CERTAINTEED CORPORATION'S SAS TRAINING/SUPPORT PROGRAM

Myron S. Kaplan, CertainTeed Corporation*

INTRODUCTION

In early 1978, CertainTeed management determined that if non-dp-trained end users were provided with a tool for producing their own one-time special-purpose reports from production data, then the Systems & Programming Department would have more time for production-level work and the bottom line would be positive in terms of time, money, and responsiveness to the needs of the users.

Among the reasons that SAS was chosen as the end-user language were the following:

- it provided many of the technical/analytical and report-writing capabilities needed by end-users, and
- it was relatively inexpensive when compared with other report-writing or analysis products.

CertainTeed's Data Resource Support Department started planning an extensive, well-defined in-house SAS training and support program. Its primary objective was to enable end users to obtain special reports and analyses using computer-resident production data. In this context, "user" refers to anyone in the company who utilizes SAS (and who may have had minimal or no prior programming training or experience).

This paper will review CertainTeed's approach to allowing users maximum autonomy consistent with sound business practices, and the training/support program's successful development to its present state. The organization structure within CertainTeed that was needed prior to the training/support program's implementation will be explained. Details of the training phase will then be given. This will lead into a discussion of the support phase. In order to clearly delineate the transition from training to support, an overview of the program from the user's standpoint will next be presented. The accomplishments of some users will be related at this point along with general conclusions.

ORGANIZATION

In order to help achieve the training/support program's main objective, a new position, Information Analyst, was created within the Data Resource Support Department. This individual adminsters and conducts the SAS training courses and provides on-going support to users on a day-to-day basis. He answers questions about SAS and assists users to access and use the data resource contained in the numerous computer data files and to use the computer processing facility in general.

Organizationally, the Information Analyst is part of the User Services function, as shown in the chart below.

The Information Analyst deals regularly with the user community in CertainTeed's Groups through each's Group User Coordinator. CertainTeed is comprised of several such Groups -- a Corporate Group plus others that are structured along manufactured product lines.

Reporting directly to each respective Group's Controller is the Group MIS Manager, who oversees the use of funds for all dp services utilized within the Group. The Group User Coordinator, who has been appointed by the Group MIS Manager (and who is, in some cases, the same individual), is the key link between the SAS users within the Group and the Data Administration Department.

In the fall of 1978, an introductory SAS course was developed with the help of the Group MIS Managers and key members of their staffs. The formal training program was developed to teach users basic data manipulation and report writing using SAS and to provide a flavor of its statistical versatility.
TRAINING

The SAS training program currently consists of two four-hour lectures, separated by a few days, with additional workshop time devoted to special applications. The separation of the classes is to allow the attendees some time to absorb the material presented in the first class. It also seems to be easier for people to attend half-day sessions in two consecutive weeks than to schedule one full-day session or two half-day sessions in the same week.

The basic course focuses upon the retrieval, analysis, and organization of computerized data. A minimal but sufficient introduction to certain key features of SAS is presented which allows a user to use SAS without a feeling of having been overwhelmed by its features. The course is taught from overhead transparency slides, a hard copy of which is provided to each attendee. Each attendee is also given a copy of the SAS User's Guide, which is designed to be used as a reference manual. The material presented in the course is shown in the syllabus in Table 1. Feedback from users has been solicited, and the course has been adjusted to reflect their suggestions; e.g., more details have been added to explain the accessing of data from disk/tape files.

As needed, a third session relating to specialized topics is added to the basic course. For example, there has been a General Ledger workshop to familiarize accounting users with the data available within the General Ledger system and the special JCL needed to access them.

To allow users to gain confidence with using SAS before submitting computer jobs under a formal project, each Group has a "SAS Training" project through which users can run self-training jobs.

An employee may attend the SAS course with the approval of his Manager and the concurrence of his Group User Coordinator. For the most part, attendance is based upon a need-to-know-to-use policy rather than for just general knowledge. Courses are held as the need warrants -- so far, about once monthly -- and attendance is usually limited to 15 people per course.

The initial reactions of the users to the training program have been very favorable. About 95% of the users' needs are being met by the contents of the basic SAS course.

**TABLE 1. "INTRODUCTION TO SAS" SYLLABUS**

<table>
<thead>
<tr>
<th>Session 1</th>
<th>Session 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overview</td>
<td>Modifying Data</td>
</tr>
<tr>
<td>SAS Usage</td>
<td>Action Statements: assignment, sum, subtracting IF, DELETE</td>
</tr>
<tr>
<td>Terminology</td>
<td>Information Statements: DROP, KEEP</td>
</tr>
<tr>
<td>SAS Program Structure</td>
<td>Control Statements: IF...THEN, GO TO, LINK/RETURN</td>
</tr>
<tr>
<td>DATA Step (to define data)</td>
<td>Custom-Tailored Reports</td>
</tr>
<tr>
<td>PROC Step (to process data)</td>
<td>Statements: SET, FILE, PUT</td>
</tr>
<tr>
<td>Basic Operations</td>
<td>Controls: headings, page/format, (sub)totals</td>
</tr>
<tr>
<td>SAS Formats</td>
<td>Operations on Data Sets</td>
</tr>
<tr>
<td>INPUT with CARDS Statements</td>
<td>Statements: SET, MERGE</td>
</tr>
<tr>
<td>Sorting (SORT) and Printing (PRINT) Data</td>
<td>Accessing Data</td>
</tr>
<tr>
<td>Analysis of Data</td>
<td>INPUT with INFILE Statements</td>
</tr>
<tr>
<td>Summarizing Data (e.g., MEANS, CORR, FREQ)</td>
<td>Record Layouts</td>
</tr>
<tr>
<td>Graphing Data (e.g., PLOT, CHART)</td>
<td>CertainTeed's Support Procedures</td>
</tr>
</tbody>
</table>

373
TABLE 2. "USER'S GUIDE" TABLE OF CONTENTS

1. Using the Computer System
   1.1. General Job Stream Flow
   1.2. Explanation of JCL Cards
      1.2.1. JOB Card Entries
         1.2.1.1. General Format
         1.2.1.2. Job Class Parameter (CLASS= )
      1.2.2. EXEC Card
      1.2.3. DD Card Entries
         1.2.3.1. Card Data in Input Stream
         1.2.3.2. Disk Data Set
         1.2.3.3. Tape Data Set
   1.3. Job Submission Locations/Procedures
   1.4. Technical Support Personnel
   1.5. Keypunch Conventions/Procedures

2. Typical Job Decks
   2.1. Statistical Analysis System (SAS)
      2.1.1. Executing with Card Input
      2.1.2. Outputting a SAS Data Set to a Disk File
      2.1.3. Inputting a SAS Data Set from a Disk File
      2.1.4. Deleting a SAS Data Set from a Disk File
      2.1.5. Inputting an OS Data Set from a Disk File
      2.1.6. Inputting an OS Data Set from a Tape File

SUPPORT

The objectives of this support phase of CertainTeed's program are: (1) to help users overcome the initial learning curve hurdles in using SAS, and (2) to provide users assistance with approved projects, with special emphasis on the controlled access to those secured production data authorized by management.

To help achieve the former objective, the Information Analyst provides continual assistance by answering questions pertaining to SAS, JCL, programming logic, and use of the computer system.

As to the other objective, data access control procedures have been formalized by the Data Administration Department for allowing/providing users access to production data. These procedures, which have been developed consistent with a Corporate statement of data security requirements, apply to all projects under the control of end users.

Only if there is a need for the user(s) on a project to access disk- or tape-resident production data, as indicated on a project request form, does the Information Analyst exercise data access control. The Group MIS Manager is responsible for determining if access may be allowed for this project from the "controlling manager" of the production data; the "controlling manager" is the manager of the department which has overall creation/maintenance responsibility of the data.
The Information Analyst first verifies that such access has been granted. He next takes steps to assure that there are adequate controls to protect the proprietary nature of the data.

When the production data set in question contains data for only the user's Group, then direct read-only access is granted to the complete data set. If this data set contains data for any other Group(s), the Information Analyst makes a selective extraction of only the data required in the project into a pre-allocated SAS-formatted Group data set for direct read-only access by the user for the duration of the project. This is done in order to assure that only the data to which access has been approved are used without severely restricting user autonomy.

It is very important to note that in all cases involving the use of production data, the users are allowed read-only access on an individual project basis in order to assure that the integrity of the data is preserved.

Upon a user's first project request, a copy of an in-house "User's Guide" is included with the return of his copy of the submitted forms. In general, the information contained in the "User's Guide" (see Table 2) aids the user in assembling his input job card deck, including JCL, for his most typical runs. These notes were designed as a reference aid in which users can find presented, in a self-contained manner with examples tailored to specific needs, the practical information on a wide range of topics relating to accessing CertainTeed's computing/data resources. Whenever an update to the "User's Guide" is published, a copy is again sent to the current users needing it.

Support is ongoing. The user is provided continued help with structuring his SAS source code, with following the details contained in the "User's Guide," with understanding and applying new concepts of SAS programming, with debugging, and with analyzing output results.

SCENARIO FROM THE USER'S VIEWPOINT

At this point, now that a view of the training and support phases of CertainTeed's program have been discussed, it is important to show how a user fits into the flow.

Now suppose that a user has a particular application in which to use SAS. It is expected that, once a person has acquired knowledge of SAS at CertainTeed — either by having attended the training course or by self-study — he would apply it to data in need of analysis.

Administrative support and control tools were developed by the Data Administration Department to be used for each such user-initiated project. Among the mechanisms are a Project Authorization Request form, a Project JCL Information form, and a Job Submission form. The purpose, contents, and implementation of all of these will be discussed below.

Initially, a prospective user submits a formal Project Authorization Request form for each project which he would like to pursue. As its name suggests, the purpose of this form, when approved, is to authorize the project described therein to be initiated; i.e., the user's Group allows dp expenditures to be incurred by the user(s) named. Included on the form are details on the project's purpose, access to other's data, usage of dp resources, and project duration. The scope and expected longevity of a project are determined by the user and his management. Since the Group User Coordinator gives final approval, he is the focal point in a project's life cycle.

After a project is approved at the Group level, the Information Analyst receives the project request form. He determines the extent of the data access support to be provided to the user. The specifics of such support have been given in the previous section.

The data set name of each file which the user has been given an approval to access is listed on a copy of a Project JCL Information form which is returned to him with a copy of his original request. In addition to advising the user (and his management) of the files able to be accessed, this form provides accounting codes that the user must use when submitting computer jobs. The user also receives a copy of the "User's Guide" plus multiple copies of a Job Submission form, one of which is used whenever the user needs (1) cards keypunched from source input (on a coding form) or (2) a computer job processed.

MANAGEMENT CONTROLS

In order to assure Group management that adequate controls have been provided and to advise the Group MIS Managers of the level of SAS usage in their respective Groups, the Data Administration Department provides several administrative reports. The main purpose of providing these reports stems from the premise that a manager has the responsibility of exercising control over his people with respect to resources expended.

- "SAS Training Enrollment" report, issued following each new SAS course, is a cumulative listing of employees within each Group who have attended the SAS training course. It is intended to be used by the Group User Coordinator to follow up with each attendee, since it is assumed that an individual attends training only if he has an immediate need to use SAS.
"Approved User Projects" report, issued whenever a project is added or extended, is a cumulative listing of all Group user projects which have been authorized as of the date of issue. It is intended to be used by the Group User Coordinator to verify the current status of each project.

"Approved Data Sets for User Access" report, issued following the addition of each new data set approved for access, includes each file for which the "controlling manager" has allowed read-only access on an as-needed basis. This advises the Group User Coordinator of those production data sets currently approved for use by any user in his Group.

"Detailed and Summary User Usage" reports, issued monthly, use data extracted from the computer activity file on which is logged all submitted user-initiated or user-supportive jobs. Both reports provide, among other data, job run date and computer CPU time with the accompanying internal charge for it. The detailed report lists, by project, all jobs that were submitted during the reporting period; a second copy is provided for the responsible project managers. The summary report summarizes, by project within department, the detailed report; a second copy is provided for the responsible departmental managers. Thus, managers at several levels are advised of certain key expense-related items, plus such additional information as frequency of job submissions and submissions after a project's termination date.

"Project Termination/Extension Turnaround Document," issued monthly, reports those projects which would be terminating within the three months following the date of issue. In the event that a project is to be extended, the new information is entered on the form by the appropriate Group manager(s) and returned to Data Administration, which changes the computerized data security system to provide continuity of user access to all authorized files through the new termination date.

The benefits that have accrued directly to the end users and their departments include:

- having one-time, custom-tailored reports produced easily and at a minimal internal charge,
- solving problems using data and/or techniques with which the users are most familiar, and
- doing either of the above without the use of outside consultants.

In addition to those listed above, the benefits of the SAS program to the Information Systems Division have included:

- allowing Systems & Programming Department's analysts/programmers to concentrate on production work, and
- having a user community with increasing knowledge about CertainTeed's available data files and an appreciation of dp in general.

Armed with SAS and provided with data from various sources, the users have been working on diverse projects. From these, there have been many success stories. In general, these involve either of the following traits:

- time/money savings over existing methods, or
- ability to do a job that was previously considered intractible (due to money and/or time constraints).

Examples of typical users (identified by function) and some of what they have accomplished are as follows:

- A Marketing Research Manager has been extracting and extensively analyzing data from public building trades tapes in order to make estimates of future consumer market shares of various products.
- A Programmer at a remote manufacturing plant has been summarizing and reporting data on certain key plant operations (e.g., tracking payroll data on hourly employees, comparing material loaded vs. material shipped) and has reported that his projects using SAS will, when completely operational, save the company over $150,000 annually.
- A Quality Control Manager has developed a system which analyzes and reports consumer data on one line of CertainTeed's home building/improvement products and has saved a consulting fee of $10,000 plus over $400 per month in maintenance charges.
• An Accountant has been accessing a register of CertainTeed's fixed assets to mathematically forecast depreciation of all plant holdings.

• A Personnel Systems Manager has been accessing extracted personnel files to analyze data on subgroups of employees, to print mailing labels on selected individuals, and to match employees for car pooling.

• An Office Services Coordinator has been tracking office equipment in use.

• A Standards Technician has been statistically evaluating quality control data from plants in order to track fluctuations in measurements made on products manufactured.

• A Process Engineer has developed a system which tracks the life and throughput of fiberglass manufacturing equipment as reported by the plants on a monthly basis.

• An Industrial Engineer has analyzed and plotted lift truck maintenance history by plant.

All of these applications have involved the programming of specialized reports using SAS's capabilities. The success stories continue.

The number of active projects and the number of jobs run have both been increasing since the start of the program. Users are generally pleased with having SAS so readily available.

Even with all of its successes, the progress of the program is evolutionary — it is undergoing a maturing process. The original emphasis had been on using SAS primarily as a report-writing tool. When it became obvious that it is relatively easy for non-dp-trained end-users to grasp the basics within a relatively short period of time, the users started to go beyond report writing, using production data to deal with quite sophisticated projects. In fact, some users have grown to a very high level of sophistication, and there is now a need to extend the training program, such as with the addition of mini-workshops to address certain specialized SAS concepts (e.g., matrix language, file-handling statements, statistical analysis procedures).

SAS usage has even spread to the Systems & Programming Department, and people at all levels there have been using it.

Some non-dp users have so well integrated SAS into their work that one area of future consideration for the Groups is that of users' having their SAS jobs that are to be run on a regular basis turned over to the dp Operations Department and run as production jobs.