

HOW TO BUILD AN EXECUTIVE INFORMATION SYSTEM (EIS)

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Introduction/Problem

In 1960, when the Federal Health Benefits Program (FEHBP) was initiated by the federal government, the Blue Cross and Blue Shield Plans throughout the country were one of the initial carriers chosen by the federal government to provide health insurance to federal employees. Currently, BCBS Plans cover approximately 40% of the total market. Federal employees constitute the largest single group covered by BCBS Plans. The Federal Employee Program Director's Office (FEPDO) in Washington, DC is a section of the BCBSA's Federal Programs division charged with administration of the program.

Claims information is generated in a nationwide, highly sophisticated and large mainframe-based system; claims data are processed, stored and transmitted to a central location where statistical systems summarize the information for analytical purposes. Claims information is, upon request, extracted from the sequential or relational databases and reported in electronic files for processing using SAS® or in hardcopies for inspection and analysis. The information then is interpreted, displayed and used for managerial decision making.

A typical scenario goes like this: analysts extract, manipulate and translate data into useful information. Then one or more middle managers condense and enhance the information by writing a narrative and making recommendations. The analyst prepares related charts and graphs. The executive is presented with a comprehensive report. If the executive asks a question not present in the report, then everybody is back to the drawing board. Analysts extract data again, middle managers revise their

narrative and recommendations and new graphs are prepared.

This scenario poses two unique challenges: providing up-to-date information with a process that takes a considerable amount of time, and staying on top of constantly changing business situations while revisions are made.

Literature Review/Discussion

Rockart and Treacy (1982) reported the technological advances in information tools of the last years and the inability of the data processing departments to fulfill on time the information needs of the different business units in the organization both which have created a new trend. Now, both "programming and non-programming users" attempt to fulfill their information needs.

But before users can help themselves, a fundamental prerequisite is a centralized data base containing data critical to the organization. Several authors have stated the importance and benefits of centralizing data. According to Friend (1990), as systems grow, a self-generating, data-driven foundation becomes extremely important because most impediments to growth manifest themselves in terms of maintenance and support problems. One of the most obvious ways to attack these problems is to centralize the maintenance of decision support data bases. This centralization provides minimum data redundancy, excellent security, and high data integrity the most critical system-level feature.

Data can be centralized in what is called a Decision Support System (DSS). According to Carlson (1990), DSSs are analytical tools usually targeted at managers and

analysts. DSSs can perform strategic planning, budgeting and forecasting, consolidated reporting, "what-if" analysis, goal setting and optimization on large volumes of data.

According to Bittlestone (1990), a DSS database should include:

- External information such as competitors' results, market share.
- Internal; more future oriented information (forecast models) than past oriented.
- Performance information as well as financial.
- Text as well as numbers.

Centralization can also take place in an Executive Information System (EIS). As Oldenkamp (1987) pointed out, EISs are aimed at executive users, because information systems professionals have recognized the fulfillment of executive information needs are critical to the organization.

As reported by Kador (1989), Polaroid Corporation implemented a DSS to eliminate much of the time invested in collecting information and shift the time invested into analyzing the business and influencing strategic direction. According to a company executive, the company succeeded in implementing a seamless information system from top to bottom rather than an isolated summary system at just the corporate end. The system is integrated with a relational data base management system and networked to share external data bases.

In 1987, Oldenkamp reported a prototype developed by the Group Health Corporation of Puget Sound using SAS®. The prototype consisted of up to 45 actual,

expected and variance variables for each of up to 45 clinics or locations for up to 90 monthly, quarterly, semi-annual, and annual time periods. These data were updated monthly and available for interactive processing. The data base had a common core of data which could be visualized as a "data cube" with three dimensions: (1) a set of relevant business variables computed for various (2) time periods and all these values available for various (3) business units.

In conclusion, a decision support system (DSS) could facilitate the work of analysts by allowing more efficient data access and management. Furthermore, an executive information system (EIS) may provide a different, more appropriate, access to the data for non-programming users.

Approach/Methodology

Our executive sponsor attended an EIS sales demo in-house. The purpose of the session was to allow the executive and other marketing staff to visualize an EIS. Our immediate goal at that meeting was to schedule a one-to-one session between our analyst and the executive to review useful reporting. The executive scheduled an interview. The analyst asked for examples of the reports, highlighted the useful parts, copied and returned them. The analyst also recorded the interview. Later, the analyst shared the recording with developers and other members of the team. The analyst prepared a non-technical "Wish List" from the information provided by the executive and shared it with managers in the division.

A kick-off meeting was scheduled. The "Wish List" was reviewed and refined. The team selected information items relevant to a single division: the marketing division. The executive sponsor prioritized the information items. First priority items were scheduled for the first deliverable. A development plan and schedule was developed.

Our hardware architecture was transitioning from an IBM mainframe to a LAN environment. Therefore, we agreed to prototype the system on a PC (single-user), in a second stage port the code to our mainframe (multi-user), and finally move the prototype to a stable LAN environment (client-server).

Results

The SAS language was selected for the prototype development. SAS provided all the analytical and developmental capabilities required by the prototype system: easy reporting (SAS System), integrated graphics (SAS/GRAPHS), a good statistical package (SAS/Stat; SAS/ETS), applications development (SAS/AF; SAS/FSP), and systems integration (SAS/CONNECT). The SAS/EIS package was not available to provide additional functionality: drill-down, critical success factors.

The SAS system for OS/2 was found to be mature and blended well with the MVS version. A system decision was taken to manage data at the mainframe level and carry out analysis and build applications at the PC level. Cooperative processing is a processing concept where different processing tasks are undertaken in different interconnected hardware platforms. SAS/CONNECT integrates the different hardware platforms and facilitates cooperative processing. The development team selected a 486-type machine running OS/2 1.3 and Communications Manager Extended Edition. The IBM-3090 mainframe running MVS/TSO provided excellent data management and enough resources to handle large sets of data on tapes or Direct Access Devices (DASD). OS/2 provided multitasking capabilities and eliminated the learning curve associated with other operating systems such as UNIX.

Prototyping was the development methodology selected because it was expected that requirements would vary

quickly and decisions were not very going to be very structured.

Our prototype allowed the system developers and analyst learn about the intricacies of the delivery and access to the data. It also helped managers and other users adjust to the required organizational change. Our PC prototype was presented to the executive group successfully and received additional funding for development. The PC prototype ported well to the mainframe but lost functionality and friendliness. We chose not to use a beta version of SAS/EIS.

The choice for a simple first deliverable was correct. Easy targets allowed the development team to get an early success. The modular approach facilitated development. SAS® was cheaper than other software companies. However, the unavailability of the SAS/EIS product at development time may have opened the chances for other software companies to be considered in a full-scale system.

Limitations of the Prototype

This project was a preliminary investigation of the data access problem at the FEPDO and additional information gathering would be appropriate before taking extensive action. An assessment of existing data which are currently collected by several organizational units may be especially useful in reducing duplication.

Establishing a true centralized data base requires improved accessibility. Some issues which should be addressed in additional studies are:

- The need to have multiple shared-access to a centralized data base.
- The need to develop an information risk assessment and

security management prior to a full-scale implementation.

- The improvement of employee interaction through the sharing of information.
- The costs and savings associated with a full-scale system.

At FEPDO, data are collected and processed in multiple hardware levels. Additional studies should provide specific guidelines for cooperative processing with high-speed links between personal computers in a LAN environment and mainframes.

Summary

The keys to developing an EIS using SAS are:

- Identifying critical data needs.
- Using the cooperative processing features of hardware and software to develop a prototype.

Disclaimer

The views expressed in this paper are those of the author, and not necessarily those of the Blue Cross and Blue Shield Association.

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