ABSTRACT

The maintenance and documentation of data-editing programs have been greatly simplified by the creation of a menu-driven system called Program Manager/Document Producer (PMDP). This system, which uses SAS/AF software, allows the Data Coordinators at A. H. Robins to eliminate repetitious programming tasks by utilizing PMDP screens to modify a set of editing programs. PMDP generates a document for archival purposes and a program directory for departmental use.

Using PMDP has significantly reduced the programming time per project and has eliminated a time-consuming process.

BACKGROUND

The Clinical Data Coordinators at A. H. Robins are responsible for quality assurance of the data base relative to the Robins protocol and FDA regulations. They create approximately twenty protocol-specific SAS® programs. These programs generate listings that identify discrepancies in the data base. Once all the discrepancies have been corrected, the data base is released for statistical analysis and report writing.

Before the creation of PMDP, managing a set of SAS programs was a difficult task. Each new program was created individually or modified from a library of existing programs. The common variables were then changed within each program individually. This was a time-consuming and tedious task.

The Clinical Data Coordinators had no product for tracking the editing process. Programs were hand listed and checked off as editing was completed. Additionally, under the old procedure, documentation of the programs for a project was manually compiled and typed. These documents listed and described each SAS program used to perform edits. The use of manual documentation procedures increased the chance of overlooking a program for inclusion in the tracking procedure and in the Data Base Release Document.

Several procedures performed by Data Coordinators involve four repetitious tasks:

- Generate a set of editing programs
- Change internal variables for programs
- Track progress of editing programs
- Produce a Data Base Release Document

These four tasks were automated by the respective use of four basic modules in the PMDP system:

- Program Manager - Copy programs
- Program Manager - Change variables
DESCRIPTION OF THE PROGRAM MANAGER/DOCUMENT PRODUCER SYSTEM

The PMDP system utilizes SAS/AF menu screens to access four macro programs that consist of two CMS Xedit® macro programs (Program Manager) and two SAS macro programs (Document Producer). The use of macros in both SAS and CMS Xedit created a unique programming challenge. The CMS Xedit macro parameters are collected within PMDP and are executed after returning to the CMS environment. An overview of the system flow is illustrated in Figure 1, and the individual menu screens are displayed in Figures 2 through 5.

The use of this system requires a standard naming convention for SAS programs. The names consist of eight alphanumeric positions; the first three positions indicate the alphabetic project code unique to the project, e.g., ABC; the next three positions specify the protocol number, e.g., 001; the last two positions describe the type of program, e.g., MH=medical history. Therefore, a program that generates listings for medical history would be named ABC001MH.

An additional requirement for the Document Producer is a header box of specific information, which must begin on the first line of all SAS programs used for editing a project. These header boxes contain the following information:

- Program name
- Program Purpose/Output
- Usage notes
- Processing Dates

PMDP is accessed by simply typing 'PMDP' on the command line, which invokes the system and displays the first screen shown in Figure 2. This PMDP SAS/AF entry screen provides lines for the Data Coordinator to input the A. H. Robins (AHR) number, the protocol number, and the three-letter project code of the current project. These variables are required for all of the PMDP functions, and entering them first eliminates multiple entries. After entering this information, the Program Manager or Document Producer is accessed via a menu screen (Figure 3).

The Program Manager screen (Figure 4) contains two selections:

1. Copy Programs
2. Change Variables

The Program Manager accesses a SAS/AF screen to enter the new project information. If Copy Programs is selected, the system uses the current project information to copy the set of programs indicated and renames them by using the new project information. If Change Variables is selected, the system changes the common internal program variables for the new set of programs.

The Document Producer screen (Figure 5) contains two selections:

1. Produce Directory
2. Product Data Base Release Document

The Program Directory is created by extracting header boxes from the approximately twenty SAS Basic programs that are used to edit the project and compiling the information into the following format:

- A timed and dated introduction
- An identification of AHR and Protocol numbers
An alphabetized list of all SAS programs

A compilation of header boxes

The Data Base Release Document is created in the same manner as the directory with a few modifications. The compilation of header boxes from the SAS programs eliminates the usage note lines. A third page with signature lines is added for the data base release sign-off. An example of output from the PMDP system is the Data Base Release Document shown in Figure 6.

CONCLUSION

The use of the Program Manager/Document Producer System has increased the productivity of the Clinical Data Coordinators at A. H. Robins. The ease of use provided by SAS/AF screens gives the novice as well as experienced users a powerful editing tool. A by-product of the system is the promotion of standardization of programs and program names. Direct advantages of the system are:

• Automates the creation of sets of editing programs
• Automates the modification of sets of editing programs
• Decreases programming time
• Decreases programming errors
• Simplifies tasks
• Automates the tracking system
• Decreases tracking errors
• Generates a Data Base Release Document
• Decreases project completion time

ACKNOWLEDGEMENTS

We acknowledge the editing services of Eileen Howard and the assistance of Martha Hampton of the Word Processing Department of A. H. Robins Company. We appreciate the services of Neil Quimby and Judy Kounnas for the graphics and artwork on our poster.

REFERENCES

3. VM/System Product: CMS Primer, Release 6 IBM Corporation, Endicott, N.Y.
4. VM/System Product: System Product Editor, Release 6 Command and Macro Reference IBM Corporation, Endicott, N.Y.

SAS and SAS/AF are trademarks of SAS Institute, Inc., Cary, N.C.

VM/System Product is a copyright of IBM Corporation.

For further information contact:

Robin Wright, Charlie Kish, or
Wayne Cannon
A. H. Robins Company
1211 Sherwood Avenue
Richmond, VA 23220

1253
Figure 1

**PMDP SYSTEM FLOWCHART**

**INVOKE PMDP**
Simply type "PMDP" on the command line.

**USER INPUT**
Project information is supplied to the system for use in subsequent operations (Figure 2).

**SELECTION MENU**
(Figure 3)

- Program Manager
- Document Producer
- Exit to CMS

**USER INPUT / PROGRAM MANAGER**
New project information is supplied to the system to copy programs and change variables (Figure 4)

**PROGRAM MANAGER**
(Figure 4)

- Selection Menu
- Copy programs or change variables
- Exit to CMS

**DOCUMENT PRODUCER**
(Figure 5)

- Exit to CMS
- Create Release Document
- Create Directory

**CMS XEDIT Commands**
- Copy a set of programs

**CMS XEDIT Commands**
- Change variables within programs

**PROGRAM DIRECTORY**
- Collection of Program Headers For Selected Protocol

**DATA BASE RELEASE DOCUMENT**
- Program Directory
- w/Signature pages

1254
WELCOME TO PMDP

PLEASE ENTER THE CURRENT PROJECT INFORMATION:

AHR NUMBER ___

PROTOCOL NUMBER ___

PROJECT CODE ___

PF3 SUBMIT INFORMATION
PF9 EXIT PMDP TO CMS

==>

SELECTION MENU

PF1 PROGRAM MANAGER (PM)

PF2 DOCUMENT PRODUCER (DP)

PF9 EXIT PMDP TO CMS

==>

PROGRAM MANAGER

PLEASE ENTER THE NEW PROJECT INFORMATION:

AHR NUMBER ___

PROTOCOL NUMBER ___

PROJECT CODE ___

PF1 COPY PROGRAMS
PF2 CHANGE TO NEW VARIABLES
PF3 RETURN TO SELECTION MENU
PF9 EXIT PMDP TO CMS

==>

DOCUMENT PRODUCER

PF1 CREATE PROGRAM DIRECTORY

PF2 CREATE DATABASE

RELEASE DOCUMENT

PF3 RETURN TO SELECTION MENU
PF4 EXIT PMDP TO CMS

==>
Figure 6
OUTPUT OF PMDP

* PROGRAM NAME PURPOSE/OUTPUT
* RELEASE LISTING RELEASE OF DATA BASE FOR CLINICAL AND DRUG METABOLISM STUDIES.
The release directory was generated by PMDP SAS.
* DATE, TIME OF DIRECTORY: 21MAR90, 15:06

The following list of programs was used to perform post entry editing for AHR-00001, protocol 001.

SAS PROGRAM NAME
* ABC001AC
* ABC001BP
* ABC001CM

* FILENAME (SAS) PURPOSE/OUTPUT
** ABC001AC SAS
** 1. REVIEW EDIT OF ACCOUNT.
** 2. EDIT FOR MISSING VALUES.
** DC IN PROCESS: ___/___ DC COMPLETE: ___/___
** FORWARDED TO PC: ___/___ RECEIVED FROM PC: ___/___

** ABC001BP SAS
** 1. REVIEW EDIT OF BLOOD PRESSURE.
** 2. EDIT FOR MISSING VALUES.
** DC IN PROCESS: ___/___ DC COMPLETE: ___/___
** FORWARDED TO PC: ___/___ RECEIVED FROM PC: ___/___

** ABC001CM SAS
** 1. REVIEW EDIT OF COMPLIANCE
** 2. EDIT FOR MISSING VALUES.
** DC IN PROCESS: ___/___ DC COMPLETE: ___/___
** FORWARDED TO PC: ___/___ RECEIVED FROM PC: ___/___

AHR-00001 PROTOCOL 001 DATE OF RELEASE: 21MAR90

MANAGER, DE/E SECTION DATE

DATA COORDINATOR DATE

PROCESS REVIEWED BY:

PROJECT COORDINATOR DATE

PROJECT STATISTICIAN DATE

1256