

SAS®Software: One Stop Shopping For Re-engineering

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ABSTRACT

Do adhoc requests from end users have you buried? Are users demanding faster results and want more direct control of their reports? An end user application with a familiar Windows GUI front end may be the answer. Users are demanding solutions and want it now. But the application developer has a lot of work and a lot of decisions to make for this to become a reality, including:

- data extraction from multiple large data files in various formats,
- design issues relative to the data warehouse, reports, GUI front end,
- choice of hardware and software,
- development and equipment costs,
- staffing,
- and implementation time frames.

This paper discusses the above issues and why the SAS System was selected to build an entire end user application including building and storing the data warehouse, writing standard reports, development of a GUI front end, and end user customer reporting, data analysis, and graphics tools. SAS products used for the application include Base SAS, SAS/FSP, SAS/AF,

SAS/GRAPH, SAS/CONNCECT, SAS/ASSIST, and SAS/INSIGHT. The system is Windows based and runs on a PC, PC LAN, or client/server enviroment, depending on the size of the data warehouse.

INTRODUCTION

Mergers, Acquisitions, Decentralization, & Centralization - OH MY! In the late 1980's, Blue Cross and Blue Shield of Indiana was desolved and Associated Insurance Companies was formed. Through the mid 1990's, the Associated Group formed over 150 companies in 17 states through decentralization and acquisitions. In 1994, Associated Insurance Companies merged with Southeastern Mutual, which holds the Blue Cross Blue Shield license in Kentucky. The Associated name was retained. In late 1995, Associated Insurance Companies merged with Community Mutual Insurance Company in Cincinnati, Ohio. Community Mutual also holds a Blue Cross Blue Shield license. The new company name is now Anthem Incorporated. The significant changes to the corporate structure have presented many challenges including those related to the business itself, the corporate culture, and information delivery. Business challenges include:

- Similiar but different business attributes
- Presenting a 'one company' appearance to customers

- Maintain existing customers
- Future business direction, including merger issues and the future of health insurance
- Cost effectiveness
- Organization structure; centralized versus decentralized
- Combining multiple functions, processes, and systems
- Multiple physical sites

Cultural challenges include job security, internal competition, benefit changes, physical moves, an early retirement offer, layoffs, and morale.

Information is always important in running a business and even more so during times of significant change. Information delivery challenges include:

- Multiple systems for a single function
- Different system architectures
- Multiple mainframes, mini's
- Telecommunications
- Fragmented data
- Different data content
- Different data analysis systems

The Advanced Healthcare Solutions division of Anthem is emerging as the unit to provide information delivery. This division is a health claims data analysis unit offering system and consulting services through the AMDS (Anthem Medical Decision Support) and a staff which includes programmers, data analysts, statisticians, physicians, and nurses. AMDS supports several types of users including employer groups, physician/hospital groups, insurance companies, and provider networks. Employer groups can utilize the system for benefit reengineering, fraud and abuse, claims payment auditing, and the identification of preventive health care programs. Physician/hospital groups use the system for competitive pricing and market research. Insurance companies and provider networks use the system for provider profiling. In addition, insurance companies can use the system for fraud and abuse, benefit design, case management identification, and to improve data coding and collection.

DATA WAREHOUSE

The primary source for health claims data is a Terradata machine in Ohio, a Terradata machine in Kentucky, and in Indiana there are two DB2 systems, flat files on DEC VAX machines, and an AS400. In addition, the Advanced Healthcare Solutions unit markets the AMDS system to customers outside the Anthem family. Data is extracted directly from the Indiana DB2 systems and all other data is shipped on tapes in a predefined flat file format. The predefined flat files ("foreign files") also have predefined data values.

The primary data type in the AMDS system is health insurance claims, provider information, and membership. Descriptive

data, categorical data, and medical intelligence data are added to the data warehouse to support analysis. Descriptive data includes text translation for medical coding and other data stored as code values. Categorical data includes the addition of medically defined groups for higher level analysis and reporting. Medical intelligence is a case mix assignment based on each patient's severity of illness.

The AMDS system is supported by a SAS data warehouse. The data warehouse provides a common format for all health claims regardless of the claims processing system. Operational data is converted to information through the collapsing of transaction data. Many data cleansing routines were written to perform functions including reformatting the data, selecting only variables required for data analysis, resolving data inconsistencies, and transforming data values. Preprocessing logic included building a final claim from adjusted claims, combining claims which had been split, and the creation of analytical variables not found in the operational data. The physical SAS tables are customer specific with many custom options and multiple data sources can be combined for a single customer. The SAS tables were designed to support the defined data analysis. Separate tables were built for different claim types and appropriate variables were added from sources other than the claims systems. The tables are relational and indexed, but not fully normalized. In cases where the data required little storage and was used often, it saved response time and simplified the system from both a technical and user perspective to put this information on the claims tables.

REPORTS

Approximately 150 standard reports have been developed to support user data analysis.

Different levels of reporting are available based on the type of claim or combination of types of claims. Reports fall into the following categories:

- Comprehensive Procedure Groups
- ICD9 Procedure Groups
- CPT/HCPC Procedures
- Revenue Codes
- Provider Ranking
- Provider Profiling
- Diagnosis
- Employer
- Operational
- Detail Claim Listings

The system directs the user in the appropriate choices of reports and the data content of those reports. The standard reports can be ran based on user subsetting. For each report, the user can click on SUBSET in the AMDS system and a list of appropriate subsetting variables will be displayed. Only those variables which are appropriate to subset for a specific report will be displayed to the user. This is another way in which the system protects the user from misuse of the data. This capability opens up the report possibilities available to the user in a standard reporting mode to millions of combinations.

USER ACCESS

The AMDS system is a Windows based GUI point and click tool which allows non-technical staff to produce reports and perform data analysis. The system runs in two modes; either completely PC based (or PC LAN for multiple user access) or client/server, depending on the size of the data warehouse. The client/server mode uses the server for report execution and the storage of the data warehouse.

End user capabilities include:

- Browsing standard reports which are ran and stored at the time the data warehouse is updated,
- Running standard reports through the use of controlled subsetting
- End user custom reporting, analysis, and graphics through SAS/ASSIST and SAS/INSIGHT.

DEVELOPMENT SOFTWARE

The SAS System was selected for the entire AMDS application. The data warehouse was built using Base SAS and is stored as SAS data sets. The standard reports are written with Base SAS. The Windows based GUI point and click user front was built using SAS/AF, SAS/FSP, and SAS/GRAPH software. End user custom reporting and analysis is through SAS/ASSIST and SAS/INSIGHT. Client/server access is through SAS/CONNECT. The PC/PC LAN version of AMDS uses SAS/CONNECT to

move the data warehouse from the mainframe to the PC.

Why was the SAS System selected? SAS was selected for the data warehouse because:

- Ability to read all file types
- A fully normalized design is not well suited for the application
- Features of a conventional DBMS such as rollback and recovery, audit trails, transaction processing, and maintenance of referential integrity are not required.
- Complex data manipulation is required to convert the operational data to informational data and this is one of the strong capabilities of SAS.
- File conversion is not necessary every time a report needs to be generated.
- System performance is increased with a SAS data warehouse.
- It was not necessary to hire a data base administrator.

In addition to the choice of SAS for the data warehouse, the SAS System provided several overall advantages.

- Operates on multiple platforms - this was valuable for the data extraction phase and the execution of AMDS itself.
- SAS was already being heavily used in Indiana, Kentucky, and Ohio

Emerging Technologies

- Additional software purchase was not required
- Hiring additional staff was not required
- Existing staff required little training
- One software vendor could be used for the entire application

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