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EVALUATION OF THE HCUP CENTRAL DISTRIBUTOR TRACKING SYSTEM

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EXECUTIVE SUMMARY

This evaluation investigated the efficiency and usefulness of the HCUP Central Distributor Tracking System. The HCUP Central Distributor is the central repository for restricted access, public release HCUP databases. The Tracking System is used to track various activities of the Distributor. It consists of a collection of tables, forms and reports that assist in the tasks of tracking, monitoring and reporting of activities regarding the central distribution of HCUP family of databases. The Tracking System, written in Microsoft Access 97, has four components: customer, products, reports, and state reimbursement.

The objectives of this evaluation were three-fold: (1) to determine how well the Tracking System worked in its current working environment; (2) to identify areas for improvement to the Tracking System, the benefits of these improvements and the level of effort to make the improvements, and (3) to predict likely expansions to the Tracking System and how these could be accomplished. The evaluation covered three main areas of the Tracking System: the user interface or front end, the system database backend and structure, and the report generator. Evaluation questions were posed. What features does the Tracking System have to handle the current functions and activities of the HCUP Central Distributor? In what ways could it be improved? What is its potential for expansion?

Data collection was obtained using three techniques: (1) interview, (2) data runs and code review and (3) comparison of the Tracking System with other database systems developed or used by Social and Scientific Systems (SSS). Suzanne Worth, the HCUP Central Distributor Task Manager at SSS, Deana Stewart, the principal user of the Tracking System, and Herb Wong at the Agency for Healthcare and Research Quality (AHRQ) were interviewed.

Findings of the evaluation follow: The Tracking System performed three functions: (1) user interface or front end, (2) database backend and (3) report generator. The user interface was for the users, the database backend for technical support and the report generator for the managers. The Tracking System was easy to operate, and easy to learn for a new person. However, it was critical for this new user of the Tracking System to understand the concepts of the Distributor products, the various modes of distribution of these products and the resources to use for content or procedure questions and technical support. Internally, SSS would like to see minor modifications in the Tracking System to improve its efficiency. These include: generation of mailing lists to send regular mail or E-mail or to use with external software packages; addition of an internal report that showed all occurrences of a selected activity within a selected time frame for quality assurance or activity tracking purposes; and addition of a more powerful duplicate check for customer names.

The Tracking System used Microsoft Access/97, which in turn, was based on Microsoft Jet Engine 3.7. The load for the Tracking System ranged from one to two users. The order-taking component of the system was by telephone, E-mail, and fax. The Tracking System contained 500 customer records with under 700 inquiry records. The design of the database structure supported the model of selling State data products (SID and SASD) and reimbursing fees to the States that supplied the data except for one database, the Kids' Inpatient Database (KID).

The Tracking System generated the HCUP Central Distributor Monthly Activity Report. This report was distributed to AHRQ and to the HCUP Partners on a monthly basis. When Herb Wong of AHRQ was interviewed, he indicated that ad hoc reports would be occasionally required to answer inquiries from any number of interested parties: within the Department of Health and Human Services (DHHS), HCUP Partners, or even Congress. Further, MEDSTAT would like the Monthly Activity Report to be transmitted electronically using the Adobe Acrobat.PDF format.

The Tracking System worked well for the current job requirements. However, it would benefit from some modifications to the *user interface*. Upgrading to Access 2000 with MSDE would make the Tracking System more robust and more closely compatible with the SQL Server. Upgrading to SQL Server would eventually move the entire database onto the centrally managed server at SSS, making day-to-day

maintenance easier to schedule. Upgrading to the SQL Server would also make e-Commerce applications easier to build and maintain.

Upgrading to MSDE or SQL Server may be *required* if Microsoft stopped supporting the current Jet engine. If an upgrade is made to either MSDE or SQL Server as the back end, we would want to migrate the current Access Database (.MDB) to a Microsoft Access Project (.ADP). This is because the Access Project structure is designed specifically to have all data tables reside externally and has native-mode access to the data. The Access Database was not principally designed for external tables, but it does allow linked table to reside externally and uses ODBC as middleware to connect to the external data.

With regard to *database structure*, the costing algorithm for the KID database structure could not be supported by the system as originally written. It was handled by adding a special exception to the Tracking System. The need for this special exception points up a need to modify the system to handle this type of costing structure normally. The costing portion of the Tracking System would need to be rewritten to accommodate this change before any significant addition of products could take place. Possibly, a table could be added to allow a description of the fee model and then the code could be rewritten to use a table-driven algorithm to determine the fee handling. Mailing List generation is also an important area of expansion to accommodate communication with the growing number of customers and HCUP Partners. SSS has several other databases that are likely to interface with the current database to do this task. Storage of customer identification and addresses and making the current database compatible should be a serious consideration.

The current *report generator* is adequate for current report usage. However, a few reports needed to be edited or reformatted whenever revisions were made to existing products or when a new product was added to the system. To avoid maintenance problems, these reports should be rewritten. Adding the Adobe Acrobat Writer to the workstation(s) accessing the database would allow reports to be generated in a format that can be sent easily by E-mail.

The current Access Database is adequate to support ad hoc reporting from the database. The simplest tool to use for ad hoc reporting is to generate SQL queries that extract the required information. Because Access 97 with the Jet engine uses a separate dialect of SQL, it would be beneficial to upgrade to MSDE or SQL Server to allow use of just one dialect of SQL.

In summary, the Tracking System is adequate for the current needs of the Central Distributor. However, with the addition of new products and the potential increase in demand for the HCUP family of databases, several modifications should be seriously considered. SSS recommends the following: (1) no change in the database backend unless a change in scope of the data forces it; (2) modify the database structure and code to better handle different payment models; (3) procure and install Adobe Acrobat for all workstations; (4) no change in the reporting system unless a change in scope forces it; (5) modify the current product-based reports for each new product to handle changes automatically; and (6) add mailing list generation as another feature of the Tracking System.

INTRODUCTION

Scope

This document addresses the results of an evaluation of the HCUP Central Distributor Tracking System. It includes an evaluation of three main areas related to the Tracking System: (1) user interface or front end, (2) system database backend and structure, and (3) report generator.

Purpose of the Evaluation

This evaluation investigated the efficiency and usefulness of the current Tracking System. It also attempted to predict possible areas of change in the future. The following evaluation questions were posed. What features does the Tracking System have to handle the current functions and activities of the HCUP Central Distributor? In what ways could it be improved? What is its potential for expansion?

Objectives

The objectives of this evaluation were three-fold:

1. Determine how well the Tracking System worked in its current working environment.

2. Identify areas for improvement to the Tracking System, the benefits of these improvements and the level of effort to make the improvements.

3. Predict likely expansions to the Tracking System and how these could be accomplished.

BACKGROUND

The HCUP Central Distributor is the central repository for restricted access, public release HCUP databases. Management of the Distributor involves the following:

- Gain the participation of the HCUP Partners through the Central Distributor Memorandum of Agreement (MOA) Amendment.

- Prepare the release of data through the Distributor.

- Monitor the activities of the Distributor through the HCUP Central Distributor Tracking System.

- Maintain the Tracking System.

Upon receipt of the signed MOA, data files are created and the technical documentation including the Application Kit are updated. Once these are done, the Distributor receives inquiries about the data, reviews applications, fills the orders, provides monthly reports to AHRQ and the HCUP Partners, and reimburses the HCUP Partners for data purchases. Information about all customer contacts and orders is entered into the Tracking System.

The Tracking System consists of a collection of tables, forms, and reports that assist in the tasks of tracking, monitoring, and reporting of activities regarding the distribution of HCUP data. The Tracking System, written in Microsoft Access 97, has four components: customer, products, reports, and state reimbursement.

1. Customer

This component compiles information on all contact with customers and the series of steps that must be completed after the Distributor receives an application.

2. Products

This component is used to review, update, or add products to the system. “Products” refers to the restricted-access public release versions of the HCUP State Inpatient Databases (SID), State Ambulatory Surgery Databases (SASD), and the Kids’ Inpatient Database (KID) that were prepared specifically for distribution through the Distributor.

3. Reports

This component generates the HCUP Central Distributor Monthly Activity Report and other reports. The reports are based on the data compiled in the tracking system, and these are used for the management of ongoing Distributor activities.

4. State Reimbursement

This component generates and maintains a record of every reimbursement to a state and links it with the appropriate applications.

METHODOLOGY

Data collection was obtained using three techniques: (1) interview, (2) data runs and code review and (3) comparison of the HCUP Central Distributor Tracking System with other database systems developed or used by Social and Scientific Systems (SSS). Suzanne Worth, the HCUP Central Distributor Task Manager at SSS and Deana Stewart, the principal user of the HCUP Central Distributor Tracking System were interviewed. Herb Wong at the Agency for Healthcare and Research Quality (AHRQ) was also interviewed. He provided suggestions based on his knowledge and experiences with the Tracking System. Further, he described what he was interested in having the Tracking System do.

Using a combination of Structure Query Language (SQL) queries and code review, a systems analyst at SSS analyzed how the data was stored, processed and interrelated. The Tracking System was created using Microsoft Access/97. Both Tracking System code and data were contained in a single file. To best understand such a system, both code and data were examined to understand interrelations. SQL provided a very easy way to extract and view data in the database.

To predict how the Tracking System might grow or change overtime, the Tracking System was compared with other database systems. These database systems included those both built and used by SSS.

FINDINGS

The HCUP Central Distributor Tracking System performed three functions: (1) user interface or front end, (2) database backend and (3) report generator. The user interface was for the users, the database backend for technical support and the report generator for the managers.

User Interface

The principal user of the Tracking System was Deana Stewart, Administrative Assistant of SSS Computer Systems Data Analysis (CSDA) Division. Her most common operations were adding customers and customer information to the Tracking System. Customer transactions consisted of requests for information about the products or place orders. Notes about questions were stored in records called “Inquiries.” Orders were recorded in records called “Applications.” Whenever a customer contacted SSS, Deana pulled up any previous records so she could have any history ready at hand. Customers contacted the HCUP Central Distributor by telephone, by fax or by E-mail. From Deana’s perspective, the speed of operation in pulling up records to respond to customers’ needs was a key customer service role. An experience Deana had with the Tracking System concerned the task of adding a customer’s name.

Because it was very easy to add a duplicated record for a customer, Deana expressed that a powerful duplicate checking function would help keep the customer data clean and correct.

According to Deana, the Tracking System was easy to operate and easy to learn for a new person. However, it was critical for this new user of the Tracking System to understand the concepts of the HCUP Central Distributor products, the various modes of distribution of these products and the resources to use for content or procedure questions and technical support.

Deana mentioned that a few modifications would be useful:

1. Add an extraction routine to generate mailing lists to send regular mail or E-mail or to use with external software packages such as Microsoft Word.
2. Add an internal report that showed all occurrences of a selected activity within a selected time frame for quality assurance or activity tracking purposes.
3. Add a more powerful duplicate check for customer names make it easier to find existing customer records.

In the past year, several minor modifications were made to the Tracking System. First Name and Last Name fields were split out as the first step in making duplicate checking easier. It was discovered that some customers had check numbers that included letters. The Tracking System's ability to have alpha characters in check numbers was also added. Further, the Report Preview option was fixed to correctly display certain reports.

System – Database Backend

The Tracking System used Microsoft Access/97, which in turn, was based on Microsoft Jet Engine 3.7. The load for the Tracking System ranged from one to two users. The Tracking System contained 500 customer records with less than 700 inquiry records.

System – Database Structure

The database structure of the Tracking System was designed to support the model of selling State data products and reimbursing fees to the States that supplied the data. One product, however, did not fit this model. States that supplied the KID data were not reimbursed. A hard-coded patch to the code was written to resolve this issue.

Report Generator

The Tracking System generated the HCUP Central Distributor Monthly Activity Report. This report was distributed to AHRQ and to the HCUP Partners on a monthly basis.

When Herb Wong was interviewed, he raised the need for occasional ad hoc reports. It was anticipated that ad hoc reports would occasionally be required to answer inquiries from any number of interested parties: within the Department of Health and Human Services (DHHS), HCUP Partners, or even Congress.

Recently, MEDSTAT requested SSS to create electronic reports using the Adobe Acrobat .PDF format. This capability would assist MEDSTAT to print the most current version of the HCUP Central Distributor Monthly Activity Report as needed.

DISCUSSION OF FINDINGS

The assumption of the discussion that follows is that the database will continue to reside and be supported at SSS. Moving or copying the database to another site such as AHRQ would add to the complexity of supporting the requirements for making the arguments valid.

User Interface

The HCUP Central Distributor Tracking System worked well for the current job requirements. However, it would benefit from minor modifications to the user interface as well as rewriting to improve maintainability. Changes to either the scope or the magnitude of the task however could result in a significant if not complete rewrite of the system.

System – Database Backend

The purpose of the Database Backend (or just Database) is to manage the actual storage, update and retrieval of data. The Database will take requests from other software and attempt to perform the required operations. In the case of a retrieval request, it will return data in the form of records.

Would another system be easier to program or maintain? Given that each programmer or Database Administrator (DBA) has his or her own preferred set of tools, it depends. Can we expect a significant *change of magnitude*? Can we expect that the demand for HCUP products will increase significantly? SSS believes the answer is no. The audience for these products is not growing significantly. Adding new products would increase the demand. On the other hand, older products grow obsolete and are no longer in demand. Thus, we expect to see a steady, but not significant growth pattern. Can we expect a significant *change of scope*? Can we anticipate other methods of taking orders or dispensing information through E-commerce? SSS believes the answer is yes. We can anticipate adding a Web-enabled information and order taking component.

The Tracking System is a small system containing under 500 customer records and under 700 inquiry records. This current backend is sufficient in the middle term. However, upgrading to Access 2000 with MSDE would make the Tracking System more robust and more closely compatible with the SQL Server. Upgrading to SQL Server would eventually move the entire database onto the centrally managed server at SSS, making day-to-day maintenance easier to schedule. Other advantages to upgrading to the SQL Server include making e-Commerce applications easier to build and maintain. This is mostly because of automation scheduling possibilities if the Tracking System is hosted on a SQL Server maintained at SSS. It is not anticipated that this is of high probability, but upgrading to MSDE or SQL Server may be *required* if Microsoft stopped supporting the current Jet engine that is two versions behind the now marketed version. A disadvantage would be that the Tracking System would not be as portable. Sending a copy of the database would no longer be a simple task of copying the file to a floppy and mailing it. The data must go through unload and load process and it must be installed on another SQL server machine. However, this should not present a problem since the original system was designed to be portable because the HCUP-3 contract was ending. The Tracking System does not need to run at more than one site.

Based on experience with other database systems, it is anticipated that a World Wide Web interface will be requested to allow customers to browse the catalog of products and place orders. If the Web access component is built, the SQL code that retrieves the data can be encapsulated making it easier to convert from the Jet Engine dialect of SQL to the SQL Server dialect. This is advantageous in the long run. If an upgrade to the database engine is needed, the number and scope of changes would be carefully controlled.

If a decision is made to upgrade to either MSDE or SQL Server as the back end, we will want to migrate the current Access Database (.MDB) to a Microsoft Access Project (.ADP). The Access Project structure is designed specifically to have all data tables reside externally and has native-mode access to the data. The Access Database is not principally designed for external tables, but it does allow linked table to reside externally and uses Open Data Base Connectivity (ODBC) drivers as middleware to connect to the external data.

System – Database Structure

A separate aspect to the system is the definition of the database tables stored by the Database Backend. Currently, one data product, the KID data, does not fit the database structure designed to support the model of selling State data products and then reimbursing fees to the States that supplied the data. A special exception was hard coded into the Tracking System code to handle this difference. However, if there are any changes to the cost structure, it will require a programmer to make the changes. It is anticipated that the NIS data product will have similar handling. Rather than patching the code with special exceptions again, it would be better to modify the system to handle the situation as a normal transaction. This method is less costly and less likely to introduce errors into the system. One possible modification would be to add a new table to allow a description of the fee model and then rewrite the code to use a table-driven algorithm to determine the fee handling.

Mailing List generation has been identified as an area of expansion that will become quite important in the future. SSS has several other databases that are likely to interface with the current database to do this task. The customer data in the HCUP Central Distributor Tracking System should be compared to these other databases and any changes that would allow us to match them up should be made. It is not anticipated that the data structures be made identical; but we do need to ensure that there is a method of uniquely identifying customers across the different databases and that all required information is available somewhere.

Report Generator

The current report generator is adequate for current report usage. However, a few reports need to be edited or reformatted whenever revisions are made to the products or when a new product is added to the system. To avoid maintenance problems, these reports may need to be rewritten. Adding the Adobe Acrobat Writer to the workstation(s) accessing the database would allow reports to be generated in a format that can be sent easily by E-mail. It is not anticipated that the complexity of new reports will significantly increase. However, if new reports are requested that have requirements that are not easily supported by the current Access Reporting tools, we will have the option of adding other tools without replacing the current Access tools. In that case, we will want to examine the utility of other reporting tools such as Microsoft Excel or Seagate Crystal Reports.

The current Access Database is adequate to support ad hoc reporting from the database. The simplest tool to use for ad hoc reporting is to generate SQL queries that pull the required information. Because Access 97 with the Jet engine uses a separate dialect of SQL, it would be beneficial to upgrade to MSDE or SQL Server to allow use of just one dialect of SQL.

Based on prior experience with similar systems, the time frame allowed for ad hoc queries tended to be quite short, i.e., 24 hours. Herb Wong from AHRQ was interviewed to get a perspective on this issue. He suggested the following questions for examination:

1. How quickly could ad hoc reports be generated? How costly?
2. How quickly could current canned reports be modified? How costly?
3. How quickly could new canned reports be generated? How costly?
4. How would a change of tools affect the answers to the previous questions?

Again, based on SSS' experience with other, more complex database systems:

1. The time it takes to generate any ad hoc report can vary from 1 hour up to a day, depending on complexity. Cost is the billable cost of the developer.
2. The time it takes to modify a canned report can vary from 1 day to a week, depending on complexity. Because canned reports are frequently considered publication quality, review and rework are often required to get them to look just the way the requesting manager wants. Again cost is the billable cost of the developer.

3. New canned reports can be created in between 1 day and 1 week, depending on complexity. Cost is the billable cost of the developer.
4. Different tools have different capabilities. It is not anticipated that the scope of the reporting requirements will change enough that other tools will provide a significant benefit. Different developers are more experienced with different tools. Staffing changes could easily make it quicker and less costly to use a particular, more familiar tool in the short run.

RECOMMENDATIONS

Based on the findings of our evaluation of the HCUP Central Distributor Tracking System, SSS recommends the following:

1. No change in the database backend unless a change in scope of the data forces it.

2. Modify the database structure and code to better handle different payment models as highlighted by the KID data.

3. Procure and install Adobe Acrobat for all workstations.

4. No change in the reporting system unless a change in scope forces it. Anticipated requests for changes to current reports and creation of new reports can be handled with the current reporting tools.

5. Modify the current product-based reports for each new product to handle changes automatically.

6. Add mailing list generation as another feature of the Tracking System.

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APPENDIX A: Microsoft Office: Microsoft® Access 2000: Choosing between MSDE and Jet – White Paper