identifying all pertinent tasks, such as validating the Study analyses of alternatives, selecting migration solutions, coordinating with other House offices regarding initiatives that would affect the individual applications, developing an implementation plan, actual implementation (e.g., migrating the applications to another platform), and post-implementation (e.g., assessing the performance of the migration solution. The work plan should indicate the level of effort and availability of resources for each major task and time frames for completion. It should also include key milestones and the migration implementation date. A complete work plan will help ensure that migration steps are identified and completed or coordinated with the completion of other implementation tasks, such as Year 2000 efforts and implementation of a new House payroll system.

- **Validation Of Study** to validate the results of this Study, assumptions employed, alternatives analysis, technical solutions, and cost-benefit analysis. As part of this process, the Migration Implementation Team will need to perform a detailed analysis of other factors (e.g., application security, network security, and internal controls) that could impact the final decision for selecting the most technically and cost-effective solution for each of the eight applications. The status of the new House-wide financial management system should also be reviewed to determine if the STUDIO and FOTO applications should be relocated to a Legislative Branch mainframe, replaced with a COTS client-server solution, or integrated into the new financial management system. This process will assist the Migration Implementation Team in selecting the most viable migration solution.

- **Selection Of Migration Solution** to identify and select the specific migration solution for each mainframe-based application. The viable alternatives and recommended migration alternative presented in this Study are presented as high level solutions. For example the results of the Study do not present a recommendation for the House to obtain the services of a *specific* Legislative Branch service provider or utilize *specific* COTS products. The final outcome of the selection of a migration solution should identify a specific service provider and specific COTS products. The selection of a migration solution for each application should be sufficiently justified through the validation/analysis process.

- **Development Of Migration Implementation Plan** to identify and describe how the House will ultimately migrate the mainframe-based applications. By developing a migration implementation plan, the CAO will have one reference tool for assuring that all key aspects of the migration implementation are performed.

By expeditiously completing these key planning task, the CAO should minimize the risk of the not completing the migration in a timely manner and avoid the potential for over-looking key steps needed to migrate the applications. More details on the planning guidelines are presented in Exhibit F, *Guidelines For Planning The Mainframe Migration.*

Management Response

On February 26, 1998, the CAO agreed that the results of the Mainframe Migration Options Study provided a good basis to begin more detailed planning for offloading the last of the House's mission-critical application systems (i.e., eight applications) from HIR's mainframe (see Appendix). The CAO stated his office would begin developing a mainframe migration implementation plan. The response also included comments regarding: (1) the Year 2000 readiness of a Legislative Branch mainframe environment, (2) full costs associated with concurrent Year 2000 and mainframe migration activities, (3) FY 1998 and FY 1999 funding issues, (4) the need for additional analysis of Fastforward capabilities in meeting the House's needs, and (5) the time frame for migrating all mainframe-based applications.

Office of Inspector General Comments

The CAO's commitment to begin developing a mainframe migration implementation plan is responsive to the issues we discussed in this Study. We also agree that the CAO's comments on the various migration issues are valid and could impact the final selection of alternatives, if left unaddressed. However, the detailed planning and validation steps of the mainframe migration planning process should provide additional information to sufficiently address the issues raised by the CAO.

Exhibit A

Application Profiles Alternatives

Application Profiles
Table of Contents

Application Profiles

This exhibit presents a profile of the eight U.S. House of Representatives (House) mainframe-based applications included in the Study. The profile describes the functional and technical characteristics of the applications. Specifically, the profile includes:

- A brief description of the application which identifies the developer, the House office responsible for operating and maintaining the application, the primary user of the application, and key functions performed by the application.

- A table listing details for each application including the:

  - Technical architecture.

  - Users/Customers.

  - Key inputs.

  - Key interfaces.

  - Key outputs.

In compiling the application profiles, we followed a three step approach to collect information about the functional and technical aspects of the applications. The three step approach involved:

- Compiling a data center inventory to assist in the identification of the technical environment for each application.

- Interviewing House staff to collect information on the applications.

- Reviewing House documentation related to the: (1) development of the applications, and (2) offices that use and support the applications.

A.1 Legislative Information Management System (LIMS)

LIMS is used to record and track bills and actions, and report on the highly complex legislative process at the House. The application was developed by HIR and is operated and maintained by HIR. The primary user of the application is the Office of the Clerk.

LIMS performs the following key functions:

- Records and tracks data on introduced bills, such as sponsors, co-sponsors, introduction dates, and referral committees.

- Records and tracks actions taken by Committees on referred bills.

- Records and tracks actions on the House floor in real time.

- Records and tracks actions on the Senate floor.

- Records and tracks actions taken by the President on bills passed by the Congress.

- Records the law numbers assigned by the National Archives after bills are signed into laws.

- Extracts and formats data for the House Calendar and transfers the data to the Government Printing Office (GPO) for printing.

- Generates and prints Committee calendars.

- Generates various reports showing bills sponsored by each Member and the Member's voting records.

Figure A.1 on the following page presents the LIMS application profile.

Figure A.1: LIMS Profile

Technical Architecture	
Technology Component	**Description**
Number of Lines of Code	Approximately 500,000
Data Storage	Approximately 1.2 GB
Technology Platform	IBM CMOS mainframe
Operating System	IBM MVS/ESA
Database	ADABAS
Programming	Natural 2, COBOL, STAIRS, SCRIPT
Communications/Connectivity	CICS
Peripherals	Printers and tape readers
Processing Mode	On-line transaction processing
CICS Transactions per Month	4,207
CPU Seconds per Month	19,006
Pages printed per Month	259, 994
Processing Volumes	Approximately 200,000 records per year[11]
Number of records in database	Approximately 2 million
Security	ACF2 (user ID and password)
Year 2000 Status	Testing Year 2000 version in 3/98 and implementation planned for 6/98
Users/Customers	
Element	**Description**
Number of Users	Approximately 10 users in Office of Legislative Information, 10 to 20 users in Office of Legislative Operations, and 20 Committee clerks
User Access	On mainframe (3270 emulation) through a LAN connected to BUDNet
Application Support	Four HIR Integration Group staff members support LIMS
Key Stakeholders	Clerk's Office, Library of Congress, Senate, Members, and Committees
Key Inputs	
Input	**Source**
Committee actions	Committee Clerks
House floor actions	Manual key entry using television coverage of floor proceedings
Senate actions	Senate's LEGIS system
Executive actions	White House clerk and National Archives
Congressional Record references	GPO
Key Interfaces	
System	**Description**
Electronic Voting System	Sends voting data to LIMS
House web site	Sends House floor actions to the Web with 15 minutes delay
Key Outputs	
Output	**Description**
House Calendars	Daily legislative calendars transferred to the GPO for printing
Committee Calendars	Annual legislative calendars listing activities for the year
Legislative Activity Guides	Members' voting record
Auto-tracking Reports	Status and actions on bills tracked by a Member or Committee
Bill status and actions	Nightly tape to Senate and nightly file transfer to Library of Congress
Member Profiles	Latest actions on bills sponsored or co-sponsored by a Member

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[11]This is an estimate calculated by dividing the total number of records in the database by ten (the number of years LIMS has been in use). This number will vary annually based on the volume of Legislative actions.

A.2 National Change of Address (NCOA)

HIR is licensed by the United States Postal Service (USPS) to provide NCOA services for the House and other government agencies. The NCOA file, developed by the USPS, consists of 36 months of permanent change-of-address information taken from the 42 million change-of-address orders filed annually with the USPS. NCOA processing permits Members of Congress and other government agencies to obtain postal rate reductions (for First Class mail), reduce paper and envelope expenses, and improve the "deliverability" of their mail. The Enterprise Computing Group is the primary user of NCOA. Enterprise Computing uses custom programs and a COTS application to complete the NCOA process.

The NCOA file, and the associated files and applications used to complete NCOA processing, perform the following key functions:

- Standardize addresses prior to NCOA processing.[12]

- Compare names and standardized addresses from a mailing list to the NCOA file. If the NCOA file has a more current address, the address on the mailing list is updated.

- Provide additional processing to include Congressional district identification, flagging of questionable addresses, and householding[13] of lists.

- Run custom programs written by Enterprise Computing for media conversion before and after NCOA processing.[14]

Figure A.2 on the following page presents the NCOA profile.

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[12]Address standardization is a process which modifies an address to comply with USPS format standards. The House uses a Commercial-Off-The-Shelf (COTS) application called Code1.

[13]Householding is a function used to combine multiple records addressed to the same household. For example, rather than sending separate letters to Joe Smith and Jane Smith at the same address, one letter would be sent to The Smith Family. This function is used to reduce postage and other mailing costs.

[14]Enterprise Computing receives address lists on various media including diskette, compact disk, and magnetic tape. Before address standardization begins, Enterprise Computing must convert the file as necessary so it can be read by the Code1 application.

Figure A.2: NCOA Profile

Technical Architecture	
Technology Component	**Description**
Number of Lines of Code	Not applicable
Data Storage	Fluctuates with volume of records from Members
Technology Platform	IBM CMOS mainframe
Operating System	IBM MVS/ESA
Database	NCOA (proprietary file from USPS)
Programming	HIR provides ad hoc programming using PL1
Communications/Connectivity	User access is via 3270 emulation
Peripherals	Tape drive and printer
Processing Mode	On-line transaction processing
CICS Transactions per Month	Not applicable
CPU Seconds per Month	3.6 million
Pages printed per Month	Not applicable
Processing Volumes	Approximately 50 million records per year
Number of records in database	Approximately 2 million
Security	ACF2 (user ID and password)
Year 2000 Status	COTS software is Year 2000 compliant
Users/Customers	
Element	**Description**
Number of Users	Six users from Enterprise Computing
User Access	Users access the application via the mainframe
Application Support	Approximately 2.5 FTE from Enterprise Computing
Key Stakeholders	120-125 Members (approx. 30%) use NCOA each year
Key Inputs	
Input	**Source**
Change of Address Data	USPS proprietary database
Mailing Lists	Miscellaneous sources including Members' Correspondence Management Systems, voter registration tapes, Department of Motor Vehicle records, etc.
Key Interfaces	
System	**Description**
None	Not applicable
Key Outputs	
Output	**Description**
Electronic mailing labels	After NCOA processing, Enterprise Computing prepares records in label format
Revised CMS data file	After NCOA processing, updated databases are returned to customers

A.3 Management of Network Income, Expense, Services (MONIES)

The MONIES application is a telecommunications cost accounting and billing system used by the House. MONIES tracks telecommunications voice equipment and lines for the House and district offices. It also provides the overall telecommunications utilization and service expense information for generating monthly charge-backs to Members, Committees, and other House offices. The application was purchased from Stonehouse Technologies in 1987 and is operated by HIR. Maintenance is provided by Stonehouse. HIR's Client Services group is the primary user of this application.

MONIES performs the following key functions:

- Tracks inventory of telecommunications equipment, lines, and services in use at the House.

- Polls call data from five House Private Branch Exchanges (PBXs).

- Prices telephone calls and services for charging back Member, Committee, and other House offices.

- Assigns telephone calls to the appropriate Member, Committee, or House office.

- Tracks and reports the monthly charge-back fees to Members' and Committees' allowances and other House offices' accounts for use of telecommunications services (e.g., line and long distance charges). The charge-backs are updated monthly in the House's Federal Financial System (FFS) via file transfer.

Figure A.3 on the following page presents the MONIES application profile.

Figure A.3: MONIES Profile

Technical Architecture	
Technology Component	**Description**
Number of Lines of Code	Approximately 2 million
Data Storage	570 MB
Technology Platform	IBM CMOS mainframe
Operating System	IBM MVS/ESA
Database	COTS (integrated database)
Programming	Stonehouse developed code
Communications/Connectivity	Access via 3270 emulation through BUDnet
Peripherals	Tape drive, PC Poller, and mainframe printer
Processing Mode	On-line transaction processing
CICS Transactions per Month	3,567
CPU Seconds per Month	10,146
Pages printed per Month	33,303
Processing Volumes	Two million records per month
Number of records in database	Approximately 600,000
Security	ACF2 (user ID and password)
Year 2000 Status	A Year 2000 compliant version will be available in 6/98
Users/Customers	
Element	**Description**
Number of Users	Approximately 20 users in HIR
User Access	A three character ID is used to access the application
Application Support	One HIR Integration Group staff provides approximately 800 to 1,000 support hours a year.
Key Stakeholders	Members' Washington D.C. offices, District Offices, and House Committees
Key Inputs	
Input	**Source**
Inventory	Lucent Telephone Operations Center report and manual key entry
Call Data	Uploaded via vendor tapes and uploaded automatically to mainframe via electronic interface with PC Poller
Key Interfaces	
System	**Description**
PC Poller	Provides electronic interface between mainframe and PBX
FFS	Data from MONIES is uploaded to FFS via file transfer
Key Outputs	
Output	**Description**
Hard Copy Statements	Statements of telecommunications equipment and services are generated monthly for Members and their district offices as well as Committees and other House offices
Electronic Statements	Electronic copies of statements are kept on-line for three months (current month and two previous months)
Locator file	This file is used by other House offices to provide Member data for other applications (e.g., Member name and district)

A.4 Financial Disclosure

The Financial Disclosure application records financial disclosure reports submitted by Members, candidates for the House, and certain Legislative Branch staff. The system consists of two components: (1) FileNet, a client-server COTS application operated and maintained by the Clerk's Office, and (2) a mainframe-based application developed, operated, and maintained by HIR. The FileNet software is used to scan hard-copy reports, accept querying criteria for viewing by the general public, and display the report images. The mainframe-based application is used to generate queries and record data for image indexing and processing. The primary user of the application is the Legislative Resource Center in the Clerk's Office.

The Financial Disclosure application performs the following key functions:

- Records indexes for the scanned documents. The index consists of various data, such as name, entered on the document.

- Records various data, such as addresses, entered on the document.

- Queries disclosure reports and compiles a list of documents that meet the querying criteria.

- Generates reminder letters for those individuals who have not filed.

Figure A.4 on the following page presents the Financial Disclosure application profile.

Figure A.4: Financial Disclosure Profile

Technical Architecture	
Technology Component	**Description**
Number of Lines of Code	Approximately 22,500
Data Storage	Approximately 17 MB
Technology Platform	IBM CMOS mainframe
Operating System	IBM MVS/ESA
Database	ADABAS
Programming	Natural 2
Communications/Connectivity	CICS (transactions), SNA backup
Peripherals	Printer
Processing Mode	On-line transaction processing
CICS Transactions per Month	189
CPU Seconds per Month	330
Pages printed per Month	5,039
Processing Volumes	Approximately 3,000 per year in non-election year and 5,000 records per year in election year
Number of records in database	Approximately 53,000
Security	ACF2 (user ID and password)
Year 2000 Status	Per HIR, the Year 2000 conversion is approximately 90 percent complete
Users/Customers	
Element	**Description**
Number of Users	Approximately seven users in the Clerk's Office have access to the system; the system is also accessible by the general public via four workstations located in the Legislative Resource Center
User Access	Users access the Financial Disclosure system on the mainframe (via 3270 emulation) through a LAN workgroup connected to the House backbone
Application Support	One HIR Integration Group staff provides approximately 300 to 500 support hours a year
Key Stakeholders	The general public and House employees
Key Inputs	
Input	**Source**
FileNet images	Financial Disclosure forms
Document index	Scanned reports
Document data	Scanned reports
Key Interfaces	
System	**Description**
FileNet	FileNet sends query criteria to the mainframe and the mainframe application sends back the query results
Key Outputs	
Output	**Description**
Letters	Letters are sent to remind filers when disclosure forms are not received

A.5 Lobby Act

The Lobby Act application records lobbyist registrations and semi-annual Lobbying Reports submitted by lobbyists pursuant to the Lobbying Disclosure Act of 1995. The system consists of two components: (1) FileNet, a client-server COTS application operated and maintained by the Clerk's Office, and (2) a mainframe-based application developed, operated, and maintained by HIR. The FileNet software is used to scan hard-copy reports, accept querying criteria for viewing by the general public, and display the report images. The mainframe-based application is used to record data for image indexing and processing and querying reports. The primary user of the application is the Legislative Resource Center in the Clerk's Office.

The Lobby Act application performs the following key functions:

- Records indexes for the scanned documents. The index consists of various data, such as lobbyist names and names of the lobbyist's clients, entered on the documents.

- Records various data, such as areas of legislative interest to the lobbyist's clients, entered on the documents.

- Records error and omission codes for inaccurate or incomplete lobbyist registrations and Lobbying Reports.

- Generates notices of receipt when registrations and reports are recorded in the system.

- Generates letters of inquiry to the lobbyists when documents contain errors or omissions.

- Queries disclosure reports and compiles a list of documents that meet the querying criteria.

- Generates reminder letters or letters for those individuals who have not filed.

Figure A.5 on the following page presents the Lobby Act application profile.

Figure A.5: Lobby Act Profile

Technical Architecture	
Technology Component	**Description**
Number of Lines of Code	Approximately 65,000
Data Storage	Approximately 175 MB
Technology Platform	IBM CMOS mainframe
Operating System	IBM MVS/ESA
Database	ADABAS
Programming	Natural 2
Communications/Connectivity	CICS (transactions)
Peripherals	Printer
Processing Mode	On-line transaction processing
CICS Transactions per Month	2,448
CPU Seconds per Month	1,548
Pages Printed per Month	5,188
Processing Volumes	Approximately 30,000 to 50,000 records per year
Number of records in database	Approximately 630,000
Security	ACF2 (user ID and password)
Year 2000 Status	The application is scheduled for Year 2000 implementation in 11/98
Users/Customers	
Element	**Description**
Number of Users	Approximately seven users from the Clerk's Office have access to the system; the system is also accessible by the general public via four workstations in the Legislative Resource Center
User Access	Users access the Lobby Act system on the mainframe (via 3270 emulation) through a LAN connected to the House backbone
Application Support	One HIR Integration Group staff provides approximately 300 to 500 support hours a year
Key Stakeholders	Lobbyists and the general public
Key Inputs	
Input	**Source**
FileNet Images	Submitted registrations and reports
Document index	Scanned registrations and reports
Document data	Scanned registrations and reports
Directory file	Office of the Clerk
Error and omission codes	Manual key entry during the review process
Key Interfaces	
System	**Description**
FileNet	FileNet sends query criteria to the mainframe and the mainframe application sends back the query results
Key Outputs	
Output	**Description**
Notices of receipt	Sent to the lobbyists when the forms are received or recorded in the system
Reference reports	List all lobbyists and their clients
Letters	Sent to lobbyists when forms contain errors or omissions and when the semi-annual reports are not filed by registered lobbyists

A.6 Recording Studio System (STUDIO)

The STUDIO application tracks the use of the House radio and video facilities by Member, Committees, and other House offices. The application was developed and is maintained by HIR. The House Recording Studio within the Office of Communication Media is the primary user of the application.

The STUDIO application performs the following key functions:

- Tracks and reports the monthly charge-back fees to Member's and Committee's allowances and other House office accounts for the use of the Recording Studio. The charge-backs are updated monthly in FFS via file transfer.

- Tracks cash receipts and debit memos issued.

- Tracks sales and generates a report which reflects the daily and monthly sales totals.

- Tracks all work orders and invoices entered into the system for the current month. Work orders are listed sequentially by work order number which allows the Studio to identify missing work orders.

- Produces quarterly and annual reports which list all work order data for every work order entered into the system. These reports also list summary statistics about the number of work orders entered into the system. For example:

  - Number of work orders processed by type.
  - Number of canceled work orders processed by type.
  - Number of voided work orders by type.
  - Number of credit and debit memos issued by type.

Figure A.6 on the following page presents the STUDIO application profile.

Figure A.6: STUDIO Profile

Technical Architecture	
Technology Component	**Description**
Number of Lines of Code	Approximately 65,000
Data Storage	Approximately 70 MB
Technology Platform	IBM CMOS mainframe
Operating System	IBM MVS/ESA
Database	ADABAS
Programming	Natural 2.0
Communications/Connectivity	CICS (transactions)
Peripherals	Printers
CICS Transactions per Month	79
CPU Seconds per Month	347
Pages Printed per Month	1,205
Processing Mode	On-line transaction processing
Processing Volumes	Per HIR, the highest volume is approximately 2,000 work orders a month
Number of records in database	Approximately 580,000
Security	ACF2 (user ID and password)
Year 2000 Status	HIR indicates that this application is Year 2000 compliant
Users/Customers	
Element	**Description**
Number of Users	One user in the Recording Studio
User Access	Through CICS
Application Support	One HIR Integration Group staff provides approximately 300 to 500 support hours a year
Key Stakeholders	All Member (440) and Committee (20) offices
Key Inputs	
Input	**Source**
Member information	Directory file
Invoices for Services Rendered	Hard copy invoices derived from appointment book are key entered into the system
Key Interfaces	
System	**Description**
FFS	Data generated by Recording Studio is uploaded to FFS via file transfer
Key Outputs	
Output	**Description**
Cash Receipt Reports	Include types of payments (i.e., transfers and checks) and debit and credit memos issued
Quarterly/Annual Reports	List all data from a work order for all work orders entered into the system
Sales Reports	Reflect the daily and monthly sales totals by types
Monthly Member Statements	Include a summary of all charges for the current month and an itemized statement of all charges for the current month, including debit and credit memos to date
Work Order Reports	List all work orders entered for the current month by sequential work order number

A.7 Photography (FOTO)

The FOTO application tracks use of photographic services by Members, Committees, and other House offices. The application was developed and is maintained by HIR. The Office of Photography is the primary user of the application.

The FOTO application performs the following key functions:

- Tracks work orders and invoices including the quantity of work orders processed.

- Tracks and reports the monthly charge-back fees to Members' and Committees' allowances and other House offices' accounts for photographic services. The charge-backs are updated monthly in the House's FFS via file transfer.

- Tracks appointments by week and month, canceled appointments, number of vouchered re-orders, and number of Members served by month.

Figure A.7 on the following page presents the FOTO application profile.

Figure A.7: FOTO Profile

Technical Architecture	
Technology Component	**Description**
Number of Lines of Code	Approximately 65,000
Data Storage	Approximately 12 MB
Technology Platform	IBM CMOS mainframe
Operating System	IBM MVS/ESA
Database	ADABAS
Programming	Natural 2.0
Communications/Connectivity	CICS (transactions)
Peripherals	None
CICS Transactions per Month	55
CPU Seconds per Month	725
Pages Printed per Month	1,168
Processing Mode	On-line transaction processing
Processing Volumes	Approximately 713 work orders processed in one month
Number of records in database	Approximately 28,000
Security	ACF2 (user ID and password)
Year 2000 Status	Year 2000 compliant
Users/Customers	
Element	**Description**
Number of Users	One full-time and three part-time users in the Office of Photography
User Access	Through CICS
Application Support	One HIR Integration Group staff provides approximately 300 to 500 support hours a year
Key Stakeholders	All Member (440) and Committee (20) offices
Key Inputs	
Input	**Source**
Member information	Directory file
Charges for services rendered	Vouchers for photographic orders, print re-order forms, and film processing
Key Interfaces	
System	**Description**
FFS	Data from FOTO is uploaded to FFS via file transfer
Key Outputs	
Output	**Description**
Monthly detail reports	List the quantity of work orders processed and include corresponding dollar amounts
Statistics reports	List detailed statistics about Office of Photography workload

A.8 Parking Office Permit System (POPS)

The POPS application tracks parking permits issued by the House Garage and Parking Security Office (Parking Office). The application was developed by HIR and is operated and maintained by HIR. The Parking Office is the primary user of the application.

POPS performs the following key functions:

- Records and tracks permanent parking permits assigned to Member, Committee, and other House office staff.

- Records and tracks temporary parking permits.

- Records and tracks permanent parking permits for reserved spaces.

- Prints temporary parking permits.

- Tracks and reports, on a monthly basis, the payroll tax withholding data for Member, Committee, and other House office staff with reserved parking. This tax withholding information is updated for payroll purposes in the Financial Management System (FMS) via file transfer.

Figure A.8 on the following page presents the POPS application profile.

Figure A.8: POPS Profile

Technical Architecture	
Technology Component	**Description**
Number of Lines of Code	Approximately 50,000 to 70,000
Data Storage	Approximately 252 MB
Technology Platform	IBM CMOS mainframe
Operating System	IBM MVS/ESA
Database	ADABAS
Programming	Natural 2
Communications/Connectivity	CICS (transactions)
Peripherals	Network and local printers
CICS Transactions per Month	277
CPU Seconds per Month	235
Pages Printed per Month	3,145
Processing Mode	On-line transaction processing
Processing Volumes	Approximately 750 records per month on average, with a peak of approximately 6,500 records per month at the beginning of a Congress
Number of records in database	Approximately 1,600,000
Security	ACF2 (user ID and password)
Year 2000 Status	Per HIR, the Year 2000 conversion will be complete in FY 98
Users/Customers	
Element	**Description**
Number of Users	Two full-time, approximately four to eight part-time
User Access	Users access POPS on the mainframe (via 3270 emulation) through BUDnet
Application Support	One HIR Integration Group staff provides approximately 650 support hours a year at the beginning of a Congress; afterwards, about 50 hours per year are required.
Key Stakeholders	Members, Committees, other House office staff, contractors, and visitors
Key Inputs	
Input	**Source**
Permit holder and vehicle information	Manual entry into POPS
Key Interfaces	
System	**Description**
FMS Payroll	Tax withholding data is extracted from POPS and loaded into FMS payroll via file transfer
Key Outputs	
Output	**Description**
Temporary permits	Short-term permits are printed for staff, contractors, and visitors
Office Rosters	List all permits assigned to an office, including permit holder name and vehicle information
Reports on monthly transactions	List number of transactions processed for permanent and temporary permits

Exhibit B

Application Requirements and Alternatives Analysis

Application Requirements and Alternatives Analysis
Table of Contents

Application Requirements and Alternatives Analysis

This exhibit presents the alternatives analysis methodology used to identify viable solutions for the migration of the U.S. House of Representatives (House) eight mainframe-based applications profiled in Exhibit A as well as the results of our analysis. The methodology section identifies the resources we used to collect information to identify viable alternatives, as well as the steps we followed to ultimately select viable migration alternatives. The results presented include the identification and prioritization of viable application alternatives for each mainframe-based application.

B.1. Methodology

The objective of the application requirements and alternative analysis was to identify and prioritize viable application alternatives for the eight mainframe applications. These viable application alternatives were then used to develop four system-wide alternatives which we incorporated into our cost-benefit analysis.[15] The results of the cost-benefit analysis are presented in Exhibit E, *Cost-Benefit Analysis of System-Wide Alternatives*, and were considered in recommending a specific alternative for each application.
The application requirements and alternatives analysis consisted of a multi-step process that began with a detailed analysis of stakeholder requirements and resulted in prioritized viable alternatives for each application. The multi-step process was comprised of four steps listed below, followed by a description of each step:
1. Analysis of Application Requirements.
2. Definition of Migration Criteria.
3. Analysis of Application Alternatives.
4. Selection of Viable Application Alternatives.

B.1.1 Analysis of Application Requirements

The analysis of application requirements was derived from a variety of sources. We interviewed application users to identify their functional needs for a viable migration solution, and interviewed relevant House Information Resources (HIR) staff to identify the technical requirements. We documented and confirmed the requirements with application users, as appropriate. We also reviewed House documentation related to the (1) development of the applications and (2) offices that use and support the applications. The requirements analysis was performed at a high-level and was not intended to provide the detail required for recommending a specific commercial off-the-shelf (COTS) software application or vendor. The focus of the requirements analysis was to identify the primary requirements in order to determine whether an alternative was viable.

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[15]For the purposes of this Study, a system-wide alternative is a group of common viable application alternatives. For example, a system-wide alternative may entail relocating all applications to another mainframe. The system-wide alternatives are presented in Exhibit C, *System-Wide Alternatives Analysis.*

B.1.2 Definition of Migration Criteria

Along with application requirements, we identified overall and application specific migration criteria that all application alternatives should meet in order to be considered. The migration criteria were used to further narrow the range of potential alternatives for each application.

The overall migration criteria were developed using the House's *Information Systems Program Plan, Management Policy for Systems Development Life Cycle*, and through discussions with users and key House management officials. The overall migration criteria defined for the Study were:

- **Client-Server, COTS Applications.** The House's *Information Systems Program Plan,* dated November 15, 1995 states that the House should adopt a network-centric approach.[16] The *Management Policy for Systems Development Life Cycle*, dated June 28, 1996, states that it is CAO/HIR's desire to move towards commercial-off-the-shelf (COTS) applications.[17]
- **Cost Containment.** The alternatives should allow for the management, containment, and reduction of costs associated with the purchase and maintenance of applications.
- **Stakeholder Preferences and Requirements.** The alternatives should meet stakeholder preferences and requirements to the greatest extent possible. These requirements include functionality and ownership of the applications. Stakeholders are defined as application users, management, customers, HIR applications support and operations staff, and key House management officials.
- **Year 2000 Compliance.** The alternatives should be Year 2000 compliant.
- **Expeditious Migration Time Frame.** The alternatives should allow for an expeditious migration from the HIR mainframe. For the purpose of this Study, we limited alternatives to those allowing a migration from the HIR mainframe by the third quarter of fiscal year 1999. This date is based on the estimated time frame for the migration of other mainframe systems such as Member Information Network (MIN), Integrated Systems and Information Services (ISIS), and the Payroll System.[18]

The specific migration criteria associated with each application were developed based on interviews with application users. The application specific migration criteria are presented in the sub-sections of B.2, *Application Requirements and Alternatives Analysis*, of this exhibit.

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[16]Network-centric, or what is known as distributed client-server computing, can be defined as all clients, servers, and Local Area Networks (LAN) being connected and controlled through the network backbone.

[17]For the purpose of this Study, we define COTS as software available in the commercial marketplace developed and marketed for specific business functions.

[18]The Member Information Network (MIN), and Integrated Systems Information Services (ISIS) applications are scheduled to be migrated off the mainframe by January 1, 1998. The Payroll System is scheduled to be replaced, or migrate to another platform, by July 1, 1999.

B.1.3 Analysis of Application Alternatives

Based on the application requirements and migration criteria, we performed an analysis of the application alternatives. The application alternatives analysis included the identification of potential alternatives for the mainframe-based applications and the assessment of the viability of alternatives. In order to focus our alternatives analysis on the most viable alternatives, we defined four categories of alternatives that best met the requirements and migration criteria**.** Figure B.1 presents a description of the alternative categories that we used to conduct the alternatives analysis.

Figure B.1: Application Alternative Categories

Alternative Category	Definition
Relocation to a Service Provider's Mainframe	The mainframe-based application is relocated to a fee-for-service commercial vendor or Government agency mainframe through a timesharing agreement. The vendor or agency would provide the necessary system environment for operating the applications and supporting the applications (e.g., hot-site backup). This alternative would be virtually transparent to application users. Applications maintenance and programming services provided by the HIR Integration Group would remain within HIR.[19]
Re-Platform to RS/6000 R/390 Server-On-Board Platform	The mainframe-based application is re-platformed to an IBM RS/6000 System/390 Server-On-Board. This platform provides MVS/ESA and OS/390 capabilities and is capable of hosting mainframe-based applications with little or no changes to the application code. This alternative would be virtually transparent to application users. All HIR operations and application maintenance support functions would remain within HIR.
Replacement with Client-Server, COTS Software	The existing mainframe-based application is replaced with a client-server, COTS application. Customization of the COTS application would be required in some cases to meet user requirements. Users would be required to change business processes to accommodate the COTS application.
Outsource Function to a Service Bureau	The transactions that the mainframe-based application performs are "outsourced" to a commercial vendor or Government fee-for-service agency. This alternative may also involve outsourcing the users' business processes.[20] For the purposes of this study, this alternative is only applicable to the NCOA application because the NCOA transaction was identified as a standard service performed by vendors in the marketplace.

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[19]For the purposes of this Study, we did not consider outsourcing application maintenance and support because of the mission-critical nature of the eight applications.

[20]The scope of this Study did not include an assessment of the viability of outsourcing the application users' business processes. However, consideration of outsourcing business processes was included for the NCOA application due to the nature of the transaction.

Using these four categories of alternatives, we researched and identified solutions for each application that met the application requirements and migration criteria. To perform the research and collect information on alternatives, we:

- **Conducted a COTS Survey.** We used a variety of sources to research potential COTS software, such as industry trade journals, the Internet, and bulletin boards. We surveyed public and private sector organizations, such as recording studios, photography studios, and parking offices that use similar applications. We collected product literature, acquisition costs, maintenance costs, implementation costs, and conversion costs, where available.
- **Interviewed Commercial and Government Fee-For-Service Providers.** We conducted telephone interviews and met with several public and private sector vendors including the Government Printing Office (GPO), Library of Congress (LOC), National Finance Center (NFC), U.S. Geological Service (USGS), and a commercial information technology outsourcing firm. We collected information on potential services and costs for timesharing services.
- **Interviewed Technology Distributors.** We conducted interviews with several distributors of RS/6000 R/390 hardware and met with one of the distributors. We estimated the House's specific hardware requirements and obtained price quotes for the RS/6000 R/390 solution.

Using the data collected from the research activities described above, we assessed the ability of each alternative to meet the requirements. We present the specific research activities used to identify alternatives for each application and the results of the assessment of the alternative in section B.2, *Application Requirements and Alternatives Analysis*. We also present the high-level cost information collected. A detailed cost analysis is presented in Exhibit E, *Cost-Benefit Analysis of System-Wide Alternatives*.

B.1.4 Selection of Viable Application Alternatives

We used the results of the alternatives analysis, as well as cost information, to identify the viable alternatives. We prioritized the viable application alternatives based on costs, strengths, and weaknesses of the alternatives relative to the application requirements and migration criteria.

B.2 Application Requirements and Alternatives Analysis

In this section, we present the results of the requirements and alternatives analysis for each application in the following order:

- **Requirements Summary** presents an overview of the primary requirements that we identified for the application.
- **Application Migration Criteria** presents migration criteria that are specific to each application.
- **Alternatives Analysis** presents our research methods for identifying and collecting information on potential alternatives along with a table containing a description of each alternative, general cost information, and a brief assessment of each alternative's ability to meet the requirements.
- **Viable Application Alternatives** presents the viable alternatives for the applications and a rationale for their prioritization.

B.2.1 Legislative Information Management System (LIMS)

In this section, we present a requirements summary, application migration criteria, alternatives analysis, and prioritized set of viable alternatives for the Legislative Information Management System (LIMS). LIMS is used by the Office of the Clerk to record, track, and report on the highly complex legislative process at the House.

B.2.1.1 Requirements Summary

We collected information on the high-level requirements for LIMS through interviews with HIR application and operations support personnel and application users in the Office of the Clerk. Based on these interviews, we identified the following high-level requirements for LIMS:

- **Input.** Ability to record House bill information. Ability to record Committee actions on bills. Ability to record House floor actions. Ability to record Executive Branch actions on bills.
- **Query and Reports.** Ability to research history of a bill. Ability to generate the House legislative calendar document. Ability to generate reports listing history of bills tracked by a Member or Committee. Ability to generate various reports using data in the database.
- **Interfaces.** Ability to import bill information, Committee actions and floor actions from the Senate. Ability to import voting results from the Electronic Voting System. Ability to export House bill information and House actions on bills to the Senate and the LOC. Ability to extract House floor action data for publishing on web sites.
- **Application Security and Controls.** Ability to authenticate and authorize users to prevent unauthorized access to the application or its data. Ability to validate

transactions to ensure the integrity of data. Ability to provide physical security to batch output.

B.2.1.2 Application Migration Criteria

We identified migration criteria specific for LIMS through interviews with application users in the Office of the Clerk. Listed below are the application migration criteria identified for LIMS.

- **Relocation Constraint.** The Office of the Clerk informed us that due to the sensitivity of the data, LIMS should remain with a Legislative Branch agency. This requirement eliminates commercial vendors and fee-for-service Government agencies outside the Legislative Branch.
- **Time Frame Restriction for Implementing Client-Server COTS Alternatives.** The Office of the Clerk plans to replace LIMS with a client-server application by 2004. However, the Office of the Clerk informed us that other priorities restrict the deployment of resources to support the implementation of a custom or package solution LIMS within the desired time frame of the mainframe migration.[21]

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[21]For the purposes of this Study, we accepted this constraint in our analysis. However, a client-server alternative to LIMS would be viable if the House were to reassess the priorities and deployment of the Office of the Clerk's resources to participate in the implementation of this alternative.

B.2.1.3 Alternatives Analysis

Using the application requirements and migration criteria, we identified potential alternatives for migrating LIMS using the following sources:

- **Legislative Branch Agencies.** We contacted the GPO and LOC to discuss the feasibility of relocating LIMS to one of their mainframes. Both organizations have data centers with mainframes capable of hosting LIMS in the near future. We obtained information on proposed services and costs.
- **COTS Software Research.** We identified software vendors that provide legislative management applications. We identified several software applications used by state legislatures such as Indiana and South Dakota to manage their legislative activities, such as drafting bills, recording floor actions, generating calendars, and querying bill status and history.

The alternatives identified for LIMS and the assessment of the ability of each alternative to meet the requirements and migration criteria are summarized in Figure B.2.

Figure B.2: Summary of LIMS Alternatives

Alternative	Description	Assessment
Relocation to a Service Provider's Mainframe	This application could be relocated to either a commercial vendor or fee-for-service Government agency. A Legislative Branch agency indicated that service for this application could be provided for about $120,000 a year.	The relocation of LIMS to a Legislative Branch agency's mainframe is a viable option because it meets the high-level application requirements.
Re-Platform to RS/6000 R/390 Server-On-Board Platform	This application could be re-platformed to an RS/6000 (model F50) server equipped with an R/390 card. The cost of a dedicated RS/6000 R/390 server is $110,370 (hardware only).	The re-platforming of LIMS to an RS/6000 platform is a viable option because it meets the high-level application requirements.
Replacement with Client-Server, COTS Software	This application could be replaced using client-server COTS software such as: • Legislative Management System by Pythia Corporation. • LawMaker by Data Retrieval International. • LegiSoft by Software Studio. These COTS applications may not meet all requirements of LIMS and may require significant customization. The software license ranges from $400,000 to $600,000.	The replacement of LIMS with client-server COTS software is not viable because of the Office of the Clerk's migration constraint.
Outsource Function to a Service Bureau	This alternative is not applicable to LIMS.	LIMS performs non-standard transactions that are not available from vendors in the marketplace.

B.2.1.4 Viable LIMS Alternatives

The selection and prioritization of the following two viable alternatives for LIMS is based on an analysis of high-level requirements, migration criteria, and the strengths, weaknesses, and potential costs of the alternatives identified above. The prioritized viable alternatives for LIMS are:

1. **Relocate to Legislative Branch Mainframe.** This alternative involves relocating the mainframe-based LIMS application to a mainframe at GPO or LOC. This alternative is potentially the lowest cost option and allows for an expeditious migration. Because an external vendor would now provide critical mainframe operations support for LIMS, this alternative could potentially introduce service level issues.

2. **Re-Platform to RS/6000.** This alternative involves re-platforming LIMS to an RS/6000 R/390 Server-On-Board platform. This alternative would allow for HIR support of LIMS to remain virtually unchanged and allow for an expeditious migration. This alternative would require investment in an RS/6000 server and may introduce potential reliability issues for LIMS.[22]

We analyzed these two viable alternatives further in a cost-benefit analysis discussed in Exhibit E, *Cost-Benefit Analysis of System-Wide Alternatives*, and developed a recommended alternative for LIMS.

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[22]The RS/6000 R/390 Server-On-Board solution is a relatively new product offered by IBM and may not be fully tested in the marketplace. The reliability of the RS/6000 may be lower than traditional mainframes. This could potentially affect the performance of larger applications such as LIMS.

B.2.2 National Change of Address (NCOA)

In this section, we present a requirements summary, application migration criteria, alternatives analysis, and a prioritized set of viable alternatives for the (NCOA) file. The NCOA file, developed by the U.S. Postal Service, consists of 36 months of permanent change-of-address information taken from the 42 million change-of-address orders filed annually with the U.S. Postal Service. HIR runs custom programs for media conversion and file formatting, and a COTS application for address standardization, before and after NCOA processing. These pre- and post-NCOA programs are integral to the use of NCOA and are considered, as appropriate, in the requirements and alternatives analysis.

B.2.2.1 Requirements Summary

We collected information on the high-level requirements for NCOA through interviews with HIR operations support personnel and Office of Mailing Services management. Based on these interviews, we identified the following high-level requirements for NCOA and the associated files and applications:

- **Input.** Ability to process data from multiple sources including Member Correspondence Systems, magnetic tapes, and miscellaneous word processing, spreadsheet, and database applications.
- **Processing.** Ability to process approximately 50 million records per year. Ability to provide U.S. Postal Service address standardization. Ability to provide change-of-address updates using U.S. Postal Service file. Ability to eliminate incorrect addresses from a mailing list.
- **Output.** Ability to generate electronic mailing labels.
- **Query and Reports.** Ability to report on the number of records modified by NCOA processing including the number of records updated and the number of records purged.
- **Interfaces.** Ability to transfer files between HIR and NCOA customers via the House LAN.
- **Application Security and Control.** Ability to authenticate and authorize users to prevent unauthorized access to the application or its data. Ability to validate transactions to ensure the integrity of data. Ability to provide physical security to batch output.

B.2.2.2 Application Migration Criteria

We identified the following migration criteria specific for NCOA through interviews with HIR operations support personnel, Office of Mailing Services management, and the U.S. Postal Service. Listed below is the application migration criteria identified for NCOA.

- **Relocation Constraint.** Organizations must be licensed and certified by the U.S. Postal Service in order to use the NCOA file. Relocating the House-licensed NCOA file to a non-House mainframe would violate licensing restrictions.[23]

B.2.2.3 Alternatives Analysis

Using the application requirements and migration criteria, we identified potential alternatives for the migration of NCOA using the following sources:

- **Service Bureau Vendors.** We contacted four service bureau vendors that provide NCOA services to obtain pricing and process information. Vendors receive mailing lists from customers, process the lists against NCOA, and return updated mailing lists to customers. All service bureau vendors accept files on magnetic tape. One vendor uses a dial-up bulletin board system that allows customers to send and receive files via password protected directories. All vendors return updated files via tape.
- **Hardware/Software Providers.** We contacted three software vendors to obtain pricing and product information about hardware and software for processing data using the U.S. Postal Service FASTForward file, a potential replacement for NCOA. Each vendor sells a proprietary COTS application that interfaces with the U.S. Postal Service FASTForward file. The FASTForward file is similar to NCOA, but it contains six months of change-of-address data. NCOA contains 36 months of change-of-address data.
- **GPO.** We contacted the GPO to discuss the feasibility and costs of hosting the pre- and post-processing programs and providing NCOA services. The GPO currently uses Coding Accuracy Support System certified address standardization software to provide similar services in-house within the GPO. The GPO indicated an interest in becoming a certified NCOA vendor.

The alternatives identified for NCOA and the assessment of the ability of each alternative to meet the requirements and migration criteria are summarized in Figure B.3.

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[23]The House cannot "relocate" the NCOA file to another mainframe because of licensing restrictions. However, the House could obtain NCOA services from another licensed Government agency or commercial vendor.

Figure B.3: Summary of NCOA Alternatives

Alternative	Description	Assessment
Relocation to a Service Provider's Mainframe	This application could be relocated to either a commercial vendor or fee-for-service Government agency. The cost would be on a fee-per-1,000-records basis.	The relocation of the House's licensed copy of the NCOA file is not a viable option because of USPS licensing restrictions.
Re-Platform to RS/6000 R/390 Server-On-Board Platform	This application could be re-platformed to an RS/6000 (model F50) server equipped with an R/390 card. The cost of a dedicated RS/6000 R/390 server is $110,370 (hardware only).	The re-platforming of NCOA to an RS/6000 platform is a viable option because it meets the high-level requirements.
Replacement with Client-Server, COTS Software	This application could be replaced using a client-server COTS software such as: • Mover ID by Postalsoft (Approximately $60,000). • MoveForward by Group1 (Approximately $65,000). Both of these products use the U.S. Postal Service FASTForward file rather than the NCOA file. FASTForward has 6 months of data compared to NCOA, which has 36 months of data. Although it contains less data, FASTForward is approved by the U.S. Postal Service for obtaining all postage discounts entitled to users of NCOA.	The replacement of NCOA with a COTS application to support FASTForward is a viable option because it meets the high-level requirements. Changes to the users and customers business processes may be required.
Outsource Function to a Service Bureau	This application could be replaced by obtaining services from service bureaus such as: • FirstSolutions. • First Data Corporation. • Direct Marketing Technology. • Database America Companies. • Government agency.[24] Service bureau cost ranges from $1.50 to $3.00 per 1,000 records based on the amount of pre- and post-processing required to modify record formats. Twenty-four hour turnaround is also available for an extra charge.	The outsourcing of NCOA transactions to a service bureau is a viable option because it meets the high-level requirements. Changes to the users and customers business processes may be required.

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[24]The Government Printing Office indicated an interest in becoming a licensed NCOA service bureau.

B.2.2.4 Viable NCOA Alternatives

The selection and prioritization of the following three viable alternatives for NCOA is based on an analysis of high-level requirements, migration criteria, and the strengths, weaknesses, and potential costs of the alternatives identified above. The prioritized viable alternatives for NCOA are:

1. **Replace with Client-Server COTS Software.** This alternative involves replacing NCOA with FASTForward and consolidating the HIR NCOA functions with the Office of Mailing Services. This alternative is estimated to cost less than the NCOA product in terms of licensing fees and would allow for an expeditious migration. The FASTForward file is similar to NCOA, except that it contains 6 months of change-of-address data as compared to the 36 months of change-of-address data in the NCOA file.[25]

2. **Re-Platform to RS/6000.** This alternative involves re-platforming NCOA to an RS/6000 R/390 Server-On-Board platform. This alternative would allow for HIR support and provision of NCOA services to remain virtually unchanged and allow for an expeditious migration. This alternative would require investment in a RS/6000 server and could potentially introduce reliability problems.[26]

3. **Outsource to a Service Bureau.** This alternative involves obtaining NCOA services from an outside vendor, including pre- and post-processing, if necessary. The Office of Mailing Services would serve as a "front desk" to interface with the vendor(s) and users. This alternative allows for an expeditious migration. However, using a service bureau to process the same number of NCOA transactions may result in higher costs to the House.

We analyzed these three viable alternatives further in a cost-benefit analysis discussed in Exhibit E, *Cost-Benefit Analysis of System-Wide Alternatives*, and developed a recommended alternative for NCOA.

B.2.2 Management of Network Income Expense Services (MONIES)

In this section, we present a requirements summary, application migration criteria, alternatives analysis, and a prioritized set of viable alternatives for the Management of Network Income Expense Services (MONIES) application. MONIES is a mainframe COTS application from Stonehouse Technologies. It is a telecommunications cost

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[25]Although it contains less data, FASTForward is approved by the U.S. Postal Service for obtaining all postage discounts entitled to users of NCOA.

[26]NCOA is a large file. We were unable to verify that other organizations have migrated NCOA to an RS/6000 platform. We were able to verify that one commercial organization migrated NCOA from a mainframe to a UNIX environment.

accounting and billing system used by HIR's Communications and Client Services groups.

B.2.3.1 Requirements Summary

We collected information on the high-level requirements for MONIES through interviews with HIR Integration Group applications support personnel and application users from the HIR Communications Group.   Based on these interviews, we identified the following high-level requirements for MONIES:

- **Input.** Ability to read magnetic tapes from service providers. Ability to upload call data from a Private Branch Exchange (PBX).
- **Processing.** Ability to track multiple features per telephone line. Ability to manage a call volume of two million calls per month. Ability to assign telephone calls (both direct dial and card calls) to a Member, Committee, or other House office. Ability to assign telephone line(s) to a Member, Committee, or other House office.
- **Inventory.** Ability to maintain inventory of multiple types of customer premise equipment (e.g., desk phones, cell phones, caller id box). Ability to track inventory and activity of telephone lines at multiple locations.
- **Reports.** Ability to generate statement of charges with multiple line items (e.g., equipment, services, calls) for each Member, Committee, or other House office.
- **Interfaces.** Ability to transfer monthly charge-back fees from Member's allowances and other House office accounts for use of telecommunications services (e.g., line and long distance charges). Ability to populate the central Locator file with phone numbers of all offices.
- **Application Security and Control.** Ability to authenticate and authorize users to prevent unauthorized access to the application or its data (especially Call Detail Records). Ability to validate transactions to ensure the integrity of data. Ability to provide physical and application level security to carrier-supplied and PBX generated call detail. Ability to validate financial data prior to submission to financial management applications.

B.2.3.2 Application Migration Criteria

We identified migration criteria specific for MONIES through interviews with application users from the HIR Communications Group. Listed below are the application migration criteria identified for MONIES.

- **Call Detail Records.** Call Detail Records are considered confidential and sensitive. In accordance with direction from the Committee on House Oversight, outside vendors cannot have access to Call Detail Records.[27]

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[27]HIR indicated that the Committee on House Oversight restricts the release of Call Detail Records outside of the House of Representatives. For the purpose of this Study, we accepted this constraint in our analysis. However, HIR was unable to provide documentation for this restriction.

B.2.3.3 Alternatives Analysis

Using the application requirements and migration criteria, we identified potential alternatives for the migration of the mainframe applications. We identified the potential alternatives for MONIES using the following sources:

- **OIG MONIES COTS Survey.** We obtained the results of a survey of 14 COTS alternatives identified during an OIG audit of MONIES.
- **Industry Specialists.** We obtained advice from Price Waterhouse industry specialists about COTS alternatives for MONIES.
- **Stonehouse Technologies.** Representatives from the MONIES vendor, Stonehouse Technologies, presented information to Price Waterhouse and HIR about their relocation options and RS/6000 R/390 re-platforming alternatives.

The alternatives identified for MONIES and the assessment of the ability of each alternative to meet the requirements and migration criteria are summarized in Figure B.4.

Figure B.4: Summary of MONIES Alternatives

Alternative	Description	Assessment
Relocation to a Service Provider's Mainframe	This application could be relocated to either a commercial vendor or fee-for-service Government agency. Stonehouse Technologies could host the existing application in Dallas, with connectivity to application users at the House via a dedicated line. (One time fee of $41,000 plus recurring monthly fee of $25,500) A Legislative Branch agency indicated that service for this application could be provided for approximately $60,000 a year.	The relocation of MONIES to a service provider's mainframe is not a viable option because of the current direction from the Committee on House Oversight restricting outside vendors and non-House personnel from obtaining Call Detail Records.
Re-Platform to RS/6000 R/390 Server-On-Board Platform	This application could be re-platformed to an RS/6000 (model F50) server equipped with an R/390 card. Stonehouse Technologies provided a proposal to install a dedicated RS/6000 R/390 server for $285,000 with an annual license fee of $50,000.	The re-platforming of MONIES to an RS/6000 platform is a viable option because it meets the high-level requirements.
Replacement with Client-Server, COTS Software	This application could be replaced using client-server COTS software such as: • Quantum Series by Angeles Group ($300,000). • TMS by Moscom Corporation ($154,215). • AXIS by Pinnacle Software ($150,000 to $200,000). All of these Windows-based applications can run on a server in a LAN environment using the Windows NT operating system. These alternatives potentially meet all requirements with little or no customization. However, additional research must be conducted to determine	The replacement of MONIES with client-server COTS software is a viable option. Customization would be required to meet House-specific processes. Changes in some business processes would be needed.

Alternative	Description	Assessment
	the impact on HIR processes and functions.	
Outsource Function to a Service Bureau	This alternative is not applicable to MONIES.	MONIES performs non-standard transactions that are not available from vendors in the marketplace.

B.2.3.4 Viable MONIES Alternatives

The selection and prioritization of the following two viable alternatives for MONIES are based on an analysis of high-level requirements, migration criteria, and the strengths, weaknesses, and potential costs of the alternatives identified above. The prioritized viable alternatives for MONIES are:

1. **Re-Platform to RS/6000.** This alternative involves re-platforming MONIES to an RS/6000 R/390 Server-On-Board platform. This alternative would allow for HIR support and business processes associated with MONIES to remain virtually unchanged. Stonehouse Technologies has indicated that several of their clients have migrated MONIES to an RS/6000 platform minimizing the risk of performance problems for the House. Security under this alternative could be enhanced because the software and data could be processed on a dedicated RS/6000 sever. This alternative would require investment in a RS/6000 server.

2. **Replace with Client-Server COTS Software.** This alternative involves replacing MONIES with a client-server COTS application. There are numerous COTS applications that potentially satisfy the requirements of MONIES. This alternative may impact the existing business processes used by the HIR Communications Group[28] and may not satisfy all requirements identified by HIR.[29] This alternative may require investment in a dedicated server.

We analyzed these two viable alternatives further in a cost-benefit analysis discussed in Exhibit E, *Cost Benefit Analysis of System-Wide Alternatives*, and developed a recommended alternative for MONIES.

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[28]The business processes associated with MONIES should be further analyzed to determine if all processes are necessary. Due to the time constraints and scope of this Study, we were unable to determine the value and purpose of some processes used by the HIR Communications Group.

[29]These requirements include the development of custom reports and performing network analysis. The applications listed in Figure B.4 may require customization to meet these requirements.

B.2.4 Financial Disclosure

In this section, we present a requirements summary, application migration criteria, alternatives analysis, and a prioritized set of viable alternatives for the Financial Disclosure application. The Financial Disclosure application records financial disclosure reports submitted by Members and certain Legislative Branch staff.

B.2.4.1 Requirements Summary

We collected information on the high-level requirements for Financial Disclosure through interviews with HIR Integration Group applications support personnel and application users from the Office of the Clerk. Based on these interviews, we identified the following high-level requirements for Financial Disclosure:[30]

- **Input.** Ability to scan and store forms in batch. Ability to index the documents using data entered on different fields on the forms. Ability to store data entered on different fields on the forms in a database for query and reports.
- **Output.** Ability to generate reminder letters for individuals who have not filed.
- **Query and Reports.** Ability to search for scanned forms using data taken from different fields stored in the database. Ability to generate reports using different fields stored in the database.
- **Application Security and Control.** Ability to authenticate and authorize users to prevent unauthorized access to the application or its data. Ability to validate transactions to ensure the integrity of data. Ability to provide physical security to batch output.

B.2.4.2 Application Migration Criteria

There were no application-specific migration criteria identified for Financial Disclosure beyond the Study-wide migration criteria.

B.2.4.3 Alternatives Analysis

Using the application requirements and migration criteria, we identified potential alternatives for Financial Disclosure using the following sources:

- **Industry Trade Publications.** We reviewed publications such as *Imaging* and *Document Management* to identify potential COTS imaging applications.
- **Industry Specialists.** We received input from Price Waterhouse imaging and document management specialists, who provided information on potential COTS alternatives, scope, and level of effort for implementing a new imaging system.

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[30]These requirements encompass the mainframe and FileNet components of the Financial Disclosure application.

The alternatives identified for Financial Disclosure and the assessment of the ability of each alternative to meet the requirements and migration criteria are summarized in Figure B.5.

Figure B.5: Summary of Financial Disclosure Alternatives

Alternative	Description	Assessment
Relocation to a Service Provider's Mainframe	This application could be relocated to either a commercial vendor or fee-for-service Government agency. A Legislative Branch agency indicated that service for this application could be provided for about $10,000 a year.	The relocation of Financial Disclosure to a service provider's mainframe is a viable option because it meets the high-level requirements.
Re-Platform to RS/6000 R/390 Server-On-Board Platform	This application could be re-platformed to an RS/6000 (model F50) server equipped with an R/390 card. The cost of a dedicated RS/6000 R/390 server is $110,370 (hardware only). However, this application could share a server with other applications.	The re-platforming of Financial Disclosure to an RS/6000 platform is a viable option because it meets the high-level requirements.
Replacement with Client-Server, COTS Software	This application could be replaced using client-server COTS software such as: • Feith Document Database. • Blueridge OPTIX. • LAVA Systems. • Hyland OnBase. • Eastman Software Imaging. Imaging software license for 10 users ranges from $25,000 to $40,000. Database software license ranges from $30,000 to $40,000. The level of effort for customization ranges from 3,500 to 8,000 hours. Conversion costs range from $42,000 to $50,000.	The replacement of Financial Disclosure with COTS imaging and document management system is a viable option Customization would be required to meet House-specific processes. Changes in some business processes would be needed.
Outsource Function to a Service Bureau	This alternative is not applicable to Financial Disclosure.	Financial Disclosure performs non-standard transactions that are not available from vendors in the marketplace.

B.2.4.4 Viable Financial Disclosure Alternatives

The selection and prioritization of the following three viable alternatives for Financial Disclosure are based on an analysis of high-level requirements, migration criteria, and the strengths, weaknesses, and potential costs of the alternatives identified above. The prioritized viable alternatives for Financial Disclosure are:

1. **Relocate to Legislative Branch Mainframe.** This alternative involves relocating the Financial Disclosure application to a mainframe at either the GPO or LOC.[31] This alternative is potentially the lowest cost option and allows for an expeditious migration. This alternative could potentially introduce service level issues because an external vendor would now be providing critical mainframe operations support for Financial Disclosure.
2. **Re-Platform to RS/6000.** This alternative involves re-platforming Financial Disclosure to an RS/6000 R/390 Server-On-Board platform. This alternative would allow for HIR support and business processes associated with Financial Disclosure to remain virtually unchanged. This alternative would require investment in an RS/6000 server but it would most likely be shared with other applications.
3. **Replace with Client-Server COTS Software.** This alternative involves replacing Financial Disclosure with a client-server COTS application. There are numerous COTS applications that potentially satisfy the requirements of Financial Disclosure. This alternative would require significant customization and conversion costs to implement.

We analyzed these three viable alternatives further in a cost-benefit analysis discussed in Exhibit E, *Cost-Benefit Analysis of System-Wide Alternatives*, and developed a recommended alternative for Financial Disclosure.

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[31]It is technically feasible to relocate Financial Disclosure to a commercial vendor or a fee-for-service Government agency outside the Legislative Branch. Considering that LIMS is restricted to a Legislative Branch mainframe, the House could benefit by migrating both LIMS and Financial Disclosure to the same mainframe. The incremental cost of relocating Financial Disclosure to the same platform as LIMS would be lower and more attractive than purchasing timesharing services from a separate vendor.

B.2.5 Lobby Act

In this section, we present a requirements summary, application migration criteria, alternatives analysis, and a prioritized set of viable alternatives for the Lobby Act application. The Lobby Act application records lobbyist registrations and semi-annual Lobbying Reports submitted by lobbyists pursuant to the Lobbying Disclosure Act of 1995.

B.2.5.1 Requirements Summary

We collected information on the high-level requirements for Lobby Act through interviews with HIR Integration Group applications support personnel and application users from the Office of the Clerk. Based on these interviews, we identified the following high-level requirements for Lobby Act:[32]

- **Input.** Ability to scan and store forms in batch. Ability to index the documents using data entered on different fields on the forms. Ability to store data entered on different fields on the forms in a database for query and reports.
- **Processing.** Ability to generate a letter to the lobbyist when the form is received. Ability to generate a letter of inquiry to a lobbyist when the form contains errors or omissions. Ability to indicate the types of errors and omissions on the forms. Ability to indicate a form was reviewed. Ability to generate letters to submitters when the semi-annual Lobbying Reports are not received.
- **Query and Reports.** Ability to search for scanned forms using data taken from different fields stored in the database (e.g., submitter name, client name). Ability to generate report using different fields stored in the database.
- **Application Security and Control.** Ability to authenticate and authorize users to prevent unauthorized access to the application or its data. Ability to validate transactions to ensure the integrity of data. Ability to provide physical security to batch output.

B.2.5.2 Application Migration Criteria

There were no application-specific migration criteria identified for Lobby Act beyond the Study-wide migration criteria.

B.2.5.3 Alternatives Analysis

Using the application requirements and migration criteria, we identified potential alternatives for the migration of the mainframe applications. We identified the potential alternatives for Lobby Act using the following sources:

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[32] These requirements encompass the mainframe and FileNet components of the Lobby Act application.

- **Industry Trade Publications.** We reviewed publications such as *Imaging* and *Document Management* to identify potential COTS imaging applications.

- **Industry Specialists.** We received input from Price Waterhouse imaging and document management specialists, who provided information on potential COTS alternatives, scope, and level of effort for implementing a new imaging system.

The alternatives identified for Lobby Act and the assessment of the ability of each alternative to meet the requirements and migration criteria are summarized in Figure B.6.

Figure B.6: Summary of Lobby Act System Alternatives

Alternative	Description	Assessment
Relocation to a Service Provider's Mainframe	This application could be relocated to either a commercial vendor or fee-for-service Government agency. A Legislative Branch agency indicated that service for this application could be provided for about $22,000 a year.	The relocation of Lobby Act System to a service provider's mainframe is a viable option because it meets the high-level requirements.
Re-Platform to RS/6000 R/390 Server-On-Board Platform	This application could be re-platformed to an RS/6000 (model F50) server equipped with an R/390 card. The cost of a dedicated RS/6000 R/390 server is $110,370 (hardware only). However, this application could share a server with other applications.	The re-platforming of Lobby Act System to an RS/6000 platform is a viable option because it meets the high-level requirements.
Replacement with Client-Server, COTS Software	This application could be replaced using client-server COTS software such as: • Feith Document Database. • Blueridge OPTIX. • Hyland OnBase. • Eastman Software Imaging. • LAVA Systems. Imaging software license for 10 users ranges from $25,000 to $40,000. Database software license ranges from $30,000 to $40,000. The level of effort for customization ranges from 3,500 to 8,000 hours. Conversion costs range from $137,000 to $177,500.	The replacement of Lobby Act System with a COTS imaging and document system is a viable option. Customization would be required to meet House-specific processes. Changes in some business processes would be needed.
Outsource Function to a Service Bureau	This alternative is not applicable to Lobby Act.	Lobby Act performs non-standard transactions that are not available from vendors in the marketplace.

B2.5.4 Viable Lobby Act Alternatives

The selection and prioritization of the following three viable alternatives for Lobby Act is based on an analysis of high-level requirements, migration criteria, and the strengths, weaknesses, and potential costs of the alternatives identified above. The prioritized viable alternatives for Lobby Act are:

1. **Relocate to Legislative Branch Mainframe.** This alternative involves relocating the Lobby Act application to a mainframe at either the GPO or LOC.[33] This alternative is potentially the lowest cost option and allows for an expeditious migration. This alternative could potentially introduce service level issues because an external vendor would now be providing critical mainframe operations support for Lobby Act.
2. **Re-Platform to RS/6000.** This alternative involves re-platforming Lobby Act to an RS/6000 R/390 Server-On-Board platform. This alternative would allow for HIR support and business processes associated with Lobby Act to remain virtually unchanged. This alternative would require investment in an RS/6000 server but it would most likely be shared with other applications.
3. **Replace with Client-Server COTS Software.** This alternative involves replacing Lobby Act with a client-server COTS application**.** There are numerous COTS applications that potentially satisfy the requirements of Lobby Act. This alternative would require significant customization and conversion costs to implement.

We analyzed these three viable alternatives further in a cost-benefit analysis discussed in Exhibit E, *Cost-Benefit Analysis of System-Wide Alternatives*, and developed a recommended alternative for Lobby Act.

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[33]It is technically feasible to relocate Lobby Act to a commercial vendor or a fee-for-service Government agency outside the Legislative Branch. Considering that LIMS is restricted to a Legislative Branch mainframe, the House could benefit by migrating both LIMS and Lobby Act to the same mainframe. The incremental cost of relocating Lobby Act to the same platform as LIMS would be lower and more attractive than purchasing timesharing services from a separate vendor.

B.2.6 STUDIO

In this section, we present a requirements summary, application migration criteria, alternatives analysis, and a prioritized set of viable alternatives for the STUDIO application. The House Recording Studio within the Office of Communication Media operates STUDIO to track Members' use of the House radio and video facilities and to charge back these services to the Members' allowances.

B.2.6.1 Requirements Summary

We collected information on the high-level requirements for STUDIO through interviews with HIR Integration Group applications support personnel and application users from the House Recording Studio. Based on these interviews, the high-level requirements that we identified for STUDIO are:

- **Processing.** Ability to record work orders and invoices. Ability to automatically calculate amounts charged using predefined pricing tables. Ability to automatically calculate amounts based on a start and end time using various rates for specified blocks of time. Ability to allow authorized user to override system generated data. Ability to prohibit duplicate entry of a work order/invoice. Ability to keep multiple accounting periods open for purposes of adjusting entries.
- **Archiving.** Ability to maintain at least three years of data. Ability to archive records after a specified amount of time.
- **Query and Reports.** Ability to query by work order/invoice number, account number, and service date. Ability to produce reports for a given period listing data, such as work order/invoice amounts, total Member usage, unit costs, and current and previous period revenue. Ability to generate monthly Member statements in summary and detail.
- **Interfaces.** Ability to export the monthly charge-back fees to Members, Committees, and House staff for the use of the Recording Studio Services. Ability to import office data, such as office ID, office name, room number and phone number, from the central directory database.
- **Application Security and Control.** Ability to authenticate and authorize users to prevent unauthorized access to the application or its data. Ability to validate transactions to ensure the integrity of financial data.

B.2.6.2 Application Migration Criteria

There were no application-specific migration criteria identified for STUDIO beyond the Study-wide migration criteria.

B.2.6.3 Alternatives Analysis

Using the application requirements and migration criteria, we identified potential alternatives for the migration of STUDIO using the following sources:

- **Industry Trade Publications.** We reviewed industry trade publications to assist in conducting market research. These publications included *Recording Industry SourceBook* and *Sound Business*.
- **U.S. Senate.** We contacted the U.S. Senate Recording Studio to assess their use of software. The studio uses Solomon IV to manage work orders and invoices.
- **Commercial Recording Studios.** We conducted telephone interviews with management officials at local recording studios, including Potomac Television and Lion & Fox Recording, Inc. The studios use software packages such as Peachtree and Cyma to process work orders and invoices.
- **Industry Specialists.** We contacted specialists with the Price Waterhouse Entertainment, Media, and Communications Group, who provide consulting services to recording and television studios. Myriad from Xymox and ScheduAll from VuzuAll were the recommended software packages, which could potentially meet the needs of the House Recording Studio.

The alternatives identified for STUDIO and the assessment of the ability of each alternative to meet the requirements and migration criteria are summarized in Figure B.7.

Figure B.7: Summary of STUDIO Alternatives

Alternative	Description	Assessment
Relocation to a Service Provider's Mainframe	This application could be relocated to either a commercial vendor or a fee-for-service Government agency. A Legislative Branch agency indicated that service for this application could be provided for about $2,000 a year.	The relocation of STUDIO to a service provider's mainframe is a viable option because it meets the high-level requirements.
Re-Platform to RS/6000 R/390 Server-On-Board Platform	This application could be re-platformed to an RS/6000 (model F50) server equipped with an R/390 card. The cost of a dedicated RS/6000 R/390 server is $110,370 (hardware only). However, this application could share a server with other applications.	The re-platforming of STUDIO to an RS/6000 platform is a viable option because it meets the high-level requirements.
Replacement with Client-Server, COTS Software	This application could be replaced using client-server COTS application run on a PC, such as: • PeachTree Complete ($200). • QuickBooks Pro 5.0 ($200). • ScheduAll by VizuAll ($7,000). • Myriad by Xymox ($15,230). • Soloman IV ($15,000)	The replacement of STUDIO with a client-server COTS application is a viable option. Customization may be required to meet House-specific processes. Changes in some business processes would be needed.
Outsource Function to a Service Bureau	This alternative is not applicable to STUDIO.	STUDIO performs non-standard transactions that are not available from vendors in the marketplace.

B.2.6.4 Viable STUDIO Alternatives

The selection and prioritization of the following three viable alternatives for STUDIO are based on an analysis of high-level requirements, migration criteria, and the strengths, weaknesses, and potential costs of the alternatives identified above. The prioritized viable alternatives for STUDIO are:

1. **Relocate to Legislative Branch Mainframe.** This alternative involves relocating STUDIO to a mainframe at the GPO or LOC.[34] This alternative is potentially the lowest cost option, allows for an expeditious migration, and minimizes the problems associated with changing to a House-wide financial application.[35] This alternative could introduce potential service level issues because an external vendor would now be providing critical mainframe operations support for STUDIO.
2. **Re-Platform to RS/6000.** This alternative involves re-platforming STUDIO to an RS/6000 R/390 Server-On-Board platform. This alternative would allow for HIR support and the House Recording Studio business processes associated with STUDIO to remain virtually unchanged. This alternative would require investment in an RS/6000 server but it would most likely be shared with other applications.
3. **Replace with Client-Server COTS Software.** This alternative involves replacing STUDIO with a client-server COTS application. There are numerous COTS applications that potentially satisfy the requirements of STUDIO. This alternative would require changes to the business processes within the House Recording Studio.

We analyzed these three viable alternatives further in a cost-benefit analysis discussed in Exhibit E, *Cost-Benefit Analysis of System-Wide Alternatives*, and developed a recommended alternative for STUDIO.

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[34]It is technically feasible to relocate STUDIO to a commercial vendor or a fee-for-service Government agency outside the Legislative Branch. Considering that LIMS is restricted to a Legislative Branch mainframe, the House could benefit by migrating both LIMS and STUDIO to the same mainframe. The incremental cost of relocating STUDIO to the same platform as LIMS would be lower and more attractive than purchasing timesharing services from a separate vendor.

[35]The House plans to identify and implement a House-wide solution to meet the House's financial management needs. This solution would serve as one central financial management system for the House. The solution would replace all financial based applications in the CAO offices and be available to all Members, Committees, and House offices. The requirements analysis phase of the implementation is expected to commence during 1998.

B.2.7 FOTO

In this section, we present a requirements summary, application migration criteria, alternatives analysis, and a prioritized set of viable alternatives for the FOTO application. The Office of Photography uses FOTO to track Member, Committee, and other House office staff use of photographic services and charge back these services to a Member, Committee, or other House office account.

B.2.7.1 Requirements Summary

We collected information on the high-level requirements for FOTO through interviews with HIR Integration Group applications support personnel and application users from the Office of Photography. Based on these interviews, the high-level requirements that we identified for FOTO are:

- **Processing.** Ability to record work orders and invoices. Ability to automatically calculate total amount charged using predefined pricing tables. Ability to allow an authorized user to override system generated data. Ability to keep multiple accounting periods open for purposes of adjusting entries. Ability to prohibit entry of duplicate work orders/invoices.
- **Query and Reports.** Ability to query by work order/invoice number, Member's name, account number, and service date. Ability to produce reports listing information such as number of appointments, quantity of work orders/invoices processed by method of payment, and number of Members served in a month.
- **Archiving.** Ability to maintain at least three years of data. Ability to archive data after a specified period of time.
- **Interfaces.** Ability to export the monthly charge-back fees to Members, Committees, and House staff for the use of the Office of Photography services. Ability to import office data, such as office IDs, office names, room numbers, and phone numbers, from the central directory database.
- **Application Security and Control.** Ability to authenticate and authorize users. Ability to ensure financial data is completely and accurately processed.

B.2.7.2 Application Migration Criteria

There were no application-specific migration criteria identified for FOTO beyond the Study-wide migration criteria.

B.2.7.3 Alternatives Analysis

Using the application requirements and migration criteria, we identified potential alternatives for the migration of FOTO using the following sources:

- **Industry Trade Publications.** We reviewed four publications to assist in conducting market research. The publications included *Photo Lab Management* and *Professional Photographers Association*.

- **U.S. Senate.** We contacted the U.S. Senate Photography Studio to assess their uses of software. The studio uses Solomon IV to manage work orders and invoices.
- **Commercial Photography Studios.** We conducted telephone interviews with local studios, including Dupont Photographers and Kaplan Photography. We found that the studios use software packages such as QuickBooks Pro and PeachTree for their financial needs.

The alternatives identified for FOTO and the assessment of the ability of each alternative to meet the requirements and migration criteria are summarized in Figure B.8.

Figure B.8: Summary of FOTO Alternatives

Alternative	Description	Assessment
Relocation to a Service Provider's Mainframe	This application could be relocated to either a commercial vendor or a fee-for-service Government agency. A Legislative Branch agency indicated that service for this application could be provided for about $3,000 a year.	The relocation of FOTO to a service provider's mainframe is a viable option because it meets the high-level requirements.
Re-Platform to RS/6000 R/390 Server-On-Board Platform	This application could be re-platformed to an RS/6000 (model F50) server equipped with an R/390 card. The cost of a dedicated RS/6000 R/390 server is $110,370 (hardware only). However, this application could share a server with other applications.	The re-platforming of FOTO to an RS/6000 platform is a viable option because it meets the high-level requirements.
Replacement with Client-Server, COTS Software	This application could be replaced using client-server COTS software run on a PC, such as: - PeachTree Complete ($200). - QuickBooks Pro 5.0 ($200). - Access Computer Software Systems ($550). - PI/E ($695). 20/20 ProStock Agency Software ($7,000). - Soloman IV ($15,000)	The replacement of STUDIO with a client-server COTS application is a viable option. Customization may be required to meet House-specific processes. Changes in some business processes would be needed.
Outsource Function to a Service Bureau	This alternative is not applicable to FOTO.	FOTO performs non-standard transactions that are not available from vendors in the marketplace.

B.2.7.4 Viable FOTO Alternatives

The selection and prioritization of the following three viable alternatives for FOTO are based on an analysis of high-level requirements, migration criteria, and the strengths, weaknesses, and potential costs of the alternatives identified above. The prioritized viable alternatives for FOTO are:

1. **Relocate to Legislative Branch Mainframe.** This alternative involves relocating the FOTO application to a mainframe at the GPO or LOC.[36] This alternative is potentially the lowest cost option, allows for an expeditious migration, and minimizes the problems associated with changing to a House-wide financial application.[37] This alternative could introduce potential service level issues because an external vendor would now be providing critical mainframe operations support for FOTO.
2. **Re-Platform to RS/6000.** This alternative involves re-platforming FOTO to an RS/6000 R/390 Server-On-Board platform. This alternative would allow for HIR support and Office of Photography business processes associated with FOTO to remain virtually unchanged. This alternative would require investment in an RS/6000 server but it would most likely be shared with other applications.
3. **Replace with Client-Server COTS Software.** This alternative involves replacing FOTO with a client-server COTS application. There are numerous COTS applications that potentially satisfy the requirements of FOTO. This alternative would require changes to the business process within the Office of Photography.

We analyzed these three viable alternatives further in a cost-benefit analysis discussed in Exhibit E, *Cost-Benefit Analysis of System-Wide Alternatives*, and developed a recommended alternative for FOTO.

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[36]It is technically feasible to relocate FOTO to a commercial vendor or a fee-for-service Government agency outside the Legislative Branch. Considering that LIMS is restricted to a Legislative Branch mainframe, the House could benefit by migrating both LIMS and FOTO to the same mainframe. The incremental cost of relocating FOTO to the same platform as LIMS would be lower and more attractive than purchasing timesharing services from a separate vendor.

[37]The House plans to identify and implement a House-wide solution to meet the House's financial management needs. This solution would serve as one central financial management system for the House. The solution would replace all financial based applications in the CAO offices and be available to all Members, Committees, and House offices. The requirements analysis phase of the implementation is expected to commence during 1998.

B.2.8 Parking Office Permits System (POPS)

In this section, we present a requirements summary, application migration criteria, alternatives analysis, and a prioritized set of viable alternatives for the Parking Office Permits System (POPS). POPS tracks parking permits issued by the House Garage and Parking Security Office (Parking Office).

B.2.8.1 Requirements Summary

We collected information on the high-level requirements for POPS through interviews with HIR Integration Group applications support personnel and application users from the Sergeant at Arms' Parking Office. Based on these interviews, the high-level requirements that we identified for POPS are:

- **System Setup.** Ability to define parking locations. Ability to set the maximum number of available spaces for a location. Ability to set office/department information.
- **Permanent Permits.** Ability to assign permits to an office without specifying employees. Ability to record permit, employee, and vehicle information. Ability to record multiple vehicles for a permit. Ability to reassign permanent permits. Ability to assign a permit to multiple employees. Ability to track permits assigned to Members. Ability to un-assign permanent permit. Ability to retain history of permit assignments.
- **Reserved Parking.** Ability to assign and reassign a permanent permit to a reserved space. Ability to capture Social Security Number for tax withholding purposes.
- **Temporary Permits.** Ability to issue temporary permits. Ability to record permit, permit holder, and vehicle information. Ability to generate sequential temporary permit numbers. Ability to print temporary permits.
- **Query and Reports.** Ability to search for a permit by permit number, permit holder name, and license plate number. Ability to search for all permits assigned to an employee. Ability to generate report listings of permits by permit number, permit holder name, office, and location. Ability to report the number of available spaces for each location.
- **Interfaces.** Ability to export the tax withholding information for reserved parking spaces to the Office of Finance. Ability to import office data, such as office IDs, office names, room numbers, and phone numbers, from the central directory database.
- **Application Security and Control.** Ability to authenticate and authorize users to prevent unauthorized access to the application or its data. Ability to validate transactions to ensure the integrity of financial data.

B.2.8.2 Application Migration Criteria

There were no application-specific migration criteria identified for POPS beyond the Study-wide migration criteria.

B.2.8.3 Alternatives Analysis

Using the application requirements and migration criteria, we identified potential alternatives for the migration of POPS using the following sources:

- **Industry Trade Associations.** The International Parking Institute and the National Parking Association provided assistance in researching vendors that provide parking permit management software.
- **Parking Offices.** We conducted telephone interviews with management of eight parking offices at Federal agencies, universities, and commercial parking operations, including the U.S. Senate, General Accounting Office, the Pentagon, National Institute of Health, University of Maryland at College Park, and George Mason University.

The alternatives identified for POPS and the assessment of the ability of each alternative to meet the requirements and migration criteria are summarized in Figure B.9.

Figure B.9: Summary of POPS Alternatives Analysis

Alternative	Description	Assessment
Relocation to a Service Provider's Mainframe	This application could be relocated to either a commercial vendor or a fee-for-service Government agency. A Legislative Branch agency indicated that service for this application could be provided for about $3,000 a year.	The relocation of POPS to a service provider's mainframe is a viable option because it meets the high-level requirements.
Re-Platform to RS/6000 R/390 Server-On-Board Platform	This application could be re-platformed to an RS/6000 (model F50) server equipped with an R/390 card. The cost of a dedicated RS/6000 R/390 server is $110,370 (hardware only). However, this application could share a server with other applications.	The re-platforming of POPS to an RS/6000 platform is a viable option because it meets the high-level requirements.
Replacement with Client-Server, COTS Software	This application could be replaced using a client-server COTS software such as: • PowerPark by T2 Systems ($38,000 plus annual maintenance fee). • TickeTrak by Cardinal Tracking ($11,900 plus annual maintenance fee). • POMS by logic4u ($13,500 plus annual maintenance fee).	The replacement of POPS with client-server COTS software is a viable option. Customization would be required to meet House-specific processes. Changes in some business processes would be needed.
Outsource Function to a Service Bureau	This alternative is not applicable to POPS.	POPS performs non-standard transactions that are not available from vendors in the marketplace.

B.2.8.4 Viable POPS Alternatives

The selection and prioritization of the following three viable alternatives for POPS are based on an analysis of high-level requirements, migration criteria, and the strengths,

weaknesses, and potential costs of the alternatives identified above. The prioritized viable alternatives for POPS are:

1. **Replace with Client-Server COTS Software.** This alternative involves replacing POPS with a client-server COTS application. There are numerous COTS applications that potentially satisfy the requirements of POPS. The potential replacement applications identified are Windows-based and can run on a PC in a LAN environment using a Windows operating system. This alternative would require changes to the business processes within the Parking Office.
2. **Relocate to Legislative Branch Mainframe.** This alternative involves relocating the POPS application to a mainframe at the GPO or LOC.[38] This alternative allows for an expeditious migration and allows the Parking Office to retain existing business processes. This alternative could introduce potential service level issues because an external vendor would now be providing mainframe operations support for POPS.
3. **Re-Platform to RS/6000.** This alternative involves re-platforming POPS to an RS/6000 R/390 Server-On-Board platform. This alternative would allow for HIR support and Parking Office business processes associated with POPS to remain virtually unchanged. This alternative would require investment in an RS/6000 server but would most likely be shared with other applications.

We analyzed these three viable alternatives further in a cost-benefit analysis discussed in Exhibit E, *Cost-Benefit Analysis of System-Wide Alternatives*, and developed a recommended alternative for POPS.

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[38]It is technically feasible to relocate POPS to a commercial vendor or a fee-for-service Government agency outside the Legislative Branch. Considering that LIMS is restricted to a Legislative Branch mainframe, the House could benefit by migrating both LIMS and POPS to the same mainframe. The incremental cost of relocating POPS to the same platform as LIMS would be lower and more attractive than purchasing timesharing services from a separate vendor.

EXHIBIT C

SYSTEM-WIDE ALTERNATIVES ANALYSIS

Exhibit C

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System-Wide Alternatives

This exhibit presents the methodology used to identify a group of common viable alternatives (i.e., system-wide alternatives) for the migration of the U.S. House of Representatives (House) mainframe-based applications.[39] It also presents the results of our work; the identification of the system-wide alternatives, as well as the resources and transition required to support the migration alternative.

C.1 Methodology

The objective of the system-wide alternatives analysis is to provide a framework for analyzing resources, transition, implementation issues, and costs of the viable alternatives for the eight mainframe-based applications. As indicated above, a system-wide alternative is a group of common viable alternatives for the eight mainframe-based applications. The common viable alternatives, identified in the system-wide alternative analysis, were based on the results of the alternative analysis presented in Exhibit B, *Application Requirements and Alternatives Analysis*. The general technical environment required to support the system-wide alternatives is presented in Exhibit D, *Technical Environment Definition,* and additional analysis of the viability of the system-wide alternatives is presented in Exhibit E, *Cost-Benefit Analysis of System-wide Alternatives*.

The identification of the system-wide alternatives was based on a multi-step process that began with developing a baseline for assessing the potential changes to the House by implementing a system-wide solution, and resulted in the identification of the resources and transition required to support the system-wide alternative. The multi-step process consisted of the following:

1. Development of a Baseline

2. Identification of System-Wide Alternatives

3. Definition of System-Wide Alternatives

Below, we present information on each step of the methodology.

C.1.1 Development of a Baseline

The purpose of developing and presenting a baseline was to provide a benchmark to analyze the changes to the House with respect to resources and business processes required to support a system-wide solution for the migration of the mainframe-based applications. The baseline

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[39]The House mainframe-based applications included in the Study are: Legislative Information Management System (LIMS), National Change of Address (NCOA), Management of Network Income Expense Services (MONIES), Financial Disclosure, Lobby Act, Recording Studio (STUDIO), Photography (FOTO), and Parking Office Permit System (POPS).

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(identified in this report as the FY 99 baseline) developed for the system-wide alternatives analysis was based on the projected House environment for Fiscal Year 1999. The projected House environment for FY 1999 is based on the resources required to operate and maintain a "right-sized" mainframe to support the eight mainframe-based applications and their associated software utilities and databases.[40]

C.2 Identification of System-Wide Alternatives

In Exhibit B, *Application Requirements and Alternatives Analyses,* we presented prioritized viable alternatives for each mainframe-based application. We grouped these alternatives into four system-wide alternatives to analyze the viability of the solutions. The rationale used to assemble the viable application alternatives into system-wide alternatives was to:

- **Achieve Economies of Scale.** We identified alternatives for relocating all applications to a single service provider or re-platforming all applications to a similar platform which could result in lower overall costs.

- **Minimize Number of Service Providers.** The management of multiple contracts for multiple service providers could be cumbersome and potentially costly to manage**.** We defined alternatives to minimize the number of vendors that would be providing service if these services could be consolidated to one vendor.

- **Provide a Range of Alternatives.** We identified system-wide alternatives to provide an analysis of a range of viable alternatives identified for the eight applications.

- **Establish Scenarios for an Expeditious Migration.** We identified system-wide alternatives that would facilitate a migration by the third quarter of FY 1999.[41]

Using the rationale described above and the viable alternatives identified in Appendix B, *Application Requirements and Alternatives Analysis*, we developed the following system-wide alternatives categories:

- **Re-Platform to RS/6000**. This alternative provides for the re-platforming of the applications to RS/6000 R/390 Server-On-Board platforms.[42]

- **Relocation to Legislative Branch**. This alternative involves relocating the applications to another Legislative Branch agency.

- **Replace with Client-Server Commercial Off-The-Shelf (COTS)**. This alternatives involves replacing the applications with a client-server application.

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[40]HIR indicated that if only the eight applications in this Study remain on the mainframe, the technical solution selected to continue to support the applications would not necessarily be an HIR operated mainframe. Accordingly, the characteristics of the FY 99 baseline are not intended to necessarily represent HIR's plans or intentions to support only the eight applications. However, no specific plans were identified by HIR to support a non-mainframe technical solution in the near future.

[41]However, some applications offer opportunities for immediate migration (e.g., MONIES to an RS/6000 platform). Other applications, such as LIMS, may require more time to negotiate with the selected Legislative Branch service provider.

[42]The IBM RS/6000 platform provides MVS/ESA and OS/390 capabilities and is capable of hosting mainframe-based applications with little or no changes to the application code.

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- **Top-Ranked Alternative**. This alternative is a composite of the highest ranked viable application alternatives identified in Exhibit B, *Application Requirements and Alternatives Analysis.*

Some of the system-wide alternative categories were further tailored to accommodate migration constraints identified during our analysis. More information on the identification of the system-wide alternatives is presented in the section below.

C.3 System-Wide Alternatives

This section of the exhibit presents the results of the system-wide alternatives analysis. It also describes the potential impact of the implementation of each alternative to the House staff that use and support the mainframe-based applications. This includes a description of:

- FY 99 Baseline of House Environment.

- System-Wide Alternatives.

The description of the FY 99 baseline and the system-wide alternatives include the following components.

- **Selected Application Alternatives.** Identification of the eight viable application alternatives considered in the system-wide alternative.

- **Transition.** Description of the transition from the existing mainframe environment to the alternative environment.

- **Stakeholder Resources and Responsibilities**. Presentation of information on the resources required to support the applications and the impact of the alternative on the primary stakeholders of the applications. The discussion focuses on changes from the FY 99 baseline.

The transition, implementation, and resources presented for each system-wide alternative were determined through a high-level analysis of application requirements and migration criteria. The actual implementation and required resources of each system-wide alternative would need to be analyzed in more detail to ensure that (1) mandatory House and user requirements are met by the functional and technical solution, (2) proper application and network security are implemented, (3) proper internal controls are implemented, and (4) personnel resources are employed in a cost effective manner. The information presented for each alternative is intended to be used to represent the implementation of the alternative, not recommend a specific alternative, application, or approach.

C.3.1 FY 99 Baseline

The projected FY 99 baseline is based on the premise that the current mainframe would be "right-sized" to support the House environment in FY 1999. In FY 1999, it is expected that all mainframe-based applications (except those eight applications included in this Study) should be

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either migrated to client-server environments or eliminated. Accordingly, the baseline assumes that the existing 77 Million Instructions Per Second (MIPS) Complementary Metal Oxide Semiconductor (CMOS) Multiprise 135 mainframe supported by House Information Resources (HIR) would be "right-sized" to meet the reduced processing and storage requirements of the eight mainframe-based applications included in this study.

The FY 99 baseline represents the projected personnel resources, mainframe, hardware, and software required to support the remaining eight mainframe-based applications. The FY 99 baseline was compiled based on: (1) interviews with HIR management and staff, and (2) the FY 1999 budget submission that is currently being prepared by HIR. The FY 99 baseline assumes the following:

- Only the eight applications included in this Study would remain on the mainframe, along with the associated utilities and supporting databases, such as ADABAS.

- All applications would be modified to be Year 2000 compliant.

- External customer data processing would not be performed and the costs and associated revenue streams are not included in this baseline.[43]

C.3.1.1 Selected Application Alternatives

Figure C.1 lists the applications and their locations, as identified in the FY 99 baseline. For the baseline, all eight applications remain on the HIR mainframe.

Figure C.1: Selected Application Alternatives

Application	Application Alternative
LIMS	HIR Mainframe
NCOA	HIR Mainframe
MONIES	HIR Mainframe
Financial Disclosure	HIR Mainframe
Lobby Act	HIR Mainframe
STUDIO	HIR Mainframe
FOTO	HIR Mainframe
Parking	HIR Mainframe

C.3.1.2 Transition

This baseline assumes that a transition from the current CMOS Multiprise 135 mainframe (77 MIPS) to a proposed CMOS Multiprise 125 (56 MIPS) mainframe or the equivalent would

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[43]HIR also provides timesharing services to GAO and CBO for hosting applications on a fee-for service basis. These services are expected to generate $1.2 million in revenues for FY 1999. However, this revenue was not included in the FY 1999 baseline because these HIR-provided services are not mission-critical to the House. Furthermore, a five year life cycle of expected revenues could not be estimated because there was no basis for the the pricing structure applied to the original and renegotiated service level agreements. Also, full costs for providing these services could not be identified for inclusion in this Study.

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occur.[44] HIR indicated that the transition effort from the current mainframe to a new mainframe would be accomplished by HIR staff.

C.3.1.3 Stakeholder Resources and Responsibilities

Figure C.2 presents a graphical representation of the relationships of the application stakeholders and their connectivity to the eight applications, followed by a brief discussion of the impact on each of the stakeholders.

Figure C.2: Overview of Stakeholder Environment
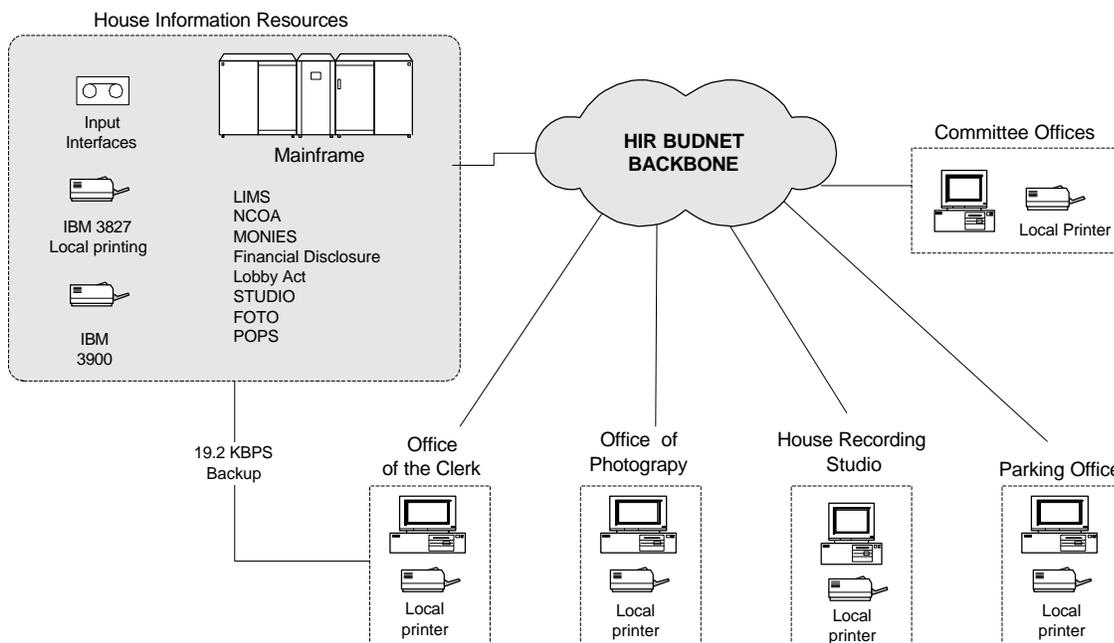
House Information Resources

The Enterprise Computing Group would consist of a total of 13 personnel continuing to support the mainframe operating system, job entry and scheduling, input/output support, and configuration management within the server system.[45] Approximately 11 personnel would

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[44]HIR indicated that plans to replace the CMOS Multiprise 135 with the CMOS Multiprise 125 will be submitted in the FY 1999 budget request. We have assumed, for the purposes of this Study, that this mainframe would be used to host the remaining eight mainframe-based application addressed in this Study. The actual mainframe used to support these applications may be different depending on HIR actions in the future. A different mainframe model should not affect the implementation discussions in this Exhibit. In Exhibit E, *Costs and Benefits Analysis of System-Wide Alternatives,* we conduct a cost sensitivity analysis on the estimated costs of the CMOS Multiprise 125 to determine if a different model mainframe with significantly lower costs would affect the conclusions of this study.

[45]The total number of Enterprise Computing Group personnel is based on the current FY 1999 budget request of 15 FTE. We subtracted two personnel from the total of 15 based on information provided by HIR on the personnel resources dedicated to providing data processing services to external customers, such as the General Accounting Office and Congressional Budget Office.

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continue their role in providing mainframe operations support. Approximately two personnel would continue to provide the NCOA services for Members.[46]

The Integration Group would consist of approximately 10 personnel to continue their role in providing applications maintenance, programming, and database administration services for users of the mainframe-based applications.[47] Approximately four staff support LIMS, one staff would support MONIES, one performs database administration, and the remaining four staff support Financial Disclosure, Lobby Act, STUDIO, FOTO, and Parking. NCOA and its supporting applications would be supported solely by the Enterprise Computing Group.

The Communications Group would provide one dedicated staff member for supporting the mainframe communications infrastructure.[48] The Client Services Group is the primary application user of MONIES with approximately 20 staff having access to the system. These application users access MONIES to maintain telecommunications cost accounting and billing information for Member, Committee, and other House offices.

Office of the Clerk

The Office of the Clerk's Office of Legislative Operations and Office of Legislative Information have approximately 30 users that access LIMS to enter and track the legislative activities of the House. The data entered include information on introduced legislative bills, Committee actions on the bills, House floor proceedings, and Executive Branch actions. The Office of Legislative Information uses the system to research bill status and history when the office receives inquiries from House offices and the general public. The offices use the system to generate several publications, such as the House legislative calendars.

The Legislative Resource Center in the Office of the Clerk has approximately eight users who access the Lobby Act and Financial Disclosure applications. The business processes and functions of these two applications are similar. These users enter data from forms to create the index for the scanned documents. The Legislative Resource Center also provides the general public with access to these documents.

Office of Photography

The Office of Photography has one primary user of the FOTO application for the purposes of entering service invoices, managing customer account information, and initiating the chargeback process to Member, Committee, and other House offices.

House Recording Studio

The House Recording Studio has one primary user of the STUDIO application for the purposes of entering service invoices, managing customer account information, and initiating the chargeback process to Member, Committee, and other House offices.

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[46]The number of personnel dedicated to NCOA services was provided by HIR.

[47]The total number and allocation of Integration Group personnel required to support the eight applications was provided by HIR.

[48]The number of personnel dedicated to supporting mainframe communications was provided by HIR.

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Parking Office

The Sergeant at Arms' Parking Office has approximately 8 to 10 users of the POPS application for the purpose of assigning and managing parking space allocation to Members and House employees and printing temporary and permanent permits. Through POPS, the application users also initiate the withholding of income taxes on the imputed value of reserved parking spaces, where appropriate.

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House of Representatives Committee Offices

Approximately 20 Committee offices have access to the LIMS application to access information in order to produce committee calendars. The Committee calendars are printed by HIR via batch print requests from the application users.

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C.3.2 Re-Platform to RS/6000 R/390 Server-On-Board Platform

This alternative represents the scenario for re-platforming the eight mainframe-based applications to an RS/6000 R/390 Server-On-Board environment. For this alternative, we present a summary of the application solutions, a description of the transition effort, and an overview of application stakeholders.

C.3.2.1 Selected Application Alternatives

In Figure C.3, we present a summary of the viable application alternatives selected for this system-wide alternative. As shown, this alternative involves re-platforming all eight applications to RS/6000 R/390 servers.

Figure C.3: Selected Application Alternatives

Application	Application Alternative
LIMS	RS/6000 R/390 Server-On-Board
NCOA	RS/6000 R/390 Server-On-Board
MONIES	RS/6000 R/390 Server-On-Board
Financial Disclosure	RS/6000 R/390 Server-On-Board
Lobby Act	RS/6000 R/390 Server-On-Board
STUDIO	RS/6000 R/390 Server-On-Board
FOTO	RS/6000 R/390 Server-On-Board
Parking	RS/6000 R/390 Server-On-Board

C.3.2.2 Transition

The eight applications would require a transition from the existing mainframe environment to the RS/6000 R/390 environment. The transition would be performed by HIR staff with the assistance of an external consultant experienced with these transitions, if required.[49] In addition, Stonehouse Technologies consultants would assist with the transition of MONIES to the RS/6000 platform.[50] The lease on the mainframe would be terminated with 120 days notice.[51] The remaining hardware peripherals not required by this system-wide alternative could be made available to other Legislative Branch entities or excessed to the General Services Administration (GSA).

C.3.2.3 Stakeholder Resources and Responsibilities

The stakeholder environment for this alternative would remain virtually unchanged from the FY 99 baseline. Our research indicates that the RS/6000 environment would require a similar number and skill set of personnel as a mainframe and that the peripherals (printers, tape drives,

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[49]The vendor who provided a proposal for the RS/6000 hardware also included a proposal for transition services.

[50]Stonehouse Technologies provided a technical and cost proposal to provide the hardware, software, and transition services to re-platform the mainframe MONIES application to the RS/6000 platform.

[51]HIR indicated that the lease on the existing mainframe could be terminated with 120 days notice without incurring any penalty charges.

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and storage devices) required to support the eight applications can be connected to the RS/6000 servers. The application users that require connectivity to the applications should not experience any changes.

Figure C.4 presents an overview of the stakeholders and their relationship to the eight applications for this alternative, followed by a discussion of the impact of this alternative on each of the primary stakeholders indicated in the Figure.

Figure C.4: Overview of Stakeholder Environment - Re-Platform to RS/6000
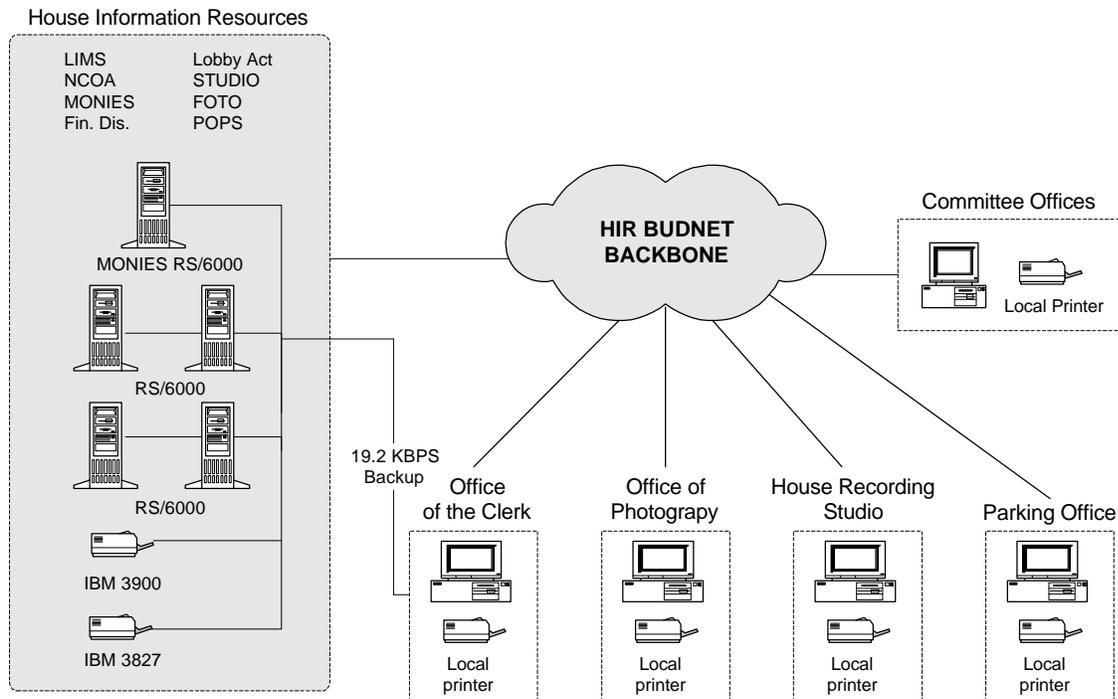
House Information Resources

The Enterprise Computing Group would consist of approximately 13 personnel to maintain the 24 hours per day, 7 days per week management, maintenance, and support of the RS/6000 servers. The staff would continue to support the mainframe operating system, job entry and scheduling, input/output support, and configuration management within the server system. It is anticipated that the staff would be primarily dedicated to supporting these RS/6000 servers. NCOA support would continue with acceptance of Correspondence Management System data and other media input into the NCOA system. The RS/6000 servers would be physically located within the HIR data center and would be supported by staff of roughly similar skill sets required to support a mainframe with an emphasis on server systems.

The Integration Group would consist of approximately 10 personnel to continue their role in providing applications maintenance, programming, and database administration services for users of the eight applications. No significant change in business processes would occur.

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The Communications Group would continue to provide approximately one staff to support the communications infrastructure of the eight applications. No significant change in business processes would occur.

Office of the Clerk

The LIMS, Lobby Act, and Financial Disclosure users in the Office of the Clerk would not experience any significant change in business processes.

Office of Photography, House Recording Studio, and Parking Office

The Office of Photography, House Recording Studio, and Parking Office application users would not experience any significant change in business processes.

House of Representative Committee Offices

The Committee users would not experience significant changes in business processes.

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C.3.3 Re-Location to Legislative Branch Service Provider

This alternative represents the relocation of the majority of the applications, excluding MONIES and NCOA, to a Legislative Branch service provider. For this alternative, we present a summary of the application solutions, a description of the transition effort, and an overview of application stakeholders.

C.3.3.1 Selected Application Alternatives

In Figure C.5, we present a summary of the viable application alternatives selected for this system-wide alternative. As shown, this alternative involves relocating all applications to a Legislative Branch mainframe, except for NCOA and MONIES. MONIES would be re-platformed to an RS/6000 R/390 server.[52] NCOA services would be provided by a commercial vendor.[53]

Figure C.5: Selected Application Alternatives

Application	Application Alternative
LIMS	Legislative Branch service provider
NCOA	Outsource to Service Bureau
MONIES	RS/6000 R/390
Financial Disclosure	Legislative Branch service provider
Lobby Act	Legislative Branch service provider
STUDIO	Legislative Branch service provider
FOTO	Legislative Branch service provider
Parking	Legislative Branch service provider

C.3.3.2 Transition

The Legislative Branch service provider and HIR would work together to transition LIMS, Financial Disclosure, Lobby Act, STUDIO, FOTO, and POPS to the Legislative Branch service provider's mainframe.[54] This transition process would ensure that:

- Operating system and utility support are compliant with all application requirements.

- All storage requirements including Direct Access Storage Device (DASD) and archival are maintained.

- Security, both system level and network level, is maintained without compromise to either the Legislative Branch provider or to the House.

- Transaction, batch and on-line access and remote printing functions are retained.

- Database support is provided with a Year 2000 compliant version of ADABAS.

- HIR would be responsible for all application backup and recovery.

MONIES would be transitioned to the RS/6000 platform by Stonehouse Technologies and HIR staff. Details about the NCOA transition are described in the Office of Mailing Services section below.

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[52]HIR indicated that the Committee on House Oversight restricts the release of Call Detail Records outside of the House of Representatives. As a result, MONIES can not be relocated to another Legislative Branch mainframe.

[53]The House's licensed NOCA file cannot be relocated to another mainframe and operated by House personnel because of licensing and U.S. Postal Service certification issues. However, if a Legislative Branch becomes a licensed vendor, they could provide NCOA services to the House. This alternative presents information on utilizing an existing certified commercial vendor for the processing of the NCOA transactions.

[54]Two Legislative Branch agencies expressed interest in hiring HIR personnel to supplement their staff for the additional workload if applications are moved to their mainframe.

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The lease on the mainframe would be terminated with 120 days notice. The remaining hardware peripherals not required by this system-wide alternative would either become GSA property or be transferred to the Legislative Branch service provider as part of a negotiated contract.

C.3.3.3 Stakeholder Resources and Responsibilities

The stakeholder environment for this alternative would primarily affect HIR, with a reduction in the number of Enterprise Computing Group mainframe support personnel. This reduction would occur because the Legislative Branch service provider would host the majority of applications on their mainframe. The Office of Mailing Services would expand their role to include serving as a "front desk" for NCOA services. Application users would experience virtually no changes.

Figure C.6 presents an overview of the stakeholders and their relationship to the eight applications for this alternative, followed by a discussion of the impact of this alternative on each of the primary stakeholders indicated in the Figure.

Figure C.6: Overview of Stakeholder Environment - Relocate to Legislative Branch
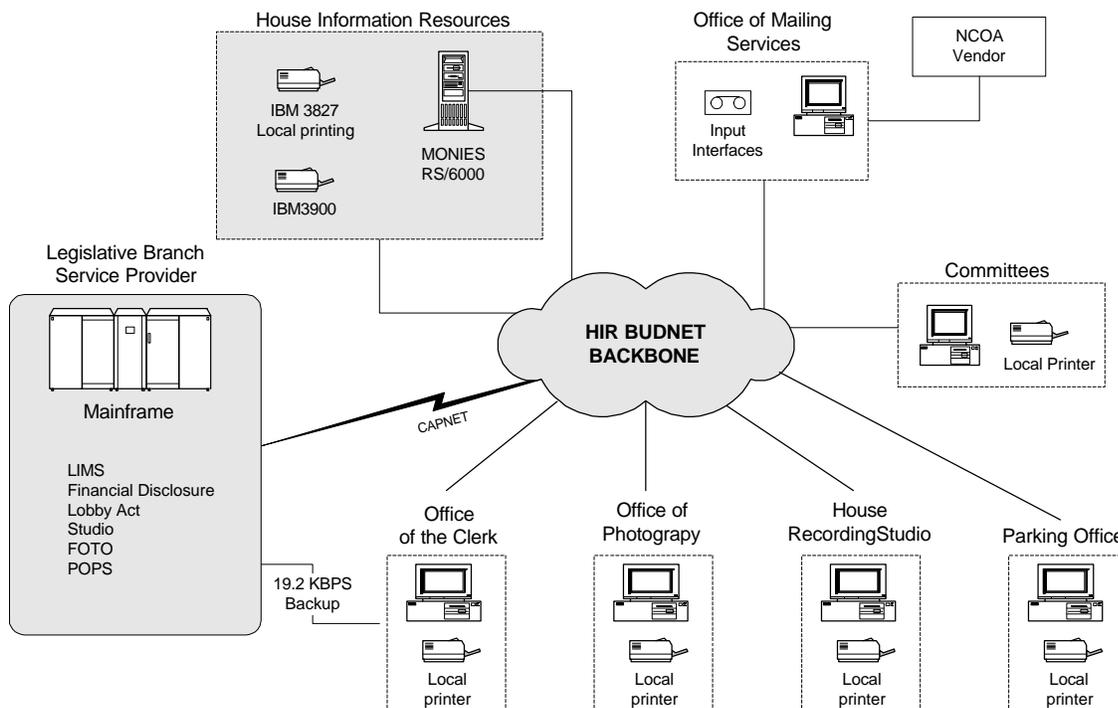
House Information Resources

The role and responsibilities of the Enterprise Computing Group would change significantly in this alternative. The Enterprise Computing Group responsibilities would change from one of operations support to monitoring and ensuring application users are provided with the proper
services. The Enterprise Computing Group would have approximately seven personnel to assist with: [55]

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[55]The HIR Enterprise Computing Group indicated that this new function may best be served by a contractor. House management would need to decide if a contractor should monitor the service levels of another contractor. The number of personnel required to support these new functions was based on discussions with HIR. The actual number of personnel required to support this function could be higher or lower depending on the scope of the function.

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- Monitoring the service levels established in the contract with the Legislative Branch service provider.

- Providing the points-of-contact between application users, HIR applications maintenance staff, and the Legislative Branch service provider data center.

- Assisting application users with the development of system requirements and performance measures.

- Resolving problems and disputes.

- Assisting with contract administration and the development of specifications and guidelines.

The two Enterprise Computing personnel that provide NCOA services would be transferred to the Office of Mailing Services. The Office of Mailing Services would be responsible for the provision of NCOA services through a third-party vendor (see below for discussion of the Office of Mailing Services).

The Integration Group would consist of approximately 10 personnel to continue their role in providing applications maintenance, programming, and database administration services for users of the eight applications. No significant change in business processes would occur. The applications and maintenance staff for LIMS, Financial Disclosure, Lobby Act, STUDIO, FOTO, and POPS would access applications on the Legislative Branch mainframe remotely. The applications and maintenance staff for MONIES would access the application on the RS/6000.

The Communications Group would continue to provide approximately one staff to support the communications infrastructure of the eight applications. The MONIES application users within Communications would not experience significant changes to their business processes.

Legislative Branch Service Provider

The Legislative Branch service provider would provide mainframe processing, storage, and back-up for LIMS, Financial Disclosure, Lobby Act, STUDIO, FOTO, and POPS on a fee-for-service basis through a timesharing agreement.[56] The service provider would be responsible for all personnel, hardware, software (including operating systems and utilities), and materials necessary to host the application. This would include support for the ADABAS/Natural application engine. This support would include ensuring that the transaction, security, and job entry subsystems are compatible with the House applications as well as Year 2000 compliant.

The service provider would be responsible for ensuring that all current users of the applications retain connectivity and access to applications at least equal in quality to that of the current system. Services would be provided 24 hours per day and 7 days per week. The service provider would also meet mutually established performance requirements including availability and processing times.

The service provider would enable access to printers located at HIR. This access and connectivity would allow batch printing to be performed physically at HIR in a manner at least equal to the quality now provided by HIR. Connectivity to Capnet would be the responsibility of

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[56]We received a proposal for one Legislative Branch agency and held discussions with another.

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the service provider.[57] Connectivity within the House network would continue to be the responsibility of Communications. The service provider would furnish necessary Systems Network Architecture (SNA) connections to the Office of the Clerk to ensure continued local printing and backup functionality.

Office of the Clerk

The Office of the Clerk's LIMS, Lobby Act, and Financial Disclosure users would access their applications on the Legislative Branch service provider's mainframe. No significant change in business processes would occur.

Office of Photography, House Recording Studio, and Parking Office

The Office of Photography, House Recording Studio, and Parking Office application users would access FOTO, STUDIO, and POPS, respectively, on the Legislative Branch service provider's mainframe. No significant change in business processes would occur.

House of Representative Committee Offices

The approximately 20 users in the Committee offices would access LIMS on the Legislative Branch service provider's mainframe. No significant change in business processes would occur.

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[57]Network security would be the responsibility of the House.

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Office of Mailing Services

The Office of Mailing Services and Enterprise Computing Group currently provide several duplicative services. Although the Office of Mailing Services does not directly use the NCOA application, they provide many of the pre- and post-processing and media conversion services also provided by the Enterprise Computing Group staff. These duplicative services include converting files received by customers to a standard format and standardizing addresses to meet U.S. Postal Service requirements. To consolidate the duplicate functions of these groups, two Enterprise Computing personnel currently providing NOCA services to Members would be transferred to the Office of Mailing Services.[58]

The Office of Mailing Services would serve as a "front desk" for NCOA services. Members and Committees would submit all data processing requests to the Office of Mailing Services. The Office of Mailing Services would use a third-party vendor for the actual NCOA processing on a fee-for-service basis per transaction.[59] The Office Mailing Services would continue to provide pre- and post-processing, media conversion, and address standardization services. If the processing volume or type of request exceeds the Office of Mailing Services' processing capacity or capabilities, the Office could obtain these services through the NCOA third-party vendor by paying a higher rate per transaction for those transactions that require additional processing.

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[58]The issue of merging the duplicative HIR and mailing services functions was addressed in Report No. 98-CAO-XX, *Improvements are Needed in House Mail Operations*. The CAO agreed to analyze the feasibility of merging these duplicative functions and make the appropriate recommendation within three months after the new Associate Administrator appointment.

[59]The Government Printing Office indicated an interest in becoming a licensed NCOA vendor. The House should investigate the possibility of negotiating an agreement with this agency to provide discounted NCOA services in return for assisting the agency with establishing the service and providing the associated hardware and pre- and post-processing programs.

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C.3.4. Replacement with Client-Server COTS

This alternative represents the scenario for replacing the majority of the eight mainframe-based applications with client-server COTS software, with the exception of LIMS. We present a summary of this alternative's application solutions, a description of the transition effort, and an overview of application stakeholders.

C.3.4.1 Selected Application Alternatives

In Figure C.7, we present a summary of the viable application alternatives selected for this system-wide alternative. As shown, this alternative involves replacing all applications, except for LIMS, with client-server COTS software. LIMS would be relocated to a Legislative Branch service provider.

Figure C.7: Selected Application Alternatives

Application	Application Alternatives
LIMS	Legislative Branch service provider
NCOA	Client-Server COTS
MONIES	Client-Server COTS
Financial Disclosure	Client-Server COTS
Lobby Act	Client-Server COTS
STUDIO	Client-Server COTS
FOTO	Client-Server COTS
Parking	Client-Server COTS

C.3.4.2 Transition

The Legislative Branch service provider and HIR would work together to transition LIMS to the Legislative Branch service provider's mainframe.[60] This transition process would work to ensure that:

- Operating system and utility support are compliant with all application requirements.

- All application storage requirements, including DASD and archival, are the responsibility of the House.

- Security, both system level and network level, is maintained without compromise to either the Legislative Branch provider or to the House.

- Transaction, batch and on-line access and remote printing functions are retained.

- Database support is provided with a Year 2000 compliant version of ADABAS.

- HIR would be responsible for all application backup and recovery.

HIR would also assist the Office of the Clerk in the conversion of data from Lobby Act and Financial Disclosure to the client-server COTS application. HIR would also assist with the FOTO, STUDIO, and POPS conversion effort.

According to the Office of the Clerk, their staff would be responsible for managing the effort to implement a client-server COTS application. A contractor would likely be hired for the implementation and customization, as necessary, of the COTS application. This effort would involve the Systems Development Life Cycle (SDLC) process for the implementation of the COTS application (i.e., requirements analysis, design, coding, testing, and implementation).

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[60]Two Legislative Branch agencies expressed interest in hiring HIR personnel to supplement their staff for the additional workload if applications are moved to their mainframe.

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The lease on the mainframe would be terminated with 120 days notice. The remaining hardware peripherals not required by this system-wide alternative would either be provided to the Legislative Branch service provider as part of a negotiated contract or excessed to GSA.

C.3.4.3 Stakeholder Resources and Responsibilities

The stakeholder environment for this alternative would be significantly changed. HIR would experience a reduction in personnel because a Legislative Branch service provider would be hosting LIMS on their mainframe. All application users, with the exception of LIMS users, would require a change to their business processes as a result of the existing mainframe-based applications being replaced with new client-server COTS applications. The Office of Mailing Services would expand their role to provide change of address processing to Members using a COTS application accessing the U.S. Postal Service's FASTForward file.

Figure C.8 presents an overview of the stakeholders and their relationship to the eight applications for this alternative, followed by a discussion of the impact of this alternative on each of the primary stakeholders indicated in the Figure.

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Figure C.8: Overview of Stakeholder Environment - Replace with Client-Server COTS
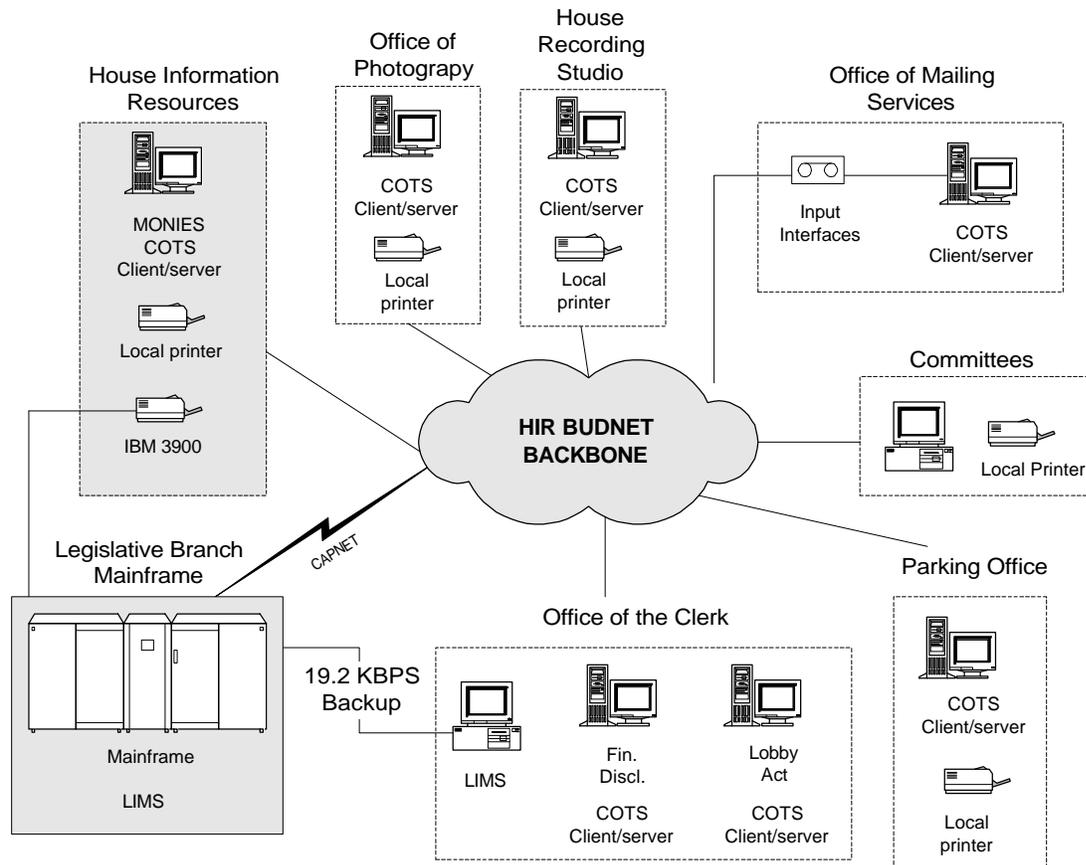
House Information Resources

The role and responsibilities of the Enterprise Computing Group would change significantly in this alternative. The Group's responsibilities would change from one of operations support to monitoring and ensuring application users are provided with the proper services. The Enterprise Computing Group would have approximately seven personnel to assist with: [61]

- Monitoring the service levels established in the contract with the Legislative Branch service provider.

- Providing the points-of-contact between application users, HIR applications maintenance staff, and the Legislative Branch service provider data center.

- Assisting application users with the development of new system requirements and performance measures.

- Resolving problems and disputes.

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[61]The HIR Enterprise Computing Group indicated that this new function may best be served by a contractor. House management would need to decide if a contractor should monitor the service levels of another contractor. The number of personnel required to support these new functions was based on discussions with HIR. The actual number of personnel required to support this function could be higher or lower depending on the scope of the function.

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- Assisting with contract administration and the development of specifications and guidelines.

The two Enterprise Computing personnel that provide NCOA services would be transferred to the Office of Mailing Services to assist with the pre- and post-processing activities associated with using the selected COTS application that accesses the U.S. Postal Service FASTForward file (see below for discussion of the Office of Mailing Services).

The Integration Group would consist of a total of approximately nine personnel to continue their role in providing applications maintenance, programming, and database administration services for users of the eight applications. The four LIMS applications and maintenance personnel would continue to provide programming support for LIMS and access the application on the Legislative Branch service provider's mainframe. One staff would continue to support database administration activities for LIMS. No significant change in business processes would occur for these LIMS applications maintenance staff.

Approximately four applications maintenance personnel would support the new client-server COTS replacement applications for MONIES, STUDIO, FOTO, and POPS.[62] The applications maintenance staff for MONIES would access the application on the RS/6000. No significant changes to business processes would occur. Application users would also obtain support from the COTS vendors, as required.

The Integration Group would require one fewer applications maintenance position associated with the Financial Disclosure and Lobby Act applications. This function would be the responsibility of the Office of the Clerk. The Office of the Clerk would provide the necessary technical and applications support for the client-server COTS applications that replace Financial Disclosure and Lobby Act (see below for discussion on the Office of the Clerk).

The Communications Group would continue to provide approximately one staff to support the communications infrastructure of the eight applications.

Legislative Branch Service Provider

The Legislative Branch service provider would provide mainframe processing, storage, and back-up for LIMS on a fee-for-service basis through a timesharing agreement. The service provider would be responsible for all personnel, hardware, software (including operating systems and utilities), and materials necessary to host the application. This would include supporting the ADABAS/Natural application engine and ensuring that transaction, security, and job entry subsystems are Year 2000 compliant and compatible with the House applications.

The service provider would be responsible for ensuring that all current users of the applications retain connectivity and access to applications at least equal in quality to that of the current system. They would furnish these services 24 hours per day and 7 days per week, and meet mutually established performance requirements, including availability and processing times.

The service provider would enable access to printers located at HIR. This access and connectivity would allow batch printing to be performed physically at HIR in a manner at least equal to the quality now provided by HIR. All connectivity to Capnet would be the responsibility of the service provider. Connectivity within the House network would continue to be the responsibility of HIR Communications. The service provider would furnish necessary SNA connections to the Office of the Clerk to ensure continued local printing and backup functionality.

Office of the Clerk

The Office of the Clerk's approximately 30 LIMS users would access the application on the Legislative Branch service provider's mainframe. No significant change in business processes would occur.

The Lobby Act and Financial Disclosure users would use new client-server COTS applications, such the COTS applications identified in Exhibit B, *Application Requirements and Alternatives Analysis*. The client-server COTS applications would reside on servers within each office and would be connected to the LAN to provide all authorized users access to the applications, as required. The application users would change their business processes to accommodate the COTS application.

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[62]The number of staff required to support MONIES, STUDIO, FOTO, and POPS could be fewer than four depending upon the level of support that application users obtain from the manufacturers.

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The Office of the Clerk would become responsible for applications maintenance and support of the Lobby Act and Financial Disclosure COTS applications. These services would be supported by a combination of Office of the Clerk staff and vendor support. The applications maintenance responsibilities would be absorbed by existing staff within the Office of the Clerk. [63]

Office of Photography, House Recording Studio, and Parking Office

The Office of Photography, House Recording Studio, and Parking Office users would use a new client-server COTS applications, such as the COTS applications identified in Exhibit B, *Application Requirements and Alternatives Analysis*. These client-server COTS applications would reside on servers within each office and would be connected to the LAN to provide all authorized users access to the applications, as required. These users would have to significantly change their business processes to accommodate the use of the new COTS applications.

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[63]The Office of the Clerk indicated that the resources to support a new client-server COTS application would be provided by the Clerk and an additional position would not be required.

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House of Representative Committee Offices

The approximately 20 Committee offices that use LIMS would not experience significant changes to their business processes.

Office of Mailing Services

The Office of Mailing Services would become the service center for address correction and standardization processing. Their staff would provide address correction services using a new client-server COTS package that utilizes the U.S. Postal Service's FASTForward file. The Office of Mailing Services would obtain the two Enterprise Computing NCOA personnel. [64] Members would submit all data processing requests to the Office of Mailing Services. They would continue to process mainframe-generated files and upload them to the LAN as they do now. The Office of Mailing Services currently runs custom programs on the LAN for converting and formatting files, but additional programs may need to be developed to replace the mainframe-based programs previously used by Enterprise Computing.

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[64]The issue of merging the duplicative HIR and mailing services functions was addressed in Report No. 98-CAO-XX, *Improvements are Needed in House Mail Operations*. The CAO agreed to analyze the feasibility of merging these duplicative functions and make the appropriate recommendation within three months after the new Associate Administrator appointment.

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C.3.5 Top-Ranked Alternative

This top-ranked alternative represents the scenario for implementing the application alternatives identified as number one in Exhibit B, *Application Requirements and Alternatives Analysis*. For this alternative, we present the most viable solution for each application, a description of the transition effort, and an overview of the potential impact to the application stakeholders.

C.3.5.1 Selected Application Alternatives

In Figure C.9, we present the top-ranked alternative selected for each application. This system-wide alternative involves relocating LIMS, Financial Disclosure, Lobby Act, STUDIO, and FOTO to a Legislative Branch service provider, replacing NCOA and POPS with client-server COTS, and re-platforming MONIES to an RS/6000 R/390 platform.

Figure C.9: Selected Application Alternatives

Application	Application Alternative
LIMS	Legislative Branch service provider
NCOA	Client-Server COTS
MONIES	RS/6000 R/390
Financial Disclosure	Legislative Branch service provider
Lobby Act	Legislative Branch service provider
STUDIO	Legislative Branch service provider
FOTO	Legislative Branch service provider
POPS	Client-Server COTS

C.3.5.2 Transition

The Legislative Branch service provider and HIR would work together to transition LIMS, Financial Disclosure, Lobby Act, STUDIO, and FOTO to the Legislative Branch service provider's mainframe data center.[65] This transition process would work to ensure that:

- Operating system and utility support are compliant with all application requirements.

- All storage requirements including DASD and archival are maintained.

- Security, both system level and network level, is maintained without compromise to either the Legislative Branch service provider or to the House.

- Transaction, batch and on-line access and remote printing functions are retained.

- Database support is provided with a Year 2000 compliant version of ADABAS.

HIR would also assist with the conversion of data from POPS to the client-server COTS application. Either the COTS vendor or a separate contractor would be required to install, and perhaps, modify the client-server COTS application that replaces POPS. MONIES would be transitioned to the RS/6000 platform by Stonehouse Technologies with assistance from HIR staff.

The lease on the mainframe would be terminated with 120 days notice. The remaining hardware peripherals not required by this system-wide alternative would either be transferred to the Legislative Branch service provider as part of a negotiated contract or excessed to GSA.

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[65]Two Legislative Branch agencies expressed interest in hiring HIR personnel to supplement their staff for the additional workload if applications are moved to their mainframe.

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C.3.5.3 Stakeholder Resources and Responsibilities

The stakeholder environment for this alternative would be changed. HIR would experience a reduction in personnel because a Legislative Branch service provider would be hosting LIMS, Financial Disclosure, Lobby Act, STUDIO, and FOTO on their mainframe. The POPS application users would require a change to their business processes as a result of their existing mainframe-based applications being replaced with new client-server COTS applications. The Office of Mailing Services would expand their role to provide change of address processing to Members using a COTS application accessing the U.S. Postal Service FASTForward file.

Figure C.10 presents an overview of the stakeholders and their relationship to the eight applications for this top-ranked alternative, followed by a discussion of the impact of this alternative on each of the primary stakeholders indicated in the Figure.

Figure C.10: Overview of Stakeholder Environment - Top-Ranked Alternative
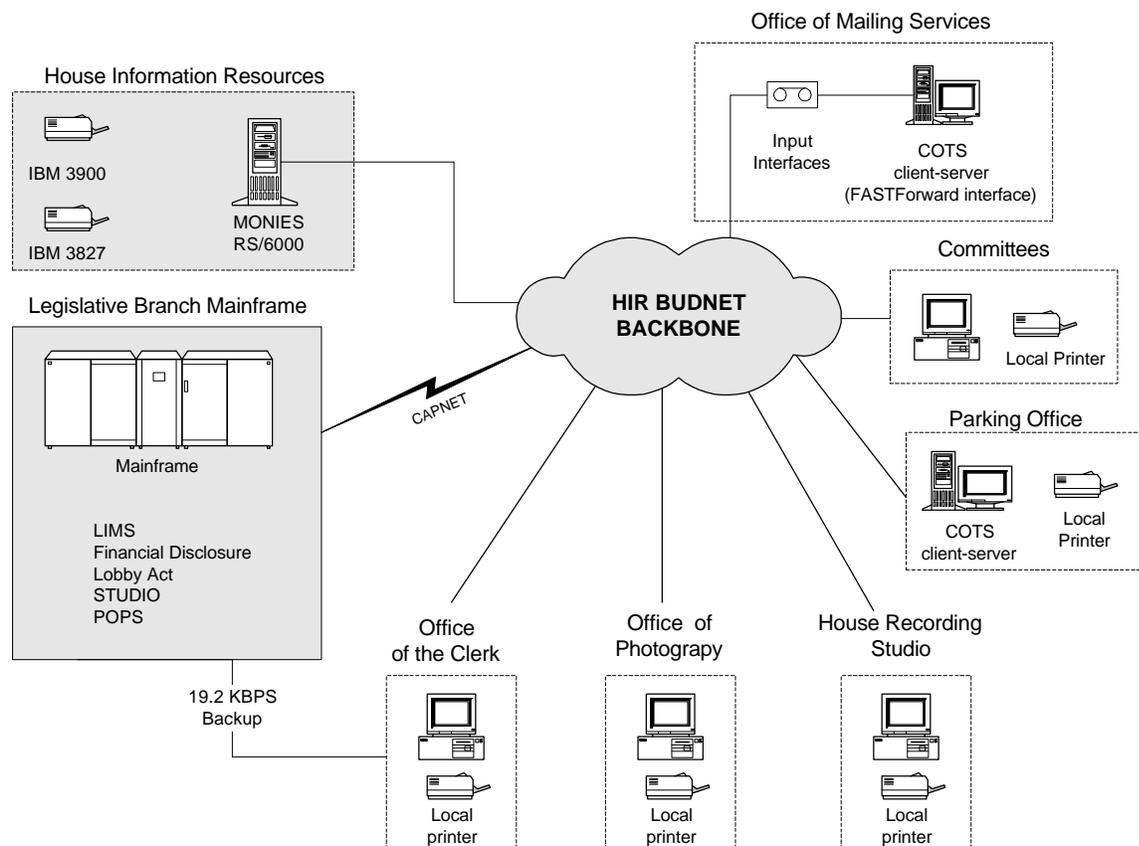
House Information Resources

The role and responsibilities of the Enterprise Computing Group would change significantly in this alternative. This Group's responsibilities would change from one of operations support to monitoring and ensuring application users are provided with the proper services. The Enterprise Computing Group would have approximately seven personnel to assist with:

- Monitoring the service levels established in the contract with the Legislative Branch service provider.

- Providing the points-of-contact between application users, HIR applications maintenance staff, and the Legislative Branch service provider data center.

- Assisting application users with the development of new system requirements and performance measures.

- Resolving problems and disputes.

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- Assisting with contract administration and the development of specifications and guidelines.

The two Enterprise Computing personnel that provide NCOA services would be transferred to the Office of Mailing Services. Their staff would be responsible for the provision of NCOA services (see below for discussion on the Office of Mailing Services).

The Integration Group would consist of approximately 10 personnel to continue their role in providing applications maintenance, programming, and database administration services for users of the eight applications. No significant change in business processes would occur. These applications and maintenance staff for LIMS, Financial Disclosure, Lobby Act, STUDIO, and FOTO would access applications on the Legislative Branch mainframe. The applications and maintenance staff for MONIES would access the system on the RS/6000 server. The staff assigned to support the client-server COTS application that replaces POPS would have remote access to the application located in the Parking Office.

The Communications Group would continue to provide approximately one staff to support the communications infrastructure of the eight applications. The MONIES application users within Communications would access the system on the RS/6000 server. No significant change in business processes would occur.

Legislative Branch Service Provider

The Legislative Branch service provider would provide mainframe processing, storage, and back-up for LIMS, Financial Disclosure, Lobby Act, STUDIO, and FOTO on a fee-for-service basis through a timesharing agreement. The service provider would be responsible for all personnel, hardware, software (including operating systems and utilities), and materials necessary to host the application. This would include supporting the ADABAS/Natural application engine and ensuring that transaction, security, and job entry subsystems are Year 2000 compliant and compatible with the House applications.

The service provider would be responsible for ensuring that all current users of the applications retain connectivity and access to applications at least equal in quality to that of the current system. The service provider would furnish these services 24 hours per day and 7 days per week. The service provider would also meet mutually established performance requirements including availability and processing times.

The service provider would enable access to printers located at HIR. This access and connectivity would allow batch printing to be performed physically at HIR in a manner at least equal to the quality now provided by HIR. All connectivity to Capnet would be the responsibility of the service provider. Connectivity within the House network would continue to be the responsibility of HIR Communications. The service provider would furnish necessary SNA connections to the Office of the Clerk to ensure continued local printing and backup functionality.

Office of the Clerk

The Office of the Clerk's LIMS, Lobby Act, and Financial Disclosure users would access their applications on the Legislative Branch service provider's mainframe. No significant change in business processes would occur.

Office of Photography and House Recording Studio

The Office of Photography and the House Recording Studio application users would access FOTO and STUDIO on the Legislative Branch service provider's mainframe. No significant change in business processes would occur.

Parking Office

The Parking Office users would use a new client-server COTS application, such as the COTS applications identified in Exhibit B, *Application Requirements and Alternatives Analysis*. This client-server COTS application would reside on an application server within each office and would be connected to the LAN to provide all authorized users access to the applications, as required. These users would have to significantly change their business processes to accommodate the use of the COTS application.

House of Representative Committee Offices

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The approximately 20 users in the Committee offices would access LIMS on the Legislative Branch service provider's mainframe and would not experience significant changes to their business processes.

Office of Mailing Services

The function of the Office of Mailing Services in this alternative is identical to their function in the Replacement with client-server COTS alternative. The NCOA application would be replaced by FASTForward and would reside at the Office of Mailing Services. The two HIR Enterprise Computing staff currently dedicated to NCOA services would be transferred to the Office of Mailing Services. [66] Members would submit all change of address data processing requests to the Office of Mailing Services. This Group may need to develop custom pre- and post-processing programs, as necessary, to run in the client-server environment. These programs would replace the mainframe-based pre- and post-processing programs used by Enterprise Computing.

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[66]The issue of merging the duplicative HIR and mailing services functions is addressed in Report No. 98-CAO-01, *Improvements are Needed in House Mail Operations*, dated February 27, 1998. The CAO agreed to analyze the feasibility of merging these duplicative functions and make the appropriate recommendation within three months after the new Associate Administrator appointment.

EXHIBIT D

Technical Environments Definition of System-Wide Alternatives

Technical Environments Definition of System-Wide Alternatives
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Technical Environments Definition

This exhibit presents the methodology used to define the general technical environments required to support the system-wide alternatives for the migration of the U. S. House of Representatives (House) mainframe-based applications[67] and the results from following the methodology. The methodology section describes the objective of defining the technical environments. The results presented provide a general description of the processing environment, storage requirements, outputs devices, communications and connectivity, COTS software, hardware placement, and interfaces for each system-wide alternative.

D.1 Methodology

The objective of defining the technical environment for the system-wide alternatives is to provide a framework for a high-level cost-benefit analysis of implementing each system-wide alternative. The general technical environments presented in this exhibit were defined based on the results of the system-wide alternative analysis presented in Exhibit C, *System-Wide Alternatives Analysis*. The costs and benefits related to implementing each system-wide alternative are presented in Exhibit E, *Cost-Benefit Analysis of System-Wide Alternatives.*

The technical environment information presented in this Study is based upon available data and a high-level assessment of the viable alternatives and the potential technical environments. A security and internal controls assessment was not performed on the alternatives or the technical environments. It should be noted that each alternative would need to be analyzed in more detail to ensure that proper application security, network security, and internal controls are implemented. For example, this Exhibit presents information describing the use of Capnet for connectivity between the Legislative Branch service provider and the House (for application users and remote printing). An assessment will be required to determine the proper security controls and measures required to use Capnet for these transactions. If Capnet does not permit appropriate security levels, another method of connectivity may be required (e.g., leased lines).

D.2 Technical Environments

This section of the exhibit presents the results of the definition of the technical environments for the system-wide alternatives. The system-wide alternatives as presented in Exhibit C, *System-wide Alternatives,* are:

- **Re-Platform to RS/6000**. This alternative provides for the re-platforming of the applications to RS/6000 R/390 Server-On-Board platforms.

- **Relocate to Legislative Branch**. This alternative involves relocating the applications to another Legislative Branch mainframe.

- **Replace with Client-Server COTS**. This alternative involves replacing the applications with a client-server application.

- **Top-Ranked Solution**. This alternative is a composite of the highest ranked viable application alternatives identified in Exhibit B, *Application Requirements and Alternatives Analysis.*

The general description of the technical environment for each system-wide alternative include the components listed below.

- **Processing Environment** describes the general operating system, utilities, and operating environment required to support the system-wide alternative.

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[67]The House mainframe-based applications included in the Study include: Legislative Information Management System (LIMS), National Change of Address (NCOA), Management of Network Income Expense Services (MONIES), Financial Disclosure, Lobby Act, Recording Studio (STUDIO), Photography (FOTO), and Parking Office Permit System (POPS).

- **Year 2000 Compliance** identifies whether the system-wide alternative offers the ability for Year 2000 compliance.

- **Storage Environment** describes the general storage environment including the application, disk, and silo storage requirements for the system-wide alternative.

- **Output Devices** identifies the primary output devices, such as printers, tapes, and optical media required to support the system-wide alternative.

- **Communications, Connectivity, and Hardware Placement** identifies the general communications, connectivity, and hardware placement required to support the system-wide alternative.

- **Commercial Off-the-Shelf (COTS) Software** identifies whether any COTS software is required to support the system-wide alternative.

- **Database** identifies the primary databases needed to support the system-wide alternative.

- **Security** describes the general security aspects of the system-wide alternative.

- **Job Entry** describes the means for executing the job entry for the system-wide alternative.

- **Key Interfaces** identifies the primary interfaces to the system-wide alternative.

D.2.1 Re-Platform to RS/6000

This alternative represents the scenario for re-platforming the eight mainframe-based applications to an RS/6000 R/390 Server-On-Board environment. In this scenario the platform would be used to emulate a mainframe operating system and run mainframe-based applications. The RS/6000 can function as a client to a host server or as a server for clients on a LAN. Presented below is a general description of the components of the technical environment required to support the Re-Platform to RS/6000 system-wide alternative.

D.2.1.1 Processing Environment

Under this system-wide alternative, five IBM RS/6000 model F50s would be located at the House to provide a mainframe environment for processing the essentially unmodified applications and their support utilities and applications including ADABAS. LIMS, MONIES, NCOA, Financial Disclosure, Lobby Act, STUDIO, FOTO, and POPS would remain mainframe compatible applications residing on the RS/6000. Listed below is additional information on the projected processing environment for the Re-Platform to RS/6000 system-wide alternative.

- The operating system employed for the support of LIMS, NCOA, Financial Disclosure, Lobby Act, STUDIO, FOTO, and POPS in the server environment would be IBM's OS/390.

- The batch and on-line support would be provided via Time Sharing Option (TSO) and transactions would be supported by an upgraded Customer Information Control System (CICS).

- The MONIES capability would be provided by an IBM RS/6000 R/390 (VSE operating system), hosting an essentially unmodified application in a mainframe environment with the server located at HIR. COBOL would be required to support existing and future custom programs for developing custom reports.

- A smaller suite of third-party system utilities would reside on the R/6000 servers. ADABAS would still be required.

- Additional RS/6000 hardware capacity beyond the basic processing requirements would be configured to provide 100 percent system redundancy and backup.[68]

D.2.1.2 Year 2000 Compliance

Under the Re-Platform to RS/6000 system-wide alternative, it is assumed that HIR would be responsible for ensuring that all of the applications included in this Study are Year 2000 compliant prior to transitioning to the RS/6000 servers.

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[68]IBM does not provide a benchmark statistic for RS/6000 fault tolerance. This conservative level of redundancy and backup allows for a potential difference in reliability between the RS/6000 and the current House mainframe.

D.2.1.3 Storage Environment

Listed below is a general description of the storage environment for the Re-Platform to RS/6000 system-wide alternative.

- The RS/6000 configuration provides disk storage resources that are be expected to be sufficient for all applications' current and projected storage requirements.

- The FileNet Optical disk storage would be retained.

- The mainframe RAID and DASD currently leased by the House would be eliminated.

- The StorageTek tape silos currently used for archival purposes would be eliminated.

- Access to archival tapes would be obtained through individual, server based tape drives located at HIR.

D.2.1.4 Output Devices

Listed below is a general description of the primary output devices that are anticipated as needed to support the Re-Platform to RS/6000 system-wide alternative.

- High volume printers, including the IBM 3900 and 3827 would continue to reside at HIR for batch print jobs.

- An ethernet adapter would be required to connect the RS/6000 servers to the HIR printers. Additional communication configuration would be required to connect RS/6000 servers to output devices.

D.2.1.5 Communications, Connectivity, and Hardware Placement

Listed below is a general description of the communications, connectivity, and hardware placement that are anticipated as needed to support the Re-Platform to RS/6000 system-wide alternative.

- HIR: Existing connectivity would be obtained through BUDNET to the RS/6000 servers and to application users.

- Office of Mailing Services (NCOA): HIR's existing connectivity would be obtained through BUDNET to the RS/6000 servers.

- Committees: Connectivity to LIMS would be obtained through BUDNET to the RS/6000 servers. Batch printing of calendars would continue at HIR.

- Parking Office: Connectivity to POPS would be obtained through BUDNET to the RS/6000 servers. Local print service functions would be upgraded.

- Recording Studio: Connectivity to STUDIO would be obtained through BUDNET to the RS/6000 servers.

- Photography Studio: Connectivity to FOTO would be obtained through BUDNET to the RS/6000 servers.

- Office of the Clerk: Connectivity to LIMS, Financial Disclosure, and Lobby Act would be obtained through BUDNET to the RS/6000 servers. The 19.2 SNA backup and print service connection to the Clerk's office would be reconfigured.

- Other connectivity: Connectivity to GPO, the Senate, and Library of Congress would be retained. The existing link to the Department of the Interior's Washington Administrative Service Center (WASC) would be retained.

D.2.1.6 COTS Software

Listed below is a general description of COTS applications that would be used to support the Re-Platform to RS/6000 system-wide alternative.

- MONIES: Proprietary Stonehouse Technologies telecommunications cost accounting and billing system.

- NCOA: U.S. Postal Service's NCOA file and Group 1's Code 1 processing software.

D.2.1.7 Databases

Listed below is a general description of the databases that are anticipated as needed to support the Re-Platform to RS/6000 system-wide alternative.

- LIMS, STUDIO, FOTO, POPS, Lobby Act, and Financial Disclosure: ADABAS version 5.2.6, with a migration to version 6.1 and ultimately to version 6.2 (Year 2000 compliant).

- NCOA: Employs a USPS proprietary database. Code 1 software is employed to process this database with PL1 utility files employed for pre- and post-processing.

- MONIES: Employs a Stonehouse integrated database. Application extensions would be custom programmed by HIR in COBOL.

D.2.1.8 Security

Listed below are the general security aspects anticipated for this system-wide alternative.

- Access and logon to mainframe applications in the RS/6000 environment would be retained through ACF2, or equivalent.

- Disaster recovery services would need to be maintained.

- Security for the MONIES application could be enhanced if it is re-platformed from the shared mainframe to a dedicated RS/6000 server.

D.2.1.9 Job Entry

Listed below are the general job entry aspects that are anticipated with the Re-Platform to RS/6000 system-wide alternative.

- The job entry would be essentially unchanged from the current system for LIMS, MONIES, NCOA, Financial Disclosure, Lobby Act, STUDIO, FOTO, and POPS, with the subsystem and automated job entry hosted on the RS/6000 platform in a modified OS/390 environment.

- The job entry for MONIES would be handled internally by the RS/6000 server.

D.2.1.10 Key Interfaces

Listed below is a general description of key interfaces that are anticipated with the Re-Platform to RS/6000 system-wide alternative.

- Directory: a listing of Members and staff would continue to be generated and supported through LIMS.

- Locator: a listing of locations and telephone numbers of Members and staff would continue to be generated and supported through MONIES. Directory and Locator would continue to work together to provide reference information for LIMS, Financial Disclosure, POPS, FOTO, and STUDIO.

- FFS: interfaces for MONIES, FOTO, and STUDIO would be maintained through file transfer to WASC.

- Payroll: interface would be maintained with POPS to supply payroll information. With the migration of the Payroll System to an alternative solution, an interface would need to be created with the new payroll application or service bureau.

D.2.2 Relocate to Legislative Branch

This alternative represents the scenario of relocating the majority of the eight mainframe-based applications to a Legislative Branch service provider, except for Management of Network Income Expense Services (MONIES). Presented below is a general description of the components of the technical environment required to support the Legislative Branch system-wide alternative. At the end of this section, Figure D.1 presents a summary of technical environments for the two potential Legislative Branch re-location sites identified in Appendix B, *Application Requirements and Alternatives Analysis*.

D.2.2.1 Processing Environment

Listed below is a general description of the processing environment that we anticipate would be required to support the Legislative Branch system-wide alternative.

- Batch and on-line support would need to be provided via TSO and transactions supported by CICS.

- The Legislative Branch mainframe would furnish a suite of system utilities (including ADABAS) sufficient to support LIMS, STUDIO, FOTO, Financial Disclosure, and Lobby Act applications and their associated transactions.

- The MONIES capability would be provided by an IBM RS/6000 R/390 (VSE operating system), hosting an essentially unmodified application in a mainframe environment with the server located at HIR. COBOL would be required to support existing and future custom programs for developing custom reports.

- The pre- and post-processing and address standardization services associated with NCOA processing would be provided by a vendor on a fee-for-service basis. All equipment associated with the Input/Output operations of this application would be relocated to the Office of Mailing Services.

D.2.2.2 Year 2000 Compliance

Under the Legislative Branch system-wide alternative, it is assumed that HIR would be responsible for ensuring that all of the applications included in this study are Year 2000 compliant prior to transitioning to the Legislative Branch mainframe. Additionally, the operating systems employed by the Legislative Branch agency would be Year 2000 compliant MVS/ESA (version 5x or better) and OS/390.

D.2.2.3 Storage Environment

Listed below is a general description of the storage environment for the Legislative Branch system-wide alternative.

- For LIMS, Financial Disclosure, Lobby Act, POPS, STUDIO, and FOTO all primary application storage requirements would be provided by the re-located mainframe computer data center.

- For MONIES, the on-board storage capacities of the RS/6000 configurations should be sufficient for application storage requirements.

- The FileNet Optical disk storage would be retained at the Office of the Clerk for Financial Disclosure and Lobby Act.

- The StorageTek silos would be eliminated. For MONIES, access to archival tapes would be obtained through server based tape drives located at HIR.

- There would be no storage requirements for NCOA because the processing would be provided by an external vendor.

D.2.2.4 Output Devices

Listed below is a general description of the primary output devices that are anticipated as needed to support the Legislative Branch system-wide alternative.

- High volume printers, including the IBM 3900 and 3827 would continue to reside at HIR for batch print jobs.

- Network connectivity to HIR output devices from the Legislative Branch mainframe would require configuration during the transition. Software capable of forms-based printing from the Legislative Branch mainframe to the House network (ethernet) attached printers is required.

- Additional communication configuration would be required to connect the MONIES RS/6000 server to output devices.

D.2.2.5 Communications, Connectivity, and Hardware Placement

Listed below is a general description of the communications, connectivity, and hardware placement that are anticipated as needed to support the Legislative Branch system-wide alternative.

- HIR: Connectivity for application support would be obtained through BUDNET and the Capnet network to the Legislative Branch mainframe computer. Connectivity for user and application support for MONIES would be obtained through BUDNET.

- Office of Mailing Services and NCOA: Connectivity would be obtained through BUDNET.

- Committees: Connectivity to LIMS would be obtained through BUDNET and the Capnet network to the Legislative Branch mainframe computer.

- Parking Office: Connectivity would be obtained through BUDNET and the Capnet network to the Legislative Branch mainframe computer. Local print service functions would be upgraded.

- Recording Studio: Connectivity to STUDIO would be obtained through BUDNET and the Capnet network to the Legislative Branch mainframe computer.

- Photography Studio: Connectivity to FOTO would be obtained through BUDNET and the Capnet network to the Legislative Branch mainframe computer.

- Office of the Clerk: Connectivity to LIMS, Financial Disclosure, and Lobby Act would be obtained through BUDNET and the Capnet network to the Legislative Branch mainframe computer. The SNA 19.2 backup connection to the Clerk's office would be reconfigured and retained, and attached to the Legislative Branch mainframe computer.

- Other connectivity: Existing links to the Government Printing Office (GPO), the Senate, and Library of Congress would be retained through Capnet. The existing link to the Department of the Interior's WASC would be retained.

- The Capnet network would require completion (GAO to GPO link) to ensure uninterrupted connectivity from the Legislative Branch service provider to the House.

D.2.2.6 COTS Software

Under the Legislative Branch system-wide alternative, MONIES would remain a COTS application. MONIES is a telecommunications cost accounting and billing system developed by Stonehouse.

D.2.2.7 Databases

Listed below is a general description of the databases that are anticipated as needed to support the Legislative Branch system-wide alternative.

- The Legislative Branch mainframe would require ADABAS version 5.2.6, with a move to version 6.2 for Year 2000 compliance.

- The MONIES application employs a Stonehouse integrated database. Application extensions are custom programmed by HIR in COBOL.

D.2.2.8 Security

Listed below are the general security aspects anticipated for this system-wide alternative.

- Access and logon to mainframe applications would be retained through ACF2, or equivalent provided by the Legislative Branch service provider.

- Disaster recovery services would need to be maintained.

- Security for the MONIES application could be enhanced if it is re-platformed from the shared mainframe to a dedicated RS/6000 server.

The use of Capnet for transactions would raise additional security concerns that must be resolved during transition to ensure security equal to or greater than current access controls and

monitoring. If Capnet cannot meet the criteria for security, other methods of connectivity would be required (e.g., leased lines).

D.2.2.9 Job Entry

Listed below are the general job entry aspects that are anticipated with the Legislative Branch system-wide alternative.

- The automated job scheduling system in use by HIR would require conversion by the host data center.

- The job entry for MONIES would be handled internally by the RS/6000 server.

D.2.2.10 Key Interfaces

Listed below is a general description of key interfaces that are anticipated with the Legislative Branch system-wide alternative.

- Directory: file interfaces would be obtained through the re-located mainframe application.

- Locator: file interfaces would be obtained through the re-located mainframe application.

- FFS: interfaces for FOTO and STUDIO would be obtained through file transfer from the re-located mainframe to WASC. A revised file transfer feature would be required during transition. The interface for MONIES would be obtained through a file transfer from the RS/6000 server.

- POPS: with the migration of the Payroll System to an alternative solution, an interface would need to be created with the new payroll application or service bureau. This interface for POPS would be retained after relocation to the Legislative Branch mainframe.

Figure D.1 presents a summary of technical environments for the two potential, Legislative Branch, re-location sites identified in Appendix B, *Application Requirements and Alternatives Analysis*.

Figure 1: Legislative Branch Re-location Capabilities

Category	Government Printing Office	Library of Congress
Processing environment	Amdahl 5995 OS: MV/XA CICS 2.1.2 Approximately 60 MIPS Planned upgrade to CMOS mainframe (65 MIPS) with OS/390 is pending.	Amdahl 5995 OS: MV/XA, OS/390 by 7/98 CICS 2.1.2 Approximately 200 MIPS
Storage environment	Similar capability to HIR	Similar capability to HIR
Output devices	Local batch printing functionality is retained at HIR	Local batch printing functionality is retained at HIR
Communications and connectivity	BUDNET through Capnet for mainframe; Customer access through BUDNET backbone	BUDNET through Capnet for mainframe; Customer access through BUDNET backbone
Databases	Current ADABAS version 4 Planned upgrade to Y2K compliant version	No current ADABAS application is supported
Security	Top Secret	ACF2
Job entry	Conversion at GPO	Conversion at LOC
Hardware placement	MF located at GPO Output peripherals located at HIR	MF located at LOC Output peripherals located at HIR

D.2.3 Replace with Client-Server COTS

This alternative would replace most of the eight mainframe-based applications with client-server COTS software, with the exception of LIMS. Presented below is a general description of the components of the technical environment required to support the Replace with Client-Server COTS system-wide alternative.

D.2.3.1 Processing Environment

Under this system-wide alternative, the majority of applications would be converted to commercial-off-the-shelf, client-server versions running on PC servers. Listed below is additional information on the projected processing environment for the Replace with Client-Server COTS system-wide alternative.

- For LIMS, batch and on-line support would have to be provided via TSO and transactions supported by CICS.

- The Legislative Branch mainframe would furnish a suite of third-party system utilities (including ADABAS) sufficient to support LIMS.

- Replacements for Financial Disclosure, Lobby Act, FOTO, STUDIO, and POPS would run in a client-server environment with the clients using Windows 95 or equivalent.

- A COTS replacement for MONIES would be deployed to a Windows NT client-server application. The application server would be located in HIR.

- The NCOA file would be replaced by the U.S. Postal Service's FastForward file and a front-end processing COTS, client-server application. All equipment associated with the Input/Output operations of this application would be relocated to the Office of Mailing Services.

D.2.3.2 Year 2000 Compliance

Listed below is a general description of the Year 2000 aspects associated with the Client-Server COTS system-wide alternative.

- HIR would be responsible for ensuring that LIMS is Year 2000 compliant.

- The COTS replacements for MONIES, NCOA, Financial Disclosure, Lobby Act, POPS, STUDIO, and FOTO would be certified for Year 2000 compliance prior to purchase.

- The operating systems employed by the Legislative Branch agency for LIMS would be Year 2000 compliant MVS/ESA (version 5x or better) and OS/390.

D.2.3.3 Storage Environment

Listed below is a general description of the storage environment for the Replace with Client-Server COTS system-wide alternative.

- All LIMS application storage requirements would be provided by the Legislative Branch agency's mainframe.

- Storage requirements for all other applications would be furnished by the local application server.

- The FileNet Optical disk storage would be eliminated.

- The mainframe RAID currently leased by the House would be eliminated.

- DASD would be eliminated.

- The StorageTek silos would be eliminated.

D.2.3.4 Output Devices

Listed below is a general description of the primary output devices that are anticipated as needed to support the Replace with Client-Server COTS system-wide alternative.

- High volume printers, including the IBM 3900 and 3827 would continue to reside at HIR for batch print jobs for LIMS.

- LIMS: Network connectivity to HIR output devices from the Legislative Branch mainframe would require configuration during the transition. Software capable of forms-based printing from the Legislative Branch mainframe to the House network (ethernet) attached printers is required.

D.2.3.5 Communications, Connectivity, and Hardware Placement

Listed below is a general description of the communications, connectivity, and hardware placement that are anticipated as needed to support the Replace with Client-Server COTS system-wide alternative.

- HIR: Connectivity for application support would be obtained through BUDNET and the Capnet network to the Legislative Branch mainframe computer. Connectivity for the MONIES replacement for application support and users would be obtained through BUDNET and the application server would be located within HIR.

- Office of Mailing Services: Connectivity would be obtained through BUDNET. The application server would reside at the Office of Mailing Services.

- Committees: Connectivity to LIMS would be obtained through BUDNET and the Capnet network to the Legislative Branch mainframe computer.

- Parking Office: Connectivity for the replacement application would be obtained through BUDNET. Local print service functions would be part of the local application. The application server would reside at the Parking Office.

- Recording Studio: Connectivity for the replacement application would be obtained through BUDNET. Local print service functions would be part of the application. The application server would reside in the Recording Studio.

- Photography Studio: Connectivity for the replacement application would be obtained through BUDNET. Local print service functions would be part of the application. The application server would reside in the Photography Studio.

- Office of the Clerk: Connectivity to LIMS would be obtained through BUDNET and the Capnet network to the Legislative Branch mainframe computer. The 19.2 SNA backup connection to the Clerk's office would be reconfigured. The application servers for the COTS replacements for the Financial Disclosure and Lobby Act applications would reside within the Office of the Clerk's Legislative Computer Systems.

- Other connectivity: Existing links to GPO, the Senate, and Library of Congress would be retained. The existing link to the Department of the Interior's WASC would be retained.

- The Capnet network would require completion (GAO to GPO link) to ensure uninterrupted connectivity from the Legislative Branch service provider to the House.

D.2.3.6 COTS Software

In Exhibit B, *Application Requirements and Alternatives Analysi*s, we identified examples of potential COTS alternatives. Listed below is a general description of types of COTS applications that would be used to support the Client-Server COTS system-wide alternative.

- NCOA: Replaced with address standardization and correction application that uses the FASTForward file.

- MONIES: Replaced with another telecommunications cost accounting and billing system.

- Financial Disclosure and Lobby Act: Replaced with imaging, document management and workflow application.

- FOTO and STUDIO: Replaced with accounting, work order, and invoicing system.

- POPS: Replaced with parking management system.

D.2.3.7 Databases

Listed below is a general description of the databases that are anticipated as needed to support the Replace with Client-Server COTS system-wide alternative.

- The NCOA, MONIES, Financial Disclosure, Lobby Act, FOTO, STUDIO, and POPS applications replaced where necessary by COTS databases integrated within each application.

- For LIMS, the ADABAS version 5.2.6, with a migration to version 6.1 and ultimately to version 6.2 for Year 2000 compliance.

D.2.3.8 Security

Listed below are the general security aspects anticipated for this system-wide alternative.

- For NCOA: Internal to Office of Mailing Services.

- For replacing MONIES, Financial Disclosure/Lobby Act, POPS, FOTO, and STUDIO: Local LAN security in addition to client-server and network security.

- For LIMS: Would retain ACF2 or Top Secret, or be converted to equivalent security software used on the Legislative Branch mainframe. Use of Capnet for LIMS transactions would raise

additional security concerns that must be resolved during transition to ensure security equal to or greater than current access controls and monitoring.

The use of Capnet for LIMS transactions would raise additional security concerns that must be resolved during transition to ensure security equal to or greater than current access controls and monitoring. If Capnet cannot meet the criteria for security, other methods of connectivity would be required (e.g., leased lines).

D.2.3.9 Job Entry

Listed below are the general job entry aspects that are anticipated with the Client-Server COTS system-wide alternative.

- The automated job scheduling system in use by HIR would require conversion by the host data center.

- Job entry is not required for COTS client-server applications.

D.2.3.10 Key Interfaces

Listed below is a general description of key interfaces that are anticipated with the Client-Server COTS system-wide alternative.

- Directory: The relocated LIMS would continue to supply the Directory interface.

- Locator: a new interface would need to be created from the telecommunications management application to supply Locator information to LIMS.

- FFS: interfaces for FOTO and STUDIO would require specific development of interfaces for the client-server application to transfer accounting files to WASC.

- POPS: with the migration of Payroll to an alternative solution, an interface would need to be created with the new payroll application or service bureau.

D.2.4 Top-Ranked Solution

This alternative represents the scenario for implementing the highest ranked viable application alternative identified in Exhibit B, *Application Requirements and Alternatives Analysis*. Presented in the following sections is a general description of the components of the technical environment required to support the Top-Ranked system-wide alternative.

D.2.4.1 Processing Environment

Listed below is a general description of the processing environment that is anticipated as needed to support the Top-Ranked system-wide alternative.

- Batch and on-line support would be provided via TSO and transactions supported by CICS.

- The Legislative Branch mainframe would furnish a suite of system utilities sufficient to support LIMS, STUDIO, FOTO, Financial Disclosure, and Lobby Act applications and their transactions.

- The POPS would be replaced by a COTS, client-server solution.

- The MONIES capability would be provided by an IBM RS/6000 R/390 (VSE operating system), hosting an essentially unmodified application with the server located at HIR. COBOL would be required to support existing and future custom programs for developing custom reports.

- The NCOA file would be replaced by the U.S. Postal Service's FastForward file and a front-end processing COTS client-server application. All equipment associated with the Input/Output operations of this application would be relocated to the Office of Mailing Services.

D.2.4.2 Year 2000 Compliance

Listed below is a general description of the Year 2000 aspects associated with the Top-Ranked system-wide alternative.

- HIR would be responsible for ensuring that LIMS, MONIES, Financial Disclosure, Lobby Act, STUDIO, and FOTO are Year 2000 compliant.

- The COTS replacements for NCOA and POPS would be certified as compliant prior to purchase.

- The operating systems employed by the Legislative Branch agency would be Year 2000 compliant MVS/ESA (version 5x or better) and OS/390.

D.2.4.3 Storage Environment

All primary application storage requirements for LIMS, Financial Disclosure, Lobby Act, POPS STUDIO, and FOTO would be provided by the Legislative Branch agency's mainframe. Additional details on the storage environment of the Top-Ranked system-wide alternative are listed below:

- The RS/6000 configuration for MONIES provides disk storage resources that would be sufficient for all current and projected DASD storage requirements.

- FileNet optical disk storage would be retained at the Office of the Clerk for the Financial Disclosure and Lobby Act applications.

- The mainframe RAID currently leased by the House would be eliminated.

- The StorageTek silos currently used for archival purposes would also be eliminated.

- Access to archival tapes would be obtained through individual, server based tape drives located in HIR.

- The NCOA file would be replaced by the U.S. Postal Service's FastForward file and a front-end processing COTS client-server application. All equipment associated with the Input/Output operations of this application would be relocated to the Office of Mailing Services.

D.2.4.4 Output Devices

Listed below is a general description of the primary output devices that are anticipated as needed to support the Top-Ranked system-wide alternative.

- Existing high volume printers, including the IBM 3900 and 3827 would be retained at HIR for batch print jobs.

- Network connectivity to HIR output devices from the Legislative Branch mainframe would require configuration during the transition. Software capable of forms-based printing from the Legislative Branch mainframe to the House network (ethernet) attached printers is required.

- Additional communication configuration would be required to connect the MONIES RS/6000 server to output devices.

- The pre- and post- processing of media (including Correspondence Management System files) associated with NCOA would be preserved with the retention of existing Input/Output (conversion) equipment and re-located to the Office of Mailing Services.

D.2.4.5 Communications, Connectivity, and Hardware Placement

Listed below is a general description of the communications, connectivity, and hardware placement that are anticipated as needed to support the Top-Ranked system-wide alternative.

- HIR: Connectivity for LIMS, Financial Disclosure, Lobby, STUDIO, and FOTO to accommodate HIR application support would be obtained through BUDNET and the Capnet network to the Legislative Branch mainframe computer.

- Office of Mailing Services: Connectivity would be obtained through BUDNET. The application server for the NCOA COTS replacement would be located at the Office of Mailing Services.

- Committees: Connectivity to LIMS would be obtained through BUDNET and the Capnet network to the Legislative Branch mainframe computer.

- Parking Office: Connectivity would be obtained through BUDNET. Local print service functions would be part of the local application. The application server for the POPS COTS replacement would be located at the Parking Office.

- Recording Studio: Connectivity would be obtained through BUDNET and the Capnet network to the Legislative Branch mainframe computer.

- Photography Studio: Connectivity would be obtained through BUDNET and the Capnet network to the Legislative Branch mainframe computer.

- Office of the Clerk: Existing connectivity to LIMS, Financial Disclosure, and Lobby Act would be retained through BUDNET and the Capnet network to the Legislative Branch mainframe computer. The SNA 19.2 backup connection to the Office of the Clerk would be reconfigured and retained.

- Other connectivity: Existing links to GPO, the Senate, and Library of Congress would be retained. The existing link to the Department of the Interior's WASC would be retained.

- The Capnet network would require completion (GAO to GPO link) to ensure uninterrupted connectivity from the Legislative Branch service provider to the House.

D.2.4.6 COTS Software

Listed below is a general description of COTS applications that would be used to support the Top-Ranked Solution.

- NCOA: Replaced with address standardization and correction application that uses the FASTForward file.

- MONIES: Would employ a Stonehouse Technologies integrated database. Application extensions would be custom programs written by HIR in COBOL.

- POPS: Would employ a parking management system.

D.2.4.7 Databases

Listed below are the general security aspects that are anticipated with the Top-Ranked system-wide alternative.

- For LIMS, STUDIO, FOTO, Lobby Act, and Financial Disclosure, ADABAS version 5.2.6 with a migration to version 6.1 and ultimately to version 6.2 (Year 2000 compliant).

- The POPS, NCOA, and MONIES applications are replaced where necessary by COTS databases integrated within each application.

D.2.4.8 Security

Under the Top-Ranked system-wide alternative, system level security would be dependent upon the host data center mainframe security. Equivalent system security levels are available from both data center prospects.

This alternative would retain ACF2 or Top Secret, or be converted to the equivalent security software used on the Legislative Branch mainframe. The use of Capnet for LIMS transactions would raise additional security concerns that must be resolved during transition to ensure security equal to or greater than current access controls and monitoring. If Capnet cannot meet the criteria for security, other methods of connectivity would be required (e.g., leased lines).

Additional security issues include:

- NCOA: Internal to Office of Mailing Services. Physical security of CMS and other files would need to be addressed.

- COTS package POPS: Local LAN security in addition to client-server, network security.

- MONIES: Security would be improved by moving the application from the shared mainframe to a dedicated server.

D.2.4.9 Job Entry

Listed below are the general job entry aspects that are anticipated with the Top-Ranked Solution system-wide alternative.

- The automated job scheduling system in use by HIR would require conversion by the host data center.

- Job entry would not be required for the COTS solutions for POPS and NCOA.

- Job entry for MONIES would be handled internally by the RS/6000 server.

D.2.4.10 Key Interfaces

Listed below is a general description of key interfaces that are anticipated with the Top-Ranked system-wide alternative.

- Directory: file interfaces would be retained through the relocated LIMS mainframe application.

- Locator: file interfaces would be retained through the relocated LIMS mainframe application. MONIES would continue to generate Locator information from the RS/6000 platform.

- FFS: interfaces for FOTO and STUDIO would be retained through file transfer from the relocated mainframe to WASC.

- Payroll: with the migration of the Payroll System to an alternative solution, an interface would need to be created with the new payroll application or service bureau.

Exhibit E

Cost-Benefit Analysis of System-Wide Alternatives

Cost-Benefit Analysis of System-Wide Alternatives

Table of Contents

Cost-Benefit Analysis of System-Wide Alternatives

This exhibit presents the methodology used to perform the cost-benefit analysis of the four system-wide alternatives to identify a recommended solution for the migration of the U.S. House of Representatives (House) eight mainframe-based applications. The methodology section identifies the resources we used to collect information to identify cost factors, as well as the steps we followed to analyze costs and ultimately select a recommended alternative. The results presented include a cost comparison of the four system-wide alternative against the FY 99 baseline, a cost sensitivity analysis, and a qualitative analysis.

E.1 Methodology

The objective of the cost-benefit analysis was to analyze and compare the high-level cost factors for the FY 99 baseline and the four system-wide alternatives in order to develop a recommended alternative. The cost-benefit analysis presents cost estimates for the FY 99 baseline and system-wide alternatives defined in Exhibit C, *System-Wide Alternatives Analysis.*

The cost-benefit analysis was based on a three-step process that began with the identification of quantitative and qualitative cost factors and resulted in the conclusion that (1) the Top-Ranked alternative is the most cost-effective system-wide alternative, and (2) each system-wide alternative is more cost-effective than the FY 99 baseline. The three-step process is listed below, followed by a description of each step:

1. System-Wide Alternatives Cost Analysis.

2. Cost Sensitivity Analysis.

3. Qualitative Analysis.

E.1.1 System-Wide Alternatives Cost Analysis

In Exhibit C*, System-Wide Alternatives Analysis*, we presented information on the transition, resources, and implementation issues of the FY 99 baseline and each system-wide alternative. For the cost-benefit analysis presented in this Exhibit, we collected cost data and developed cost estimates which were incorporated into a cost model used to compare the FY 99 baseline costs and the system-wide alternatives costs. We collected cost data from a variety of sources, including HIR personnel interviews, commercial and government proposals, and secondary research.

The system-wide alternatives cost analysis comprised the following steps:

• Development of Assumptions.

• Identification of Cost Factors.

• Cost Comparison Analysis and Identification of Recommended Alternative.

We describe each step below.

Development of Assumptions

The system-wide alternatives cost analysis used the following general assumptions:

- **Salary and Fringe Benefits.** We used an average annual salary of $55,000 and a fringe benefit rate of 30.05 percent for all personnel costs in this Study.[69]

- **Cost Factor Escalation.** We escalated personnel costs (salary and fringe benefits) by 4 percent per year to represent cost-of-living increases.

- **Time Period of Analysis.** We used a five year time period for this Study.[70]

- **Net Present Value and Discount Factor.** We used the net present value calculation to discount future costs using a discount rate of seven percent.[71]

- **Mainframe Operating System Costs.** We decreased the estimated costs of the mainframe operating system software in the FY 99 baseline by 10 percent per year.[72] We did not escalate or deflate mainframe hardware costs because these costs are generally fixed under long term leasing agreements.

Identification of Cost Factors

We identified the following applicable cost factors using HIR budget documentation and the GSA IT Planning and Investment Guide:

1. Non-recurring costs are costs that occur in the first year of the analysis and are primarily transition costs for installation of software, software purchases and customization, hardware purchases, training, and Year 2000 renovation. Non-recurring costs are assumed to be incurred during the first month of the analysis time period and are not discounted.

2. Recurring costs are costs that are incurred on an annual basis throughout the time period of the analysis, including the first year. The recurring costs include personnel salaries and fringe benefits, computer hardware (lease and maintenance), software licenses and maintenance fees, and external vendor services, such as disaster recovery and timesharing. The recurring costs for each year are discounted using net present value.

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[69]Average annual salary costs were determined through discussions with HIR. The fringe benefit rate was obtained from OMB Circular A-76 for Executive Branch cost-benefit calculations. We increased the fringe benefit rate by 0.5 percent due to the House's higher retirement costs.

[70]OMB Circular A-11 entitled *Preparation and Submission of Budget Estimates* and *The GSA IT Planning and Investment Guide* prescribe a six year planning horizon for IT investments. We reduced this time period to five years to be more conservative in our analysis of the system-wide alternatives against the FY 99 baseline. A six year planning horizon would make the FY 99 baseline, with its higher annual recurring costs, even less cost-effective than the alternatives.

[71]OMB Circular A-94 entitled *Guidelines and Discount Rates for Benefit-Cost Analysis of Federal Programs* indicates that a 7 percent discount factor should be used and that net present value is the standard criterion for deciding whether a Government program can be justified on economic principles.

[72]Source: *Reducing Mainframe Software Costs*, March 24, 1995, Gartner Group.

The cost factors included in this Study represent the high-level "primary" costs to support the applications. We did not include cost factors that were not directly associated with supporting the applications or were not expected to change significantly from one alternative to another. Cost factors not included in the analysis include facilities and utilities costs, personnel overhead, and supplies.

Cost Comparison Analysis and Identification of Recommended Alternative

We collected costs on the FY 99 baseline and each system-wide alternative and performed a cost comparison of each system-wide alternative with the FY 99 baseline and with the other system-wide alternatives. The results of the cost comparison indicated that each of the four system-wide alternatives are more cost-effective than the FY 99 baseline. The Top-Ranked alternative was the most cost-effective of the system-wide alternatives.

The cost comparison of each of the system-wide alternatives and the FY 99 baseline was performed using five year total costs discounted using the net present value calculation. The net present value calculation is used to convert nominal values (unadjusted for inflation) to real, or constant, dollars (adjusted for inflation).

E.1.2 Cost Sensitivity Analysis

Following the cost comparison analysis, we performed a sensitivity analysis to determine if significant changes in the cost factors and assumptions used in this Study would validate (1) the selection of the Top-Ranked alternative as the recommended alternative, and (2) the determination that each of the system-wide alternatives are more cost-effective than the FY 99 baseline.

We performed the sensitivity analysis by varying specific cost factors while leaving all other cost factors unchanged. For one scenario, we decreased the FY 99 baseline mainframe personnel support costs, mainframe processor, and mainframe operating system and utilities software cost factors by 50 percent to determine if a smaller mainframe (and associated costs) and fewer personnel resources would impact the Study results. This analysis confirmed that the Top-Ranked (recommended) alternative is more cost-effective than the FY 99 baseline, even with a 50 percent reduction in the FY 99 baseline personnel and mainframe hardware and software costs.

E.1.3 Qualitative Analysis

Following the sensitivity analysis, we identified and assessed various qualitative factors of each system-wide alternative. The qualitative analysis was intended to be used as a "tie-breaker" in the event that the cost analysis resulted in insignificant differences in the costs between the FY 99 baseline and the system-wide alternatives. The qualitative analysis methodology comprised:

- **Identification of Qualitative Factors.** We identified and defined five qualitative categories to assess the system-wide alternatives: Performance, Stakeholder Requirements,

Management Control, Security, and Commercial Acceptance. These categories represent qualitative or non-quantifiable attributes of each application and system-wide alternative.

- **Analysis of Qualitative Factors.** We used the five qualitative factors to score each application within each system-wide alternative. We used the FY 99 baseline as a benchmark and scored each application/system-wide alternative as either less effective (-), similar, (O), or more effective, (+) than the baseline. We tabulated the scores for system-wide alternatives across the applications to form an overall assessment for each system-wide alternative. We did not weight the applications or the qualitative factors for this analysis.

The qualitative analysis did not present significant evidence to justify a reevaluation of our conclusions from the cost comparison and sensitivity analysis.

E.2. System-Wide Alternative Cost Analysis

The system-wide alternative cost analysis presents the results of the cost analysis for the FY 99 baseline and each system-wide alternative. The cost analysis presentation is organized as follows:

- Summary of Cost Analysis.

- FY 99 Baseline Cost Analysis.

- Re-Platform to RS/6000 Cost Analysis.

- Relocate to Legislative Branch Cost Analysis.

- Replace with Client-Server COTS Cost Analysis.

- Top-Ranked Alternative Cost Analysis.

In each section, we discuss the non-recurring and recurring cost factors.

E.2.1 Cost Analysis Summary

The cost analysis for the system-wide alternatives indicates that each system-wide alternative is more cost-effective than the FY 99 baseline. The cost analysis also indicates that the Top-Ranked alternative is the most cost-effective of the system-wide alternatives. Figure E.1 presents a summary of the non-recurring and recurring cost estimates for the FY 99 baseline and the four system-wide alternatives. The Figure presents five year total cost estimates discounted using the net present value calculation to provide overall five year lifecycle cost estimates of the FY 99 baseline and each alternative.

Figure E.1: Summary of System-Wide Alternative Cost Analysis

Cost Factor	FY 99 Baseline	Re-Platform to RS/6000	Relocation to Legis. Branch	Replacment with C/S COTS	Top-Ranked Alternative
		System-Wide Alternatives			
1. Non-Recurring Costs					
Installation/Conversion	$5,500	$301,458	$252,458	$380,708	$266,458
Software Customization	$0	$0	$0	$1,127,500	$11,000
Hardware Purchase	$0	$1,010,480	$215,000	$161,391	$255,300
Software Purchase	$0	$349,480	$0	$513,230	$103,000
Training	$0	$24,000	$7,000	$71,000	$22,000
Year 2000 Software Renovation	$573,000	$573,000	$573,000	$423,000	$463,000
Total Non-Recurring Costs	**$578,500**	**$2,258,418**	**$1,047,458**	**$2,676,829**	**$1,120,758**
2. Recurring Costs					
Personnel Salaries and Fringe Benefits					
Computer Operations (Enterprise)	$4,108,213	$4,108,213	$2,212,114	$2,212,114	$2,212,114
Telecommunications (Communications)	$316,016	$316,016	$316,016	$316,016	$316,016
Applications Maintenance (Integration)	$3,160,164	$3,160,164	$3,160,164	$2,844,147	$3,160,164
Office of Mailing Services	$0	$0	$632,033	$632,033	$632,033
Hardware (Lease and Maintenance)					
Mainframe Processor Costs	$1,258,761	$0	$0	$0	$0
RAID	$279,097	$0	$0	$0	$0
DASD	$59,863	$0	$0	$0	$0
STK Tape Silos	$487,923	$0	$0	$0	$0
FileNet Optical Disk Storage Unit	$253,938	$253,938	$253,938	$0	$253,938
Printers	$609,699	$609,699	$609,699	$609,699	$609,699
Printer Usage	$60,519	$60,519	$60,519	$60,519	$60,519
New Hardware (Maintenance)	$0	$479,819	$102,091	$76,635	$121,227
Software (License and Maintenance)					
Mainframe Operating system	$974,063	$0	$0	$0	$0
Utility software	$1,446,923	$866,888	$0	$0	$0
COTS Applications	$805,864	$805,864	$256,438	$246,383	$352,386
External Vendor Services		$0			
Inter-Agency Timesharing (Legis. Branch)	$0	$0	$1,093,113	$943,045	$1,080,812
Disaster Recovery/Back-Up	$82,004	$82,004	$82,004	$82,004	$82,004
NCOA Services (Gov't or Comm. Vendor)	$0	$0	$680,694	$0	$0
Total Recurring Costs	**$13,903,047**	**$10,743,124**	**$9,458,823**	**$8,022,595**	**$8,880,912**
Total Estimated Costs	**$14,481,547**	**$13,001,542**	**$10,506,281**	**$10,699,424**	**$10,001,670**

E.2.2 FY 99 Baseline Cost Analysis

In the discussion below, we present the non-recurring and recurring cost estimates for the FY 99
baseline. Figure E.2 summarizes the non-recurring and recurring cost estimates.

Figure E.2: Summary of FY 99 Baseline Lifecycle Costs

Category	Estimated Costs
Non-Recurring Costs*	$578,500
Recurring Costs**	$13,903,047
Total Estimated Costs	$14,481,547

* First-year costs
** 5 year discounted costs

E.2.2.1 Non-Recurring Costs

Figure E.3 presents the non-recurring FY 99 baseline cost estimates. The Figure presents costs
that are allocated to (1) the eight individual applications, as appropriate, and (2) an application-
wide category that presents estimated costs incurred to support all eight applications. These non-
recurring costs are assumed to be incurred during the first month of the FY 99 baseline lifecycle
and are not discounted.

Figure E.3: FY 99 Baseline - Non-Recurring Cost Estimates

Application	Installation/ Conversion/	Software Customization	Hardware Purchase	Software Purchase	Training	Year 2000 Renovation	Total Non-Recurring Costs
FY 99 Baseline							
LIMS	$0	$0	$0	$0	$0	$423,000	$423,000
NCOA	$0	$0	$0	$0	$0	$10,000	$10,000
MONIES	$0	$0	$0	$0	$0	$20,000	$20,000
Financial Disclosure	$0	$0	$0	$0	$0	$0	$0
Lobby Act	$0	$0	$0	$0	$0	$20,000	$20,000
STUDIO	$0	$0	$0	$0	$0	$0	$0
FOTO	$0	$0	$0	$0	$0	$0	$0
POPS	$0	$0	$0	$0	$0	$100,000	$100,000
Application-wide	$5,500	$0	$0	$0	$0	$0	$5,500
Total	**$5,500**	**$0**	**$0**	**$0**	**$0**	**$573,000**	**$578,500**

The primary non-recurring costs for the FY 99 baseline are for the installation and conversion of
the "rightsized" mainframe and Year 2000 renovation costs for the required applications. The
cost estimates for the installation/conversion/testing of the "rightsized" mainframe were provided
by the HIR Enterprise Computing Group. The estimates are based on a similar transition to
"rightsize" the previous IBM 9021-720 mainframe to the current CMOS Multiprise 135 in 1997.
The cost estimates for the Year 2000 compliance for each application are based on the Year 2000

plan.[73] Costs are not included for the applications that have already been Year 2000 renovated (Financial Disclosure, STUDIO, and FOTO).[74]

E.2.2.2 Recurring Costs

Figure E.4 presents the recurring cost estimates for the FY 99 baseline. The Figure presents estimated annual recurring costs and a five year total of annual recurring costs discounted using the net present value calculation. These recurring costs are incurred on an annual basis throughout the five year period of the analysis. The primary recurring costs associated with the FY 99 baseline are discussed below.

Personnel Salaries and Fringe Benefits

The personnel salaries and fringe benefits cost estimates are based on:

- **Computer Operations Support.** The HIR Enterprise Computing Group is staffed with 13 positions.

- **Applications Maintenance.** The HIR Integration Group is staffed with 10 positions.

- **Telecommunications.** The HIR Communications Group has one position dedicated to supporting the eight applications.

For the purposes of this Study, the Office of Mailing Services were not considered to have significant costs directly associated with supporting NCOA services in the FY 99 baseline.

These personnel and fringe benefit cost estimates were derived from discussions with the HIR Enterprise, Integration, and Communication Groups. These cost estimates are included for cost comparison purposes and are not intended to represent recommendations for the personnel resources required to support the eight applications.

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[73]Reference: The Year 2000 Plan produced by HIR (May 16, 1997 revision). The Year 2000 Project Manager indicated that these cost estimates have not been revised.

[74]HIR indicated that these applications have been modified to Year 2000 compliance. We did not independently verify this information. There may be more costs associated with further testing of these applications to ensure Year 2000 compliance.

Figure E.4: FY 99 Baseline Recurring Cost Estimates

Cost Factor	Annual Recurring Cost	5 Year Net Present Value Total
Personnel Salaries and Fringe Benefits		
Computer Operations (Enterprise)	$929,858	$4,108,213
Telecommunications (Communications)	$55,000	$316,016
Applications Maintenance (Integration)	$715,275	$3,160,164
Office of Mailing Services	$0	$0
Hardware (Lease and Maintenance)		
Mainframe Processor Costs	$307,000	$1,258,761
RAID*	$124,404	$279,097
DASD	$14,600	$59,863
STK Tape Silos	$119,000	$487,923
FileNet Optical Disk Storage Unit	$61,933	$253,938
Printers	$148,700	$609,699
Printer Usage	$14,760	$60,519
New Hardware (Maintenance)	$0	$0
Software (License and Maintenance)		
Mainframe Operating system	$286,000	$974,063
Utility software	$352,891	$1,446,923
COTS Applications	$196,543	$805,864
External Vendor Services		
Inter-Agency Timesharing (Legis. Branch)	$0	$0
Disaster Recovery/Back-Up	$20,000	$82,004
NCOA Services (Gov't or Comm. Vendor)	$0	$0
Total Recurring Costs	**$3,345,964**	**$13,903,047**

*Note: RAID recurring costs include lease costs in addition to maintenance costs until July 31, 2000.

Hardware (Lease and Maintenance)

The hardware presented in the category are lease and maintenance cost estimates for the mainframe processor, disk storage, and printers that would support the eight applications under the FY 99 baseline scenario. These cost estimates were derived from data collected from and interviews with the HIR Enterprise Computing Group. The specific cost factors include:

- **Mainframe Processor** includes the lease and maintenance costs associated with mainframe hardware.

- **RAID** includes the lease and maintenance costs for the Redundant Array of Inexpensive Disks (RAID).

- **DASD** includes the maintenance costs used for Direct Access Storage Devices (DASD).

- **STK Tape Silos** includes the maintenance costs for the StorageTek archive tape storage units.

- **Printers** includes the maintenance costs for the five, high-speed mainframe printers.

- **FileNet Optical Disk Storage Unit** includes the maintenance costs associated with the optical storage unit used for the Financial Disclosure and Lobby Act images.

- **Printer Usage** includes the usage fee paid to IBM based on the volume of printing.

- **New Hardware (Maintenance)** includes the maintenance fees associated with new hardware purchases for the alternatives. There are no new hardware purchases included in the FY 99 baseline.

Software (License and Maintenance)

This cost factor represents the licensing and maintenance costs associated with the mainframe software. These cost estimates were derived from discussions with the HIR Enterprise Computing Group. The specific cost factors include:

- **Mainframe Operating System** includes the license costs for the mainframe operating system software.

- **Utility Software** includes the licensing costs for the mainframe third-party utility software including ADABAS and SAS.

- **COTS Applications** includes license and maintenance fees for the COTS applications. The FY baseline includes the costs for NCOA, MONIES, and FileNet software for the Financial Disclosure and Lobby Act applications.

External Vendor Services

The external vendor services costs for the FY 99 baseline are for disaster recovery services.

E.2.3 Re-Platform to RS/6000 Cost Analysis

In the discussion below, we present the non-recurring and recurring cost estimates for this alternative. Figure E.5 summarizes the non-recurring and recurring cost estimates.

Figure E.5: Summary of Re-Platform Lifecycle Costs

Category	Estimated Costs
Non-Recurring Costs*	$2,258,418
Recurring Costs**	$10,743,124
Total Estimated Costs	$13,001,542

*   First-year costs
** 5 year discounted costs

E.2.3.1 Non-Recurring Costs

Figure E.6 presents the non-recurring cost estimates for the Re-Platform to RS/6000 alternative. The Figure presents cost estimates allocated to (1) the eight individual applications, as appropriate, and (2) an application-wide category that presents estimated costs incurred to support all eight applications. These non-recurring costs are assumed to be incurred during the first month of the lifecycle of this alternative and are not discounted.

Figure E.6: Re-Platform to RS/6000 - Non-Recurring Cost Estimates

Re-Platform to RS/6000							
LIMS	$18,000	$0	$0	$0	$0	$423,000	$441,000
NCOA	$18,000	$0	$0	$0	$0	$10,000	$28,000
MONIES	$74,750	$0	$175,000	$0	$0	$20,000	$269,750
Financial Disclosure	$18,000	$0	$0	$0	$0	$0	$18,000
Lobby Act	$18,000	$0	$0	$0	$0	$20,000	$38,000
STUDIO	$18,000	$0	$0	$0	$0	$0	$18,000
FOTO	$18,000	$0	$0	$0	$0	$0	$18,000
POPS	$18,000	$0	$0	$0	$0	$100,000	$118,000
Application-wide	$100,708	$0	$835,480	$349,480	$24,000	$0	$1,309,668
Total	**$301,458**	**$0**	**$1,010,480**	**$349,480**	**$24,000**	**$573,000**	**$2,258,418**

Installation and Conversion includes the costs to transition the eight applications from the mainframe to the RS/6000 servers. The installation and conversion costs for LIMS, NCOA, Financial Disclosure, Lobby Act, STUDIO, FOTO, and POPS are based on a vendor quote.[75] The installation and conversion costs for MONIES is based on a quote from Stonehouse Technologies. We also included a cost estimate to operate the mainframe for one month in parallel during the transition for testing purposes.[76]

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[75]A vendor provided a proposal for 120 hours at $150 per hour ($18,000) to assist HIR with the installation and conversion of all the applications to the RS/6000. We applied the cost estimate to each application being transitioned to account for the possibility of a more complex transition effort.

[76]This cost estimate includes cost factors for the mainframe processor, mainframe operating system software, utilities software, and mainframe storage devices, prorated for one month (approx. $100,000). It is assumed that sufficient planning and lead time would reduce the

Hardware Purchases includes the costs for five RS/6000 server units. The costs include the one-time charge for the operating system software, and the four RS/6000 servers to host LIMS, NCOA, Financial Disclosure, Lobby Act, STUDIO, FOTO, and POPS.[77] These costs are presented in the application-wide cost category in the Figure.[78] The costs for a separate RS/6000 server for MONIES is presented in the hardware purchase category for MONIES. We also included a cost estimate (in the application-wide category in the Figure) for communications equipment to connect printers to the RS/6000 servers.

Software Purchases includes the estimated cost to purchase the software utilities required for the eight applications. The cost estimates are based on a vendor quote.

Training includes a cost estimate of $1,000 for a training session for the 24 HIR staff members to assist with building skills to support the RS/6000 technology.

Year 2000 Renovation includes the costs to renovate all non-Year 2000 compliant applications.

E.2.3.2 Recurring Costs

Figure E.7 presents the recurring cost estimates for this alternative. The Figure presents (1) annual recurring cost estimates and (2) a five year total of recurring costs discounted using the net present value calculation. These recurring costs are incurred on an annual basis throughout the five year period of the analysis. The primary differences in the recurring costs of this alternative compared with the FY 99 baseline are discussed below.

Personnel Salaries and Fringe Benefits

The personnel salaries and fringe benefits cost estimates do not change from the FY 99 baseline.

Hardware (Lease and Maintenance)

The primary difference in the recurring hardware costs from the FY 99 baseline is the elimination of the lease and maintenance costs in the Mainframe Processor, RAID, DASD, and STK Tape Silos cost categories. These hardware items are no longer needed for this alternative as the processing and storage capacities of the RS/6000 servers are estimated to be sufficient for the eight applications.

The FileNet Optical Disk Storage, Printers, and Printer Usage costs remain the same as the FY 99 baseline.

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need for an extended parallel processing testing effort.

[77]The vendor quote included a proposal for three RS/6000 servers for LIMS, NCOA, Financial Disclosure, Lobby Act, STUDIO, FOTO, and Parking. We added an additional server to be conservative and to provide for the additional capacity that may be required for back-up, redundancy, and test environment requirements. The actual number of servers required to host the eight applications may be less than estimated in this Study.

[78]These costs of the RS/6000 servers are not specifically allocated to each application because each server would most likely host more than one application.

Figure E.7: Re-Platform to RS/6000 - Recurring Cost Estimates

Cost Factor	Annual Recurring Cost	5 Year Net Present Value Total
Personnel Salaries and Fringe Benefits		
Computer Operations (Enterprise)	$929,858	$4,108,213
Telecommunications (Communications)	$71,528	$316,016
Applications Maintenance (Integration)	$715,275	$3,160,164
Office of Mailing Services	$0	$0
Hardware (Lease and Maintenance)		
Mainframe Processor Costs	$0	$0
RAID	$0	$0
DASD	$0	$0
STK Tape Silos	$0	$0
FileNet Optical Disk Storage Unit	$61,933	$253,938
Printers	$148,700	$609,699
Printer Usage	$14,760	$60,519
New Hardware (Maintenance)	$151,572	$479,819
Software (License and Maintenance)		
Mainframe Operating system	$0	$0
Utility software	$247,977	$866,888
COTS Applications	$196,543	$805,864
External Vendor Services		
Inter-Agency Timesharing (Legis. Branch)	$0	$0
Disaster Recovery/Back-Up	$20,000	$82,004
NCOA Services (Gov't or Comm. Vendor)	$0	$0
Total Recurring Costs	**$2,558,146**	**$10,743,124**

The cost estimates for New Hardware (Maintenance) represents the maintenance costs for the five RS/6000 servers discussed in the non-recurring cost section. These maintenance costs are estimated at 15 percent of the initial hardware purchase costs per year.[79]

Software (License and Maintenance)

The primary difference in the recurring software costs from the FY 99 baseline is the elimination of the mainframe operating system license costs and the reduced costs for third-party software

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[79]HIR and several commercial vendors indicated that the average maintenance costs for hardware are 15 percent of the initial purchase price.

utilities for use on the RS/6000. The costs for third-party software utilities for use on the RS/6000 platform, including ADABAS, were provided by vendor quotes.

The software utilities costs are also decreased from the FY 99 baseline. This decrease reflects the lower estimated recurring utilities costs for the RS/6000 servers.

External Vendor Services

There are no changes to the external vendor services cost category from the FY 99 baseline.

E.2. Relocate to Legislative Branch Cost Analysis

In the discussion below, we present the non-recurring and recurring cost estimates for this alternative. Figure E.8 summarizes the non-recurring and recurring cost estimates.

Figure E.8: Summary of Relocation Lifecycle Costs

Category	Estimated Costs
Non-Recurring Costs*	$1,047,458
Recurring Costs**	$9,458,823
Total Estimated Costs	**$10,506,281**

* First-year costs
** 5 year discounted costs

E.2.4.1 Non-Recurring Costs

Figure E.9 presents the non-recurring cost estimates for the Relocate to Legislative Branch alternative. The Figure presents cost estimates allocated to (1) the eight individual applications, as appropriate, and (2) an application-wide category that presents estimated costs incurred to support all eight applications. These non-recurring costs are assumed to be incurred during the first month of the lifecycle of this alternative and are not discounted.

Figure E.9: Relocate to Legislative Branch - Non-Recurring Cost Estimates

Application	Installation/ Conversion/	Software Customization	Hardware Purchase	Software Purchase	Training	Year 2000 Renovation	Total Non-Recurring Costs
Relocation to Legislative Branch							
LIMS	$11,000	$0	$0	$0	$0	$423,000	$434,000
NCOA	$11,000	$0	$0	$0	$0	$10,000	$21,000
MONIES	$74,750	$0	$175,000	$0	$0	$20,000	$269,750
Financial Disclosure	$11,000	$0	$0	$0	$0	$0	$11,000
Lobby Act	$11,000	$0	$0	$0	$0	$20,000	$31,000
STUDIO	$11,000	$0	$0	$0	$0	$0	$11,000
FOTO	$11,000	$0	$0	$0	$0	$0	$11,000
POPS	$11,000	$0	$0	$0	$0	$100,000	$111,000
Application-wide	$100,708	$0	$40,000	$0	$7,000	$0	$147,708
Total	**$252,458**	**$0**	**$215,000**	**$0**	**$7,000**	**$573,000**	**$1,047,458**

Installation and Conversion includes cost estimates for transitioning LIMS, Financial Disclosure, Lobby Act, STUDIO, FOTO, and POPS to the Legislative Branch mainframe computer. This cost estimate is based on HIR's experience with a previous mainframe transition.[80] To be conservative, we doubled that estimate and applied it to each application that

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[80]HIR indicated that $5,500 in personnel resources were expended to transition from the IBM 9021-720 mainframe to the IBM CMOS Multiprise 135 in 1997.

would be relocated to an alternate mainframe.[81] The estimate to transition MONIES to an RS/6000 was based on the quote from Stonehouse Technologies. We also included a cost estimate to operate the mainframe for one month in parallel during the transition for testing purposes.[82]

Hardware Purchases includes the costs for the MONIES RS/6000 server and communications equipment to enable remote printing at the House from the Legislative Branch mainframe. The costs for this communications equipment is presented in the application-wide cost category in Figure E.9 and is based on a vendor quote.

Year 2000 Renovation includes the costs to renovate all non-Year 2000 compliant applications.

Training includes a cost estimate of $1,000 for a training session for the 7 HIR staff members to assist with building additional skills for their new function (e.g., monitoring the service levels of the Legislative Branch service provider and serving as technical liaison between the House and the Legislative Branch service provider) .

E.2.4.2 Recurring Costs

Figure E.10 presents the recurring cost estimates. The Figure presents (1) annual recurring cost estimates and (2) a five year total of recurring costs discounted using the net present value calculation. These recurring costs are incurred on an annual basis throughout the five year period of the analysis. The primary differences in the recurring costs of this alternative compared with the FY 99 baseline are discussed below.

Personnel Salaries and Fringe Benefits

The personnel salaries and fringe benefits cost estimates decrease significantly from the FY 99 baseline. The personnel changes are as follows:

- **Computer Operations Support.** The number of positions in the HIR Enterprise Computing Group would be reduced from 13 positions to 7 positions.

- **Applications Maintenance.** The number of positions in the HIR Integration Group would remain at 10 positions.

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[81]A Legislative Branch agency indicated that the first year timesharing costs would be sufficient to cover their costs of transitioning the applications from the HIR mainframe to their mainframe. We included this additional transition cost estimate to represent the potential additional costs to the House, in personnel resources, for HIR to assist with the transition.

[82]This cost estimate includes cost factors for the mainframe processor, mainframe operating system software, utilities software, and mainframe storage devices, prorated for one month (approx. $100,000). It is assumed that sufficient planning and lead time would reduce the need for an extended parallel processing testing effort. A Legislative Branch service provider indicated that the first year timesharing fees would cover transition costs (i.e., testing).

- **Telecommunications.** The number of positions in the HIR Communications Group dedicated to the eight applications would remain at one position.

- **Office of Mailing Services.** The Office of Mailing Services would add two positions for change of address processing. These two positions would be transferred from the HIR Enterprise Computing Group.

Figure E.10: Relocate to Legislative Branch - Recurring Cost Estimates

Cost Factor	Annual Recurring Cost	5 Year Net Present Value Total
Personnel Salaries and Fringe Benefits		
Computer Operations (Enterprise)	$500,693	$2,212,114
Telecommunications (Communications)	$71,528	$316,016
Applications Maintenance (Integration)	$715,275	$3,160,164
Office of Mailing Services	$143,055	$632,033
Hardware (Lease and Maintenance)		
Mainframe Processor Costs	$0	$0
RAID	$0	$0
DASD	$0	$0
STK Tape Silos	$0	$0
FileNet Optical Disk Storage Unit	$61,933	$253,938
Printers	$148,700	$609,699
Printer Usage	$14,760	$60,519
New Hardware (Maintenance)	$32,250	$102,091
Software (License and Maintenance)		
Mainframe Operating system	$0	$0
Utility software	$0	$0
COTS Applications	$62,543	$256,438
External Vendor Services		
Inter-Agency Timesharing (Legis. Branch)	$266,600	$1,093,113
Disaster Recovery/Back-Up	$20,000	$82,004
NCOA Services (Gov't or Comm. Vendor)	$166,015	$680,694
Total Recurring Costs	**$2,203,352**	**$9,458,823**

Hardware (Lease and Maintenance)

The primary difference in the recurring hardware costs from the FY 99 baseline is the elimination of the lease and maintenance costs in the Mainframe Processor, RAID, DASD, and STK Tape Silos cost categories. These hardware items are no longer needed for this alternative.

The FileNet Optical Disk Storage, Printers, and Printer Usage costs remain the same. The printers would be required for remote printing at the House from the Legislative Branch service provider.

The cost estimates for new hardware represents the maintenance costs for the MONIES RS/6000 servers. These maintenance costs are estimated at 15 percent of the initial hardware purchase costs per year.

Software (License and Maintenance)

The primary difference in the recurring software costs from the FY 99 baseline is the elimination of the mainframe operating system license costs. The Legislative Branch service provider would be responsible for the costs of mainframe utility software associated with hosting LIMS, Financial Disclosure, Lobby Act, STUDIO, FOTO, and POPS.

The COTS application license fee would be reduced by the NCOA license fee, which would be eliminated because NCOA processing would now be performed by an outside vendor.

External Vendor Services

The external vendor services costs include the Legislative Branch service provider timesharing charges for hosting LIMS, Financial Disclosure, Lobby Act, STUDIO, FOTO, and Parking.

The NCOA processing fees are based on quotes obtained from vendors ranging from $1.50 to $4.00 per 1,000 records, depending on amount of pre- and post-processing of the data. We estimated the costs to the House for obtaining NCOA services from an external vendor by applying a $3.00 per 1,000 record price estimate to the average annual number of records processed for Members by HIR.[83] We used this conservative estimate of $3.00 to compensate for any pre- and post-processing services required by Members that the Office of Mailing Service may be unable to accomplish.

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[83]We obtained four years of NCOA transaction data from HIR. We calculated the average annual number of transactions from 1993 to 1996.

E.2.5 Replace with Client-Server COTS Cost Analysis

In the discussion below, we present the non-recurring and recurring cost estimates for this alternative. Figure E.11 summarizes the non-recurring and recurring cost estimates.

Figure E.11: Summary of Replacement Lifecycle Costs

Category	Estimated Costs
Non-Recurring Costs*	$2,676,829
Recurring Costs**	$8,022,595
Total Estimated Costs	**$10,699,424**

* First-year costs
** 5 year discounted costs

E.2.5.1 Non-Recurring Costs

Figure E.12 presents the non-recurring cost estimates for the Replace with Client-Server COTS alternative. The Figure presents cost estimates allocated to (1) the eight individual applications, as appropriate, and (2) an application-wide category that presents estimated costs incurred to support all eight applications. These non-recurring costs are assumed to be incurred during the first month of the lifecycle of this alternative and are not discounted.

Figure E.12: Replace with Client-Server COTS - Non-Recurring Cost Estimates

Application	Installation/ Conversion/	Software Customization	Hardware Purchase	Software Purchase	Training	Year 2000 Renovation	Total Non-Recurring Costs
Replacement with Client-Server COTS							
LIMS	$11,000	$0	$40,000	$0	$0	$423,000	$474,000
NCOA	$18,000	$5,500	$15,996	$65,000	$5,000	$0	$109,496
MONIES	$18,000	$5,500	$24,304	$300,000	$20,000	$0	$367,804
Financial Disclosure	$41,500	$550,000	$15,966	$40,000	$8,000	$0	$655,466
Lobby Act	$137,500	$550,000	$34,823	$40,000	$8,000	$0	$770,323
STUDIO	$18,000	$5,500	$2,999	$15,230	$2,000	$0	$43,729
FOTO	$18,000	$5,500	$2,999	$15,000	$2,000	$0	$43,499
POPS	$18,000	$5,500	$24,304	$38,000	$10,000	$0	$95,804
Application-wide	$100,708	$0	$0	$0	$16,000	$0	$116,708
Total	**$380,708**	**$1,127,500**	**$161,391**	**$513,230**	**$71,000**	**$423,000**	**$2,676,829**

The non-recurring costs for this alternative are significantly higher then the FY 99 baseline and the other system-wide alternatives, primarily because of hardware and software purchases and software customization costs for the new client-server COTS applications to replace the existing mainframe-based applications.

Installation and Conversion includes cost estimates for transitioning LIMS to the Legislative Branch. The conversion costs for the image files for Financial Disclosure and Lobby Act applications are based on the estimated number of image files and a quote obtained from a vendor. The installation and conversion costs estimated for NCOA, Financial Disclosure, Lobby

Act, STUDIO, FOTO, and POPS were based on the assumption that the effort to install and convert the COTS applications would be similar to the effort of transferring the applications to the RS/6000 servers. We also included a cost estimate to operate the mainframe for one month in parallel during the transition for testing purposes.[84]

Software Customization includes cost estimates to implement a client-server COTS application for Financial Disclosure and Lobby Act. These two applications would require significant tailoring and customization to meet the specific requirements of the Office of the Clerk. These costs were estimated based on research of the average level of effort for the implementation of similar scope imaging and document management projects. The software customization costs for the replacement client-server COTS for NCOA, STUDIO, FOTO, and POPS were assumed to be approximately ten percent of the effort required for the Financial Disclosure and Lobby Act applications, as these COTS applications would require significantly less customization.

Hardware Purchases includes the cost for servers and, where appropriate, workstations to host the client-server COTS replacements for NCOA, MONIES, Financial Disclosure, Lobby Act, STUDIO, FOTO, and POPS. LIMS does not incur hardware purchases because it is relocated to a Legislative Branch service provider. We also included a cost estimate for communications equipment to enable remote printing at the House for LIMS from the Legislative Branch service provider.

Software Purchases includes the purchase price of the client-server COTS applications that replace the mainframe-based applications. The estimate is based on the highest price for each application identified in the COTS survey in Exhibit B, *Application Requirements and Alternatives Analysis*.

Training includes a cost estimate of $1,000 for a training session for the applications users of NCOA, MONIES, Financial Disclosure, Lobby Act, STUDIO, FOTO, and POPS to cover basic user skills for the client-server COTS replacements for these seven applications. A training cost estimate is also included for the 7 HIR staff members to assist with building additional skills for their new function (e.g., monitoring the service levels of the Legislative Branch service provider and serving as technical liaison between the House and the Legislative Branch service provider).

Year 2000 Renovation includes the costs to renovate LIMS for Year 2000 compliance. All other non-compliant applications are being replaced with client-server COTS applications and would not be renovated.

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[84]This cost estimate includes cost factors for the mainframe processor, mainframe operating system software, utilities software, and mainframe storage devices, prorated for one month (approx. $100,000). It is assumed that sufficient planning and lead time would reduce the need for an extended parallel processing testing effort. A Legislative Branch service provider indicated that the first year timesharing fees would cover transition costs (i.e., testing).

E.2.5.2 Recurring Costs

Figure E.13 presents the recurring cost estimates. The Figure presents (1) annual recurring cost estimates and (2) a five year total of recurring costs discounted using the net present value calculation. These recurring costs are incurred on an annual basis throughout the five year period of the analysis. The primary differences in the recurring costs of this alternative compared with the FY 99 baseline are discussed below.

Figure E.13: Replace with Client-Server COTS - Recurring Cost Estimates

Cost Factor	Annual Recurring Cost	5 Year Net Present Value Total
Personnel Salaries and Fringe Benefits		
Computer Operations (Enterprise)	$500,693	$2,212,114
Telecommunications (Monies)	$71,528	$316,016
Applications Maintenance (Integration)	$643,748	$2,844,147
Office of Mailing Services	$143,055	$632,033
Hardware (Lease and Maintenance)		
Mainframe Processor Costs	$0	$0
RAID	$0	$0
DASD	$0	$0
STK Tape Silos	$0	$0
FileNet Optical Disk Storage Unit	$0	$0
Printers	$148,700	$609,699
Printer Usage	$14,760	$60,519
New Hardware (Maintenance)	$24,209	$76,635
Software (License and Maintenance)		
Mainframe Operating system	$0	$0
Utility software	$0	$0
COTS Applications	$77,235	$246,383
External Vendor Services		
Inter-Agency Timesharing (Legis. Branch)	$230,000	$943,045
Disaster Recovery/Back-Up	$20,000	$82,004
NCOA Services (Gov't or Comm. Vendor)	$0	$0
Total Recurring Costs	**$1,873,928**	**$8,022,595**

Personnel Salaries and Fringe Benefits

The personnel salaries and fringe benefits cost estimates decrease significantly from the FY 99 baseline. The personnel changes are as follows:

- **Computer Operations Support.** The number of positions in the HIR Enterprise Computing Group would be reduced from 13 to 7 positions.

- **Applications Maintenance.** The number of positions in the HIR Integration Group would be reduced from 10 to 9 positions.

- **Telecommunications.** The number of positions in the HIR Communications Group dedicated to the eight applications would remain at one position.

- **Office of Mailing Services.** The Office of Mailing Services would add two positions for change of address processing. These two positions would be transferred from the HIR Enterprise Computing Group.

Hardware (Lease and Maintenance)

The primary difference in the recurring hardware costs from the FY 99 baseline is the elimination of the lease and maintenance costs in the Mainframe Processor, RAID, DASD, and STK Tape Silos cost categories. The maintenance costs for the FileNet optical disk storage unit are also eliminated because the hardware purchased for the Financial Disclosure and Lobby Act replaces this FileNet unit. These hardware items are no longer needed for this alternative.

The Printers and Printer Usage costs remain the same. The printers would be required for remote printing at the House from the Legislative Branch service provider for LIMS.

The cost estimates for new hardware represents the maintenance costs for the new hardware purchases for the servers for the client-server COTS applications. These maintenance costs are estimated at 15 percent of the initial hardware purchase costs per year.

Software (License and Maintenance)

The primary difference in the recurring software costs from the FY 99 baseline is the elimination of the mainframe operating system license costs and utilities costs. The Legislative Branch service provider will be responsible for the software utilities costs associated with hosting LIMS.

The COTS application license fee would include application license and maintenance fees for the COTS applications replacing NCOA, MONIES, Financial Disclosure, Lobby Act, STUDIO, FOTO, and POPS.

External Vendor Services

The external vendor services costs include the Legislative Branch service provider timesharing charges for hosting LIMS and the disaster recovery fees.

E.2.6 Top-Ranked (Recommended) Alternative Cost Analysis

In the discussion below, we present the non-recurring and recurring cost estimates for the Top-Ranked, or recommended, alternative. Figure E.14 summarizes the non-recurring and recurring cost estimates.

Figure E.14: Summary of Top-Ranked Lifecycle Costs

Category	Estimated Costs
Non-Recurring Costs*	$1,120,758
Recurring Costs**	$8,880,912
Total Estimated Costs	$10,001,670

* First-year costs
** 5 year discounted costs

E.2.6.1 Non-Recurring Costs

Figure E.15 presents the non-recurring cost estimates for the Top-Ranked alternative. The Figure presents cost estimates allocated to (1) the eight individual applications, as appropriate, and (2) an application-wide category that presents estimated costs incurred to support all eight applications. These non-recurring costs are assumed to be incurred during the first month of the lifecycle of this alternative and are not discounted.

Figure E.15: Top-Ranked Alternative - Non-Recurring Cost Estimates

Application	Installation/ Conversion/	Software Customization	Hardware Purchase	Software Purchase	Training	Year 2000 Renovation	Total Non-Recurring Costs
Top-Ranked Alternative							
LIMS	$11,000	$0	$0	$0	$0	$423,000	$434,000
NCOA	$18,000	$5,500	$15,996	$65,000	$5,000	$0	$109,496
MONIES	$74,750	$0	$175,000	$0	$0	$20,000	$269,750
Financial Disclosure	$11,000	$0	$0	$0	$0	$0	$11,000
Lobby Act	$11,000	$0	$0	$0	$0	$20,000	$31,000
STUDIO	$11,000	$0	$0	$0	$0	$0	$11,000
FOTO	$11,000	$0	$0	$0	$0	$0	$11,000
POPS	$18,000	$5,500	$24,304	$38,000	$10,000	$0	$95,804
Application-wide	$100,708	$0	$40,000	$0	$7,000	$0	$147,708
Total	**$266,458**	**$11,000**	**$255,300**	**$103,000**	**$22,000**	**$463,000**	**$1,120,758**

Installation/Conversion includes cost estimates to transition LIMS, Financial Disclosure, Lobby Act, STUDIO, and FOTO to a Legislative Branch service provider, MONIES to an RS/6000 server environment, and NCOA and POPS to their client-server COTS replacement applications. We also included a cost estimate to operate the mainframe for one month in parallel during the transition for testing purposes.[85]

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[85]This cost estimate includes cost factors for the mainframe processor, mainframe operating system software, utilities software, and mainframe storage devices, prorated for one month (approx. $100,000). It is assumed that sufficient planning and lead time would reduce the need for an extended parallel processing testing effort. A Legislative Branch service provider

Software Customization includes the cost estimates to customize the client-server COTS replacement for NCOA and POPS.

Hardware Purchases includes (1) four additional workstations for the Office of Mailing Services for the additional change of address processing and the client-server COTS replacement for NCOA[86], (2) an RS/6000 server for MONIES, and (3) a server for the client-server COTS replacement for POPS. We also included a cost estimate for communications equipment to enable remote printing at the House from the Legislative Branch service provider presented in the application-wide cost category.

Software Purchases includes the purchase prices for the client-server COTS replacements for NCOA and POPS.

Training includes a cost estimate of $1,000 for a training session for the 7 HIR staff members to assist with building additional skills for their new function (e.g., monitoring the service levels of the Legislative Branch service provider and serving as technical liaison between the House and the Legislative Branch service provider) and for the application users that will be using the client-server COTS replacement for POPS and NCOA.

Year 2000 Renovation includes the costs to renovate all non-Year 2000 compliant applications, except POPS since it is being replaced.

E.2.6.2 Recurring Costs

Figure E.7 presents the recurring cost estimates.[87] The Figure presents (1) annual recurring cost estimates and (2) a five year total of recurring costs discounted using the net present value calculation. These recurring costs are incurred on an annual basis throughout the five year period of the analysis. The primary differences in the recurring costs of this alternative compared with the FY 99 baseline are discussed below.

Personnel Salaries and Fringe Benefits

The personnel salaries and fringe benefits cost estimates decrease significantly from the FY 99 baseline. The personnel changes are as follows:

- **Computer Operations Support.** The number of positions in the HIR Enterprise Computing Group would be reduced from 13 to 7 positions.

- **Applications Maintenance.** The number of positions in the HIR Integration Group would remain at 10 positions.

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indicated that the first year timesharing fees would cover transition costs (i.e., testing).
[86]The estimate of the number of workstations is based on requirements identified by the Office of Mailing Services.
[87]All recurring costs are discounted using net present value with a discount rate of 7 percent.

- **Telecommunications.** The number of positions in the HIR Communications Group dedicated to the eight applications would remain at one position.

- **Office of Mailing Services.** The Office of Mailing Services would add two positions for change of address processing. These two positions would be transferred from the HIR Enterprise Computing Group.

Figure E.15: Top-Ranked Alternative - Recurring Cost Estimates

Cost Factor	Annual Recurring Cost	5 Year Net Present Value Total
Personnel Salaries and Fringe Benefits		
Computer Operations (Enterprise)	$500,693	$2,212,114
Telecommunications (Monies)	$71,528	$316,016
Applications Maintenance (Integration)	$715,275	$3,160,164
Office of Mailing Services	$143,055	$632,033
Hardware (Lease and Maintenance)		
Mainframe Processor Costs	$0	$0
RAID	$0	$0
DASD	$0	$0
STK Tape Silos	$0	$0
FileNet Optical Disk Storage Unit	$61,933	$253,938
Printers	$148,700	$609,699
Printer Usage	$14,760	$60,519
New Hardware (Maintenance)	$38,295	$121,227
Software (License and Maintenance)		
Mainframe Operating system	$0	$0
Utility software	$0	$0
COTS Applications	$87,243	$352,386
External Vendor Services		
Inter-Agency Timesharing (Legis. Branch)	$263,600	$1,080,812
Disaster Recovery/Back-Up	$20,000	$82,004
NCOA Services (Gov't or Comm. Vendor)	$0	$0
Total Recurring Costs	**$2,065,082**	**$8,880,912**

Hardware (Lease and Maintenance)

The primary difference in the recurring hardware costs from the FY 99 baseline is the elimination of the lease and maintenance costs in the Mainframe Processor, RAID, DASD, and STK Tape Silos cost categories. These hardware items are no longer needed because storage for the applications is provided by the Legislative Branch service provider and the application servers for the client-server replacements would have adequate storage for NCOA and POPS.

The FileNet Optical Disk Storage costs remain because this hardware would be required to support Financial Disclosure and Lobby Act applications.

The Printers and Printer Usage costs remain the same. The printers would be required for remote printing at the House from the Legislative Branch service provider for LIMS.

The cost estimates for new hardware represents the maintenance costs for the new hardware purchases for the servers and workstations for the client-server COTS applications. These maintenance costs are estimated at 15 percent of the initial hardware purchase costs per year.

Software (License and Maintenance)

The primary difference in the recurring software costs from the FY 99 baseline is the elimination of the operating system license and utilities costs associated with the mainframe. The Legislative Branch service provide will be responsible for the costs for mainframe software utilities associated with hosting LIMS, Financial Disclosure, Lobby Act, STUDIO, and FOTO.

The COTS application costs include license and maintenance fees for the COTS applications replacing NCOA and POPS and the costs associated with MONIES and FileNet software for the Financial Disclosure and Lobby Act applications.

External Vendor Services

The external vendor services costs include the Legislative Branch service provider timesharing charges for hosting LIMS, Financial Disclosure, Lobby Act, STUDIO, and FOTO and disaster recovery fees.

E.3 Cost Sensitivity Analysis

We conducted a sensitivity analysis on the estimated costs (non-recurring and recurring) of the FY 99 baseline and the system-wide alternatives. The objective of the sensitivity analysis was to determine if a change in costs or assumptions would affect the recommendation of the Top-Ranked alternative over the FY 99 baseline and to further validate if the conclusion that each of the system-wide alternatives is more cost-effective than the FY 99 baseline.

The scenarios developed for the cost sensitivity analysis are defined as follows:

- **Mainframe Cost Reduction.** We decreased the FY 99 baseline cost factors associated with the mainframe processor, mainframe operating system, and utilities by 50 percent. This represents a scenario in which a significantly lower cost mainframe could possibly support the eight mainframe applications. Only the assumptions in the FY 99 baseline were changed for this scenario. As shown in Figure E.16, the results of this scenario indicated that the Top-Ranked alternative remains more cost-effective than the FY 99 baseline.

- **Transition Cost Increase.** We quadrupled the cost factors associated with installation and conversion, and training to represent a scenario in which the transition effort for each system-wide alternative is significantly more time consuming. We did not change any cost factors for the FY 99 baseline. Only the cost factors for the system-wide alternatives were increased. As shown in Figure E.16, all of the system-wide alternatives remain more cost-effective than the FY 99 baseline.

- **Lifecycle of Analysis Decrease.** We decreased the lifecycle of the analysis from five years to three years to assess whether a shorter analysis time period would affect the conclusions of the Study. As shown in Figure E.16, the shorter time period does not change the conclusions.

Figure E.16 presents the total lifecycle estimated costs of the FY 99 baseline and each system-wide alternative for each scenario defined above.

Figure E.16: Summary of Sensitivity Analysis Results

Sensitivity Analysis Scenario	FY 99 Baseline	Re-Platform to RS/6000	Relocate to Legislative Branch	Replace with Client-Server COTS	Top-Ranked Alternative
Mainframe Cost Reduction	$12,502,125	$13,001,542	$10,506,281	$10,699,424	$10,001,670
Transition Cost Increase	$14,481,547	$13,977,914	$11,284,653	$12,054,546	$10,867,042
Lifecycle of Analysis Decrease	$9,414,794	$8,854,598	$6,944,875	$7,645,141	$6,644,335
Study Results Benchmark	$14,481,547	$13,001,542	$10,506,281	$10,699,424	$10,001,670

As depicted in the above Figure, the sensitivity analysis indicates that the Top-Ranked alternative remains the most cost-effective alternative under all scenarios. Under the Mainframe Cost Reduction scenario, the FY 99 baseline becomes more cost-effective than the Re-Platform to RS/6000 alternative.

E.4 Qualitative Analysis

In addition to the cost analysis and sensitivity analysis, we performed an assessment of qualitative, or non-quantifiable, factors for the system-wide alternatives. The qualitative analysis was intended to be used as a "tie-breaker" in the event that the cost differences between the system-wide alternatives and the FY 99 baseline was insignificant. Since the cost differences are not insignificant and clearly indicate the cost-effectiveness of the alternatives, the results of this qualitative analysis could be used to assess areas that need to be addressed during the mainframe migration.

The five qualitative factors that we identified for this analysis are presented in Figure E.17. This Figure presents a definition of each factor and a description of how each factor was scored.

Figure E.17: Definition of Qualitative Factors and Scoring Methodology

Qualitative Factor	Definition	Scoring
Performance	The level of throughput, transaction speed, up-time, reliability, and accessibility associated with an alternative.	+ More effective than baseline O Same as baseline - Less effective than baseline
User Requirements	The level of satisfaction of range of application user requirements for the alternative.	+ More effective than baseline O Same as baseline - Less effective than baseline
Management Control	The management of the outcomes, processes, schedules, and costs associated with an alternative.	+ More effective than baseline O Same as baseline - Less effective than baseline
Security Risk	The risks associated with application, network, and physical security associated with the implementation of an alternative.	+ Less risk than baseline O Same as baseline - More risk than baseline
Commercial Acceptance	The availability of knowledgeable customer support, upgrades, documentation, and proven success in the marketplace of an alternative.	+ More effective than baseline O Same as baseline - Less effective than baseline

Figure E.18 presents the overall results of the high-level qualitative assessment of each system-wide alternative. The FY 99 baseline is scored with a "O" for each qualitative factor. The system-wide alternatives are then scored using the FY 99 as a benchmark (i.e., more effective, neutral, or less effective than the baseline). The results indicate that there are differences between the system-wide alternatives and the baseline. However, these differences are not significant enough to reevaluate the conclusions based on the cost analysis. The primary issues indicated for the Top-Ranked, or recommended, alternative are management control and security as a result of outsourcing the data processing of applications to an outside vendor. These factors can be mitigated by proper planning and contracting (management control) and information systems risk management planning (security).

Figure E.18: Overall Results of Qualitative Analysis

Qualitative Factor	FY 99 Baseline	Re-Platform to RS/6000	Relocate to Legislative Branch	Replace with Client-Server COTS	Top-Ranked
Performance	O	O	O	O	O
Stakeholder Requirements	O	O	O	O	O
Management Control	O	O	-	+	-
Security Risk	O	O	-	O	-[88]
Commercial Acceptance	O	O	O	+	O

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[88]The security risk for the MONIES application is actually rated more effective than the baseline because of the ability to isolate the application and its data on an individual server. The overall score for the Security Risk category is "-" because of the security risks associated with hosting LIMS, Financial Disclosure, Lobby Act, STUDIO, and FOTO on a mainframe outside the House of Representatives. Proper security planning and controls would mitigate this risk.

Exhibit F
Guidelines for Planning the Mainframe Migration

Guidelines for Planning the Mainframe Migration

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Guidelines for Planning the Mainframe Migration

This exhibit provides advice for planning for the migration of the eight applications on the U.S. House of Representatives' (House) mainframe. It includes the identification of key planning tools and advice regarding how to proceed with the results of this Study. Specifically, the exhibit presents advice on the following:

- Establishment of a Migration Implementation Team.
- Development of a work plan and migration implementation milestones.
- Validation of the Study.
- Selection of a migration solution.
- Development of a migration implementation plan.

Utilizing the advice presented in this exhibit should minimize the risk of not expeditiously completing the migration and of over-looking key steps needed to migrate the applications.

F.1. Establishment of a Migration Implementation Team

The success of implementing the migration solution for the eight mainframe-based applications addressed in this Study will greatly depend on the qualifications of individuals assigned and the amount of time they devote to this project. Without a fully-devoted, qualified implementation team, the implementation tasks may not be thoroughly completed or completed in a timely manner. To help ensure a successful migration, we recommend:

- A Migration Implementation Team be established immediately.
- The Migration Implementation Team be led by a project manager who will be directly responsible for the success or failure of the project.
- A Charter be prepared that clearly defines the (1) project goals and objectives, and (2) the organizational structure of the Migration Implementation Team and their specific responsibilities.
- The Migration Implementation Team be comprised of full-time individuals that are solely dedicated to this project.
- The Migration Implementation Team be comprised of individuals whose job function will not be greatly impacted by the results of this project. For example, some individuals may require training for a new House position because their previous position was terminated as a result of the migration solution. These individuals may not be motivated to help the project succeed.

F.2. Development of a Work Plan and Milestones

To assist the project manager in managing and executing the migration of the mainframe-based applications, we suggest that a comprehensive work plan be developed. The work plan

should serve as a master plan, which would allow the project manager to monitor progress and facilitate reporting to the Chief Administrative Officer (CAO) and Committee on House Oversight (CHO).

The success of managing and executing large-scale projects greatly relies on a sound work plan. The work plan should encompass planning the overall migration effort—i.e., identify all tasks that need to be completed in order to migrate the eight applications. This should include identifying all pertinent tasks, such as validating the Study analyses of alternatives, performing detailed analyses, coordinating with other House offices regarding initiatives that would affect the individual applications, and selecting migration solutions. The work plan should also include developing an implementation plan, actual implementation (e.g., migrating the applications to another platform) activities, and post-implementation (e.g., assessing the performance of the migration solution) activities. The time frames for the completion of the tasks should be based on the level of effort and availability of resources to complete the tasks.

As part of developing the work plan, the migration implementation dates will need to be determined. The migration implementation date is dependent on several factors:

- The actual time required to complete the implementation tasks identified in the work plan.
- Coordination with other House initiatives that affect the House's mainframe (e.g., Year 2000 Project and Human Resources/Payroll System Implementation Project).
- Coordination with other House offices regarding initiatives that would affect the individual applications that are the subject of this Study (e.g., Office of the Clerk replacement initiatives).

Without a thorough work plan, all tasks needed to migrate the eight applications may not be identified and completed or coordinated with the completion of other implementation tasks. Such oversights could ultimately contribute to the failure of the project.

F.3.   Validation of the Study

After the establishment of a dedicated Migration Implementation Team and development of a work plan, the results of this Study should be validated. The process of validating this Study will further assist the Migration Implementation Team in understanding the analysis and results of the Study. Having a thorough understanding of the Study will assist the Migration Implementation Team in performing a timely selection of the migration solution and commencing the planning and execution of the migration.

As part of the validation, we suggest the Migration Implementation Team perform further detailed analysis of the results presented in the Study to determine the most technically and cost-effective solution for each of the eight applications. We recommend using the following steps to validate this Study:

1. Validate the assumptions employed in the Study.
2. Validate the alternative analysis.
3. Validate technical solutions.
4. Validate costs and benefits.
5. Confirm the recommended alternative.

The sections below define these processes and anticipated outcomes of completing the recommended validation steps.

F.3.1 Validate the Assumptions Used in Study

Because of the short time frame for completing this Study, many factors that impacted the results of the Study could not be identified or definitively determined. For example, the data collected during the Study could not be independently validated. Therefore, before validating other aspects of this Study, the following assumptions should be reviewed and validated:

- The scope of the Study did not include outsourcing House Information Resources (HIR), only outsourcing the House's mainframe.
- The mainframe-based applications need to be expeditiously migrated over a two-year transition period (i.e., no later than the third quarter of FY 1999).
- The internal controls, including adequate security of the migration solution, will be assessed as part of CAO's mainframe migration validation and selection process.
- The Study excludes the analysis of migration options for the House's external clients (i.e., General Accounting Office and Congressional Budget Office) whose applications are currently operating on the House mainframe.

F.3.2 Validate the Alternatives Analysis

As presented in Exhibit B, *Application Requirements and Alternatives Analysis*, the alternatives analysis performed for each of the eight applications was based on high-level user and technical requirements. In validating the alternative analysis for each application, we recommend using the high-level requirements as a baseline to identify lower level requirements. We also recommend performing a more detailed assessment of application security and controls as part of the validation. This process will support the confirmation of alternatives identified and recommended in the Study. Prior to the final determination of the solution that best meets the House's requirement, the following is recommended:

1. Perform comprehensive market research to explore the ability of the marketplace to provide competitive solutions within the framework of the recommended alternative.
2. Request an operation capabilities demonstration from vendors for COTS solution(s).
3. Meet with representatives associated with outsourcing and relocation alternatives to determine their baseline services.

F.3.3 Validate the Technical Solutions

0
As presented in Exhibit D, *Technical Environment Definition*, the technical solutions developed were based on the system-wide alternatives analysis performed for each application. The technical solutions should be reviewed to assess the technical feasibility and practicality of the general solutions for the House. The information contained in this exhibit can be used later by the Migration Implementation Team to develop the technical architecture for the selected migration solution once the solution is selected.

F.3.4 Validate the Costs and Benefits

As presented in Exhibit E, *Cost-Benefit Analysis of System-Wide Alternatives*, the costs and benefits used in the Study were based on high-level estimates. These figures should be reviewed to assess whether the cost and benefit figures can be further defined into lower detail. Where costs and benefits can be refined, net cost-benefit and net present value should be recalculated.

F.3.5 Confirm the Recommended Alternative

Using the results of the validation of the previous parts of the Study, the recommended alternative should be confirmed or another alternative should be determined by the Migration Implementation Team. The results of this step should be used as a basis for selecting the specific migration solution for each application.

F.4. Selection of a Specific Migration Solution

The viable migration alternatives in this Study are presented as general solutions. For example, we identify that there are viable COTS packages available that would generally meet the user requirements and the migration criteria. However, we do not recommend a specific COTS alternative. The process of actually selecting application or system-wide alternatives should be open and explicit, and include the:

- Establishment of stakeholder design and an evaluation group which will take ownership of both the general framework and the actual implementation process.
- Development of explicit performance standards for the implementation process.
- Development of explicit statements of work, incorporating mandatory and qualitative requirements.
- Emphasis upon open competition, even between related providers.
- Aggressive scheduling to avoid: (1) obsolescence of technical objectives in today's dynamic information technology market, and (2) increases to the costs associated with migrating the applications (e.g., the cost of hardware needed to support the migration may increase over time).
- Emphasis upon the functional solution from providers, rather than detailed directions given to them.

Once the specific migration solution is selected by the Migration Implementation Team, we suggest the solution be presented to the CAO for approval. The CAO should then present to the CHO the recommended solution and targeted dates for migrating the mainframe-based applications.

F.5.   Development of the Migration Implementation Plan

Another key planning tool for the migration of the eight mainframe-based applications is the development of a migration implementation plan. The migration implementation plan provides a road map describing how the House will actually migrate the applications. By developing a migration implementation plan, the Migration Implementation Team will have a single reference for performing all key aspects of the migration. Thus, the migration implementation plan will ensure that no key migration aspect is missed.

Listed below are key migration items that should be considered for inclusion in the migration implementation plan, regardless of the migration solution selected:

1. **Detailed technical architecture** - defines the technical architecture needed to support the migration solution.
2. **Performance standards** - presents the performance standards for the eight applications.
3. **Transition plan** - addresses the activities needed to transition each application to its migration solution.
4. **Security plan and disaster recovery plan** - presents the assessment of the compliance of the migration solution to the House's security program policies and procedures and describes the steps that should be performed to ensure effective security and disaster recovery plan.
5. **Resources management technical plan (Funding Plan)** - identifies the spending plans for the migration of the applications.
6. **Human resources plan** - addresses the skill sets needed to support the transition, implementation and execution, and support of the new environment and addresses the potential displacement of current HIR staff.
7. **Acquisition plan** - identifies the acquisitions needed to support the migration and addresses the methods to purchase the new items.
8. **Fee-for-service structure** - identifies the applications that will require a fee-for-service chargeback and the structure for the chargeback.
9. **Management oversight and contract administration** - addresses the required skills necessary to effectively monitor the implementation and performance of the migration solution.

The Office of Management and Budget Bulletin 96-02, *Consolidation of Agency Data Centers*, provides additional guidance that the Migration Implementation Team should consider in developing the implementation plan.

F.5.1   Detailed Technical Architecture

This section of the implementation plan should define the technical architecture for the application migration solution(s). The technical architecture should describe in depth the existing environment and, in functional outline form, the proposed technical environment.

Listed below are aspects of the technical environment that should be addressed at a minimum in this section of the implementation plan.

- Information processing environment, including processor platforms, on-line storage requirements, and terminals.

- Resource allocation by user environments (in terms of system use and associated costs).

- Physical layout including hardware placement, cabling, communications, power distribution, and heating, ventilation, and air conditioning (HVAC) requirements.

- Connectivity and communications.

- Input and output access to the system.

- COTS and operating system software.

- Security.

It should be noted that all elements of the technical architecture listed above may not apply to each application's migration solution, but a conscious decision should be made in excluding an element. Exhibit D, *Technical Environment Definition*, includes a general description of the technical environment for the system-wide alternatives identified in this Study. The information contained in this exhibit can be used as a basis to complete this section of the implementation plan for any alternative selected from this Study. However, a detailed analysis to determine the technical architecture of the selected migration solution will need to be performed by the Migration Implementation Team.

F.5.2 Performance Standards

This step of the process results in the development of preliminary, stakeholder-driven performance standards for the eight applications and for intermediate steps during the migration process. This is to ensure satisfaction of customer requirements and contract compliance.

Existing system performance standards provide a critical benchmark by which future system and contract performance can be measured. These standards are driven by system customers and by HIR support staff. These application performance benchmarks include:

- **Uptime/Downtime -** measures the time that resources are available or unavailable during the normal working hours.
- **Output and Delivery** - measures the timely performance of the delivery of resources, reports, and other types of electronic outputs and deliverables.
- **Response time -** measures the responsiveness of the Help Desk, Network Operations Center staff, and other support staff.
- **Resource capacity** - measures the ability to provide additional resources to complete a task.
- **Customer satisfaction** - measures end-user level satisfaction with the system.

F.5.3   Transition Plan

The transition plan provides the detailed road map to transition the application from the existing system to the complete implementation of the solution. This plan should address the activities needed to transition each mainframe-based application to its migration solution, and address the coordination with other initiatives that impact the House's mainframe. Listed below are examples of activities that are typically included in a transition plan.

- Define a baseline workload mix and corresponding performance levels that must be met by the migration solution. These performance levels are derived from the performance standards defined in the previous step.

- Establish acceptance criteria with users and the relocation site.

- Reconfigure the relocation site to accommodate additional data processing and communication workload requirements.

- Integrate and test systems to ensure that the applications perform as expected after the migration.

- Move the data processing workloads to relocation sites, if required.

- Ensure that the relocation site is performing at acceptable levels in accordance with mutually agreed upon criteria.

Generally, this Study recommends that Year 2000 migration efforts be given priority over both scheduling and resources. The transition plan should explicitly consider Year 2000 efforts that would be affected by actions taken with respect to the eight applications or the alternatives recommended by this Study.

F.5.4   Security Plan and Disaster Recovery Plan

This implementation plan section presents the assessment of the compliance of the migration solution to the House's security program policies and procedures. It also describes the steps that should be performed to ensure effective security, rollback processes at critical junctures of the project along with the provision for prototyping, test bed approaches and proof-of-performance, and a disaster recovery plan during the migration process.

The security plan should include at a minimum:
- Assessment of the compliance of the migration solution to the House's security program policies and procedures.
- Definition of the security environment for the migration solution.
- Identification of security requirements.
- Establishment of customer and data center security roles and responsibilities.
- Description of core security services provided by the relocation site and any unique customer security services.
- Description of how security services will be provided, periodically reviewed, and tested.
- Identification of security training.
- Documentation of security procedures.

The disaster recovery plan and rollback plan should include at a minimum:
- Identification of critical House operations.
- Description of how critical House operations will be recovered in the event of a prolonged service interruption or disaster.

F.5.5   Resources Management Technical Plan

The resources management technical plan should include the spending plans for the migration of the applications. Listed below are examples of potential non-recurring and recurring costs that the House could incur in the migration of the applications.

Non-Recurring costs include:

- Installation/Conversion/Testing.
- Software development.
- Hardware purchase.
- Software purchase.
- Training.
- Year 2000 software renovation.
- Mainframe disposition.

Recurring costs include:

- Personnel salaries and fringe benefits.
- Hardware (lease and maintenance).
- Software (license and maintenance).
- Communications.
- Supplies.
- Facilities.
- External vendor services.

F.5.6   Human Resources Plan

The displacement of personnel could be a consequence of migration. The human resources plan should be developed with the objective of retaining the necessary HIR personnel to successfully support the transition, implementation, and execution of the migration as well as provide a supportive environment for the inevitable personal displacement that will occur.

Skill set retention should include items such as:

- Personnel skill requirements for each application that is being replaced with a COTS solution.
- Training and retraining requirements.
- Retention of critical skills within HIR where full-time employment of specific skills is not anticipated.

Existing personnel support should include items such as:

- Outplacement options.

- Transfer options within the House and to the relocation site.

- Retraining opportunities.

F.5.7   Acquisition Plan

The acquisition plan should include elements of the acquisition process, competition, definition of the vendor universe, schedule of events, and resources required during the acquisition process. The acquisition plan should identify acquisitions needed to support the migration of the applications, and address the methods available to purchase the new items. Listed below is advice on developing the acquisition plan, including (1) identifying potential acquisition items, (2) acquisition methods, and (3) contracting considerations.

Acquisition Items

Listed below are sample acquisition items that may need to be procured for the migration:

- Implementation (hardware, software, communications, and related installation services).
- One-time development (including customization of COTS solutions).
- Training.
- Planning support.
- Independent validation and verification.
- Help desk and related support services.
- Maintenance, including upgrade customization of COTS solutions, and version upgrades.
- Licensing.
- Outsourcing services.
- Input/Output and processing services.
- Reimbursable services.

Acquisition Methodologies

The acquisition plan should also address the methods available to purchase equipment, services, and supplies. Acquisition methodologies will differ according to the actual solution. Firm, fixed-price, and cost-based acquisitions can be effectively employed. However, for all acquisitions, several general recommendations are listed below:

- Clearly specified functional designs are preferred over House dictated designs.
- Competitive acquisitions are preferred over non-competitive.
- Best value acquisitions (cost and technical) are preferred over cost- or technical-only acquisition processes.
- The creation of business partnerships can provide significant added value to acquisitions. Incentives for superior performance can be as valuable as penalties for poor performance.
- Development of performance metrics can be an offeror-developed element of proposals.
- Clearly stated and explicit statements of work that precisely define existing and anticipated environments should be developed.
- Specific recommendations are appropriate for application level acquisitions.
- For acquisitions that require a reimbursable agreement to relocate applications onto another Legislative Branch mainframe, we recommend negotiating a firm, fixed price for services and establishing explicit service level agreements.
- Solutions that anticipate later redeployment of hardware should incorporate those future transition elements in the original proposal.

Acquisition Contracting Considerations

Prior to entering into a contract, the following negotiation factors should be considered to ensure that expectations are realized[89]:

- **Measure everything during the baseline period**. The baseline period is the yardstick that determines what services the vendor is obligated to provide the customer. It is suggested that every service during the baseline period be measured to ensure that these services will be included under the fixed fee obligation. This measure will assist the House in avoiding charges for excess fees for services above and beyond the baseline.
- **Develop service level measures and reports**. As the baseline measures provide a yardstick for the vendor's obligations during the arrangement, the customer or vendor may wish to add, combine, improve, or delete measures. It is important that a service level measure unequivocally express the level of required service by the vendor. In addition, the vendor should be required to report on these measures to ensure the agreed upon service level and service performance levels are tracked and monitored.
- **Specify escalation procedures**. The customer and vendor should agree on problem escalation procedures in the event the vendor is unable to meet a service level measure. This ensures that fault can be determined for each missed measure thus allowing appropriate action to be taken.
- **Include penalties for non-performance**. Cash penalties tend to motivate the vendor to perform, although the customer may not be fully compensated if the vendor does not perform to the level of highest expectations. Penalties for non-performance may minimize severe service degradation.
- **Determine growth**. Most outsourcing contracts include a growth rate where the customer gets a certain amount of growth free of charge, as the customer shares the benefits of price/performance improvements. However, growth should not be under-estimated in order to avoid future excess charges.
- **Adjust charges to changes in business volume**. A clause for severe volume fluctuations should be included in the contract. This clause should assist in the expedition and identification of solutions for any adjustments resulting from severe volume fluctuations, whether they are monetary, time related, or the redirection of resources.
- **Include a termination clause**. This clause protects both parties, and should require either party to notify the other within a specified time period upon the need to terminate services. Failure to provide adequate notice could result in a severe penalty charge.
- **Beware of "change of character" clauses.** This provision states that the customer will be charged for any changes in functionality. It is suggested that the contract explicitly specify what changes will initiate an excess charge and what changes will be included in the baseline fee to avoid any misunderstanding of expectations regarding functionality.
- **Ensure only completed contracts are signed**. The outsourcing vendor may be anxious to close negotiations swiftly and an incomplete contract may be signed. It is advised that only a completed contract, which specifies all terms clearly, be signed in order to avoid a misunderstanding of expectations.

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[89]Lacity, M., and Hirschheim, R., *Information Systems Outsourcing Myths, Metaphors and Realities*, John Wiley & Sons Ltd, West Sussex, England, 1993.

F.5.8   Fee-for-Service Structure

Where chargebacks or fee-for-services are anticipated at a customer level, the foundational processes should be developed at an early stage to ensure that the budgetary and business process effects are incorporated into all other relevant planning processes. This section of the plan should identify which migration solution will require a fee-for-service chargeback and the structure for the chargeback. Applications that are candidates for a fee-for-service chargeback include those that:

- **Provide a service to Member, Committee, or other House offices**. For applications that provide a service, the recipient of the service should be charged a fee for the service. For example, NCOA provides a service to Members. The Members that use this service should be charged a fee for the service regardless of where the application is migrated.
- **Track Member, Committee, and other House office expenses outside the House's Federal Financial System**. For applications that track the use and the cost of services provided by House offices, the cost of services should be charged-back to the user. For example, FOTO tracks the use and the cost of the Office of Photography services. These costs should be charged-back to the recipient accordingly and recorded in the House's FFS.
- **Reside at a relocation site**. For applications that are selected to be relocated to another Legislative Branch mainframe, the cost for the relocation site to host and operate the application should be charged-back to the House. The CAO will need to determine which House office(s) will fund the costs. For example, the Office of the Clerk could pay a fee-for-service charge for the cost of LIMS to reside and operate on a Legislative Branch mainframe.

For each application that requires a chargeback fee, the following structure should be considered:

- A mechanism for tracking system usage and monitoring operational costs.
- The establishment of the service rates.
- Automatic billing or chargeback process.

F.5.9   Management Oversight and Contract Administration

The management oversight and contract administration performed during the migration effort and during system operation will, to a considerable extent, determine the success of the selected solution. The planning for this function should address the required skills necessary to effectively monitor the performance of the solution at every stage of the effort. Some skills will be available from House resources while others may be most effectively obtained from outsourcing (especially specific technical expertise, independent validation, and verification of performance).

Listed below are examples of technical and management oversight and contract administration actions that the Migration Implementation Team should consider in planning for and performing the migration.

<u>Technical and management oversight actions</u>

- Identify the mechanisms for managing the relocation site and the individual responsible for monitoring the performance of the relocation site.
- Carefully monitor performance against established performance standards. Have a remedial plan in place for situations where these standards are not met.
- Solicit customer feedback at regular intervals to determine the level of satisfaction with implemented solutions.
- Monitor and manage input/output operations that remain within the House.
- Prepare and adopt an internal "upgrade and migration plan" for constant improvement of the implemented solution. Mechanisms to encourage this include customer suggestions or customer nominated improvements.

<u>Contract administration actions</u>

- Precisely define required outcomes (i.e., acceptance criteria).
- Manage expectations of outcomes among program officials and customers.
- Document the roles, responsibilities, and contributions to be made by the House in the performance of the contract.
- Explicitly document all contract actions.
- Establish regular status meetings where contractor officials authorized to commit the entity are present.

Exhibit G

List of Acronyms

List of Acronyms

ACF2	Computer Associates' Access Control Facility 2
AT&T	American Telephone & Telegraph
CAO	Chief Administrative Officer
CBO	Congressional Budget Office
CHO	Committee on House Oversight
CICS	Customer Information Control System
CISWG	Computer and Information Services Work Group
CMOS	Complementary Metal Oxide Semiconductor
CMS	Correspondence Management System
COTS	Commercial Off-The-Shelf
DASD	Direct Access Storage Device
DNS	Domain Name Services
DOI	U.S. Department of the Interior
DOS	Disk Operating System
FDDI	Fiber Distributed Data Interface
FFS	Federal Financial System
FMS	Financial Management System
FOTO	Photography
FY	Fiscal Year
GAO	General Accounting Office
GPO	Government Printing Office
GSA	General Services Administration
HIR	House Information Resources
House	U.S. House of Representatives
IBM	International Business Machines
ID	Identification
I/O	Input/Output
ISIS	Integrated Systems And Information Services
ISPP	Information Systems Program Plan
JES2	Job Entry System 2
KBPS	Kilobytes Per Second
LAN	Local Area Network
LIMS	Legislative Information Management System
LOC	Library of Congress
MB	Megabytes
MIN	Member Information Network
MIPS	Millions of Instructions Per Second
MONIES	Management of Network Income, Expense, and Services
MVS	Multiple Virtual Storage
MVS/ESA	Multiple Virtual Storage/Extended Systems Architecture
NCOA	National Change of Address
OIG	Office of Inspector General
OMB	Office of Management and Budget

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OSM	Office Systems Management
PBX	Private Branch Exchange
PC	Microcomputer
POPS	Parking Office Permit System
RAID	Redundant Array of Inexpensive Disks
SAA	Sergeant at Arms
SDLC	System Development Life Cycle
SNA	System Network Architecture
STK	Storage Tek
STUDIO	Recording Studio System
TCP/IP	Transmission Control Protocol/Internet Protocol
TSO	Time Sharing Option
VSAM	Virtual Storage Access Method
VSE	Virtual Storage Extended
VTAM	Virtual Telecommunications Access Method
WAN	Wide Area Network
WASC	Washington Administrative Service Center
Y2K	Year 2000

Appendix

CAO Management Response To The Draft Report

James M. Eagen III
Chief Administrative Officer

**Office of the
Chief Administrative Officer
U.S. House of Representatives**
Washington, DC 20515–6860

MEMORANDUM
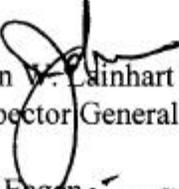
TO: John W. Lainhart IV
            Inspector General
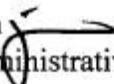
FROM: Jay Eagen
            Chief Administrative Officer

SUBJECT: Response to Mainframe Migration Options Study

CC: Tim Campen, Jerry Boho, Peggy Hyland, Greg Wills

DATE: February 26, 1998

The "Mainframe Migration Options Study at the U.S. House of Representatives" discussion draft report was reviewed in technical sessions with HIR management. The draft document's recommendations provide a good basis to begin more detailed planning; and we do have some "big picture" comments, which are cited in the "Overview Comments" section below.

We now turn to the task of developing a Mainframe Migration (MFM) implementation plan. The plan must deal with the resources, major project concurrency and the migration destination concerns referenced below. As you know well, considerably more effort will be required to move from the study phase to an implementation plan; and your offer of contract resources to assist in this endeavor is greatly appreciated. It will be especially helpful to have technical personnel, who worked on the study, join HIR as integral members of the MFM implementation-planning group.

CAO comments follow:

Overview Comments

- Major assumption that destination environment (Leg. Branch mainframe environment) is available on target date, Y2K compliant, and compatible.
  The concern here is that the equipment and software available at the candidate Legislative Branch organizations are not Y2K compliant and will require significant upgrading to accommodate the migrating systems. There is also no schedule for identifying when the hardware and software at the destination site will be available.

- Study's resource estimates do not include concurrent Y2K, mainframe migration, payroll and asset management replacement activities. The same personnel resources at HIR will be spread across all of these tasks.

- Top rated alternative requires approximately $350,000 hardware/software expenditures in CY98. The "Top-Ranked Alternative – Non-Recurring Cost Estimates Table" (p. E.22) lists the costs for this recommendation. This hardware ($255,300) and software ($103,000) must be procured in late FY98 or early FY99. This expense has not been budgeted in either fiscal year's budget.

- Replacing mainframe based NCOA service with Fastforward requires further analysis. Initial investigation indicates the use of Fastforward with outside vendor software does not provide the same capabilities as NCOA.

- "The mainframe-based applications need to be expeditiously migrated by the third quarter of FY 1999" (page 4) needs to be qualified with "provided the effort can be completed in conjunction with Y2K compliance effort." The third quarter 3Q/FY99 is a stated goal. However, other efforts (such as Y2K compliance) simultaneously underway may prevent the full migration by the stated date. Unforeseen complications or contingencies may cause delays as well.