



U.S. DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT
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OFFICE OF THE INSPECTOR GENERAL

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SUBJECT: Interim Review on HUDCAPS Performance-Year 2000 Compliance

INTRODUCTION

We are conducting a performance review of HUD's Central Accounting and Program System/Federal Financial System (HUDCAPS). HUDCAPS is HUD's core financial system and considered a critical, major risk system at HUD. As part of our review, we evaluated HUD's current effort to make HUDCAPS Year 2000 compliant.

Our review disclosed several areas that, if not addressed, could result in HUDCAPS system failure in Year 2000. Because of our concerns and the time sensitive nature of the Year 2000 work, we are providing this interim report for your immediate consideration. We discussed the results and recommendations of our review at a meeting on December 17, 1997 with representatives of the Office the Chief Financial Officer (CFO), Office of Public and Indian Housing (PIH), and the Office of Information Technology (IT). We are requesting that you provide a formal response to our findings and recommendations by January 23, 1998.

SUMMARY

During our review of HUDCAPS performance, we found that HUD has not taken adequate steps to minimize the impact of the Year 2000 problem. Specifically, HUD has not (1) developed a Year 2000 detailed project plan for HUDCAPS, (2) assessed the adverse impact of stored dates on HUDCAPS application processing, (3) traced and mapped the missing source code modules with date fields to the executable modules, and (4) developed a test strategy and acquired the necessary test supporting tools. Additionally, HUD has not yet completed the implementation of configuration management software (ENDEVOR) for HUDCAPS. Without adequate configuration management, HUD cannot ensure that the Year 2000 changes are properly made to avoid system failures, errors and omissions.

BACKGROUND

The upcoming century date change is considered to be one of the most critical problems facing information technology today. Defining the problem is relatively straightforward but the solution is much more complex. The Year 2000 problem is rooted in the way dates are recorded and computed in many computer systems. For the past several decades, systems have typically used two digits to represent the year in order to conserve on electronic data storage and reduce operating costs. Calculations work fine as long as the dates are in the same century. However, as we move between centuries, the two digit format will result in the Year 2000 being indistinguishable from 1900. Because of this ambiguity, most legacy and some recent systems and applications that use dates to perform calculations, comparisons, or sorting may generate incorrect results when working with years after 1999. Additionally, systems and applications that use calculation or logic operations using dates in the future will run into the problem even sooner as these dates come closer to the Year 2000.

HUDCAPS is currently a critical financial system supporting the Section 8 program of Public and Indian Housing (PIH) and HUD's administrative accounting. Although HUDCAPS will eventually be replaced by a new integrated financial system, which should be 2000 compliant, the new system will not be implemented in time to resolve the Year 2000 problem. Consequently, HUD must implement a Year 2000 solution for the current HUDCAPS system. Adding to the complexity of this problem is that this system also has interfaces to other HUD financial reporting and application systems such as the Program Accounting System (PAS) and the Central Reporting System (CRS).

In response to the Year 2000 problem, HUD's Office of Information Technology (IT) established the Team 2000 Project Office in June of 1996. Although the mission of Team 2000 is to ensure that HUD's application systems are Year 2000 compliant, responsibility for implementing the conversion tasks necessary to ensure compliance rests with the system's owners. They have the responsibilities to ensure that the system will be able to compute HUD business rules accurately before, during and after January 1, 2000 regardless of whether dates are received from the computer's operating system, a data repository, an external interface, or user input. Accordingly, a well planned, coordinated, and structured approach to the Year 2000 problem is crucial to ensure its successful implementation. Current plans call for HUDCAPS to be Year 2000 compliant by August, 1998.

RESULTS

Our evaluation showed that HUD's progress in implementing HUDCAPS Year 2000 date conversion tasks has not been sufficient. As a result, HUDCAPS may not be Year 2000 compliant by the scheduled date of August, 1998.

Need to Develop a Detailed Project Plan

The Department of Housing and Urban Development's Central Accounting and Program System/Federal Financial System will be upgraded from its current version of FFS 5.2 to FFS release 5.3.1. Under the scope of the FFS release 5.3.1 upgrade effort, HUDCAPS is to be fully Year 2000 compliant. An implementation analysis has been prepared which contains the specifications for the integration of current HUDCAPS software with FFS release 5.3.1. However, a detailed project work plan has not been completed for implementing the changes required to make the HUDCAPS Year 2000 compliant. IT is responsible for the detailed plan and is currently working on the plan.

A detailed project work plan is required so as to show the major steps to be taken in converting and testing the code, establishing the necessary infrastructure, and determining the resources required to accomplish these tasks. Without this plan, management has no basis to determine the level of effort required nor the resources needed to complete the project. Consequently, there is an increased risk that the project may not be completed in time to avoid HUDCAPS system failure as the millennium arrives.

Recommendation 1:

We recommend that the Office of the Chief Financial Officer (CFO) and the Office of Public and Indian Housing (PIH) work with the Office of Information Technology (IT) to prepare an adequate detailed project work plan as soon as possible. This work plan should define the specific tasks and schedule. It should also establish the necessary infrastructure, conversion and testing code tasks and the resources required to accomplish these tasks.

Stored Date Fields

We found HUDCAPS has stored date fields which could have an impact on future system processing activities as well HUD's ability to meet their planned Year 2000 completion date. The date when a system first encounters Year 2000 is determined by how far the system looks in the future. This, in turn, determines the date in which the Year 2000 fix must be completed to avoid potential processing errors. For example, assume that as of October, 1997 the system has a stored date field of November, 1998 and this date field is critical for processing data. This means that the system is operating 13 months in the future and, therefore, the Year 2000 impact on date processing will occur in December, 1998. Accordingly, the Year 2000 fix must be completed by December, 1998 to avoid any processing errors when the date encounters the Year 2000.

One of the tasks performed as part of an application analysis of the Year 2000 project is to identify and produce a list of all date fields in the system. A decision is required for every date field to determine its system functionality and impact to the Year 2000. However, based on the FFS 5.3.1 Upgrade Analysis Document, we did not see evidence that this analysis had been performed. As part of our review, we performed a limited analysis of date fields in HUDCAPS. As of October, 1997, we analyzed 113 out of 320 HUDCAPS data sets to identify six character stored date fields. Although we did not determine whether the date fields were critical for processing data, we did identify four stored date fields that may have an impact on processing of data as they encounter the Year 2000. Of the four dates, the earliest stored date possibly affecting HUDCAPS processing we found was December 1, 1999. This means that as of October, 1997, module(s) in HUDCAPS could be processing dates almost 26 months into the future. Accordingly, this date could be currently impacting the processing of data in HUDCAPS. Therefore, HUD management needs to perform an assessment of these four date fields, as well as

any other date fields in the system, and determine their effect on system functionality and its impact on the scheduled August, 1998 completion date for HUDCAPS to be Year 2000 compliant.

Recommendation 2:

We recommend that the Director, Information Technology, review all HUDCAPS data to identify all stored dates and determine their effect on system functionality and its impact on HUD's schedule for completing the Year 2000 efforts.

Missing Source Code

We found a large amount of customized source code missing. The Year 2000 issue requires every piece of code be examined to determine if any two digit date handling is involved. Missing source code increases both the scope and the cost of the project. It requires additional time and resources to develop both the functional and program specifications to either rewrite the missing modules or disassemble the object code and recreate the source from that.

As part of our review, we ran a software program that compared the source and load libraries for HUDCAPS code. We found that out of a total of 486 load modules applicable to customized code, 136 (28 percent) were missing their comparable source modules. As part of the assessment phase of a Year 2000 project, a complete application inventory, including names and library locations, needs to be identified for system components. These components include application source code and object code. Code inventory includes all of the code which must be modified for the Year 2000. We reviewed an application inventory contained in the FFS 5.3.1 Upgrade Analysis Document. We did not see evidence that a one-to-one mapping of source code to executable code was performed which would identify the missing source code modules. One-to-one mapping determines source/load integrity which ensures that the source and load are the same module. This mapping is necessary to accurately determine that the source code in the inventory corresponds to the executable code running in production. This step is critical to ensure that all applicable date fields are identified for the Year 2000 modification.

Although there may be valid reasons why certain load modules are missing their comparable source module, HUD still must identify and investigate any missing source modules and determine the reasons for such. Otherwise, critical dates may not be found and properly corrected for Year 2000 compliance. We have provided IT with a list of missing source code modules for their review and resolution.

Recommendation 3:

We recommend that the Director of Information Technology review all of the customized load modules for missing source modules and determine the reasons for any missing source module found and evaluate its impact on the Year 2000 project.

Test Environment Strategy

The Department of Housing and Urban Development management has neither developed a test strategy nor acquired the necessary test supporting tools for the Year 2000 effort. The Year 2000

test strategy requires a detailed analysis of the existing application to determine the types of test strategies which are appropriate. Ensuring that HUDCAPS will operate properly in the Year 2000 requires a unique test strategy which is entirely different from any previous development effort. Testing Year 2000 renovated software will also require a dedicated test environment which can be used to simulate Year 2000 processing. Although HUD is committed to establishing a separate test environment, the actual system requirements of this test environment are dependent on the Year 2000 test strategy which has not been done. In addition, an analysis and acquisition of automated tools to support the test set-up, execution, and reconciliation of the Year 2000 test is required. However, these automated tools have not been identified as part of the test strategy to be used.

Recommendation 4:

We recommend that the CFO and PIH Offices work with IT to develop a test strategy and identify the necessary test supporting tools as soon as possible to determine the system requirements needed for the Year 2000 effort and to support the test set-up, execution, and reconciliation of the Year 2000 test.

Configuration Management

Our review identified 211 duplicate and/or different versions of load modules. Proper software migration requires that the source code be copied to the appropriate production load library. Having duplicate or different versions of load modules makes it difficult to determine which version of the software is actually in use. This condition could have been avoided if an

automated configuration management tool had been implemented. Using an automated configuration management tool is even more critical for the Year 2000 effort. Without such a tool, HUD cannot control the software changes and migrations for HUDCAPS to ensure Year 2000 compliance and increases the risk that production failures, errors, and omissions may occur.

The OIG has identified this lack of an automated configuration management process as an internal control weakness in HUD's Fiscal Year 1996 Financial Statement Audit. We recommended that HUD implement the already purchased change management software (ENDEVOR) for HUDCAPS. HUD management agreed with the recommendation and indicated that activities necessary to implement the software have been funded with implementation to begin in August, 1997 and completed by April, 1998. Also, HUD management indicated that it will work closely with the Offices of PIH and the CFO to establish an accelerated implementation schedule and, therefore, considered it no longer a funding issue.

HUD management has recently begun to implement ENDEVOR for HUDCAPS. However, based on the current timetable, it is unlikely that ENDEVOR will be fully implemented to be of use for controlling Year 2000 software changes during the development and testing phases unless HUD management immediately commits additional resources to complete the implementation as soon as possible. IT has not completed a schedule for ENDEVOR implementation. So far, only one subsystem component Query Management Facility (QMF) of HUDCAPS is scheduled for ENDEVOR installation. Once QMF is installed, IT will then analyze other HUDCAPS subsystems (i.e., FFS, INTRFACE, and CYCLE) to define the remaining activities and to

complete the implementation schedule. The expected completion date for these tasks is January 8, 1998. However, the current Year 2000 task schedule indicates that mainframe development work has already begun. Additionally, all development and testing work for both mainframe and Graphical User Interface (GUI) is scheduled to be completed by March 30, 1998. Consequently, in order for ENDEVOR to be used in the Year 2000 effort, it should already be available for use as the development activities have currently begun. Further, it is not likely that ENDEVOR will be ready for use within the three month window, i.e., January to March 1998, when the Year 2000 development and testing activities occur.

IT indicated that the ENDEVOR implementation for HUDCAPS cannot be accelerated because of limited funds. However, this implementation is critical to the success of the Year 2000 effort for HUDCAPS. We strongly urge HUD to immediately commit additional resources to complete the implementation as soon as possible.

Recommendation 5:

We recommend that the CFO and PIH Offices work with IT to :

- (a) Review the duplicate load modules, determine the correct version, and eliminate the incorrect version from the appropriate load libraries.
- (b) Fully fund and accelerate the implementation of ENDEVOR for HUDCAPS so that it can be used for the development and testing activities for the Year 2000 project.

