How to Develop a Corporate Plan for Training and Retaining SAS® Programmers

Michael G. Sadof, MGS Associates, Inc.
Larry Lutz, Independent Consultant.

ABSTRACT

The SAS System is a valuable tool for information visualization, data warehousing, and decision support. But before it can be fully embraced by management, it must be shown to be an effective and sustainable solution. Training and maintaining a cadre of skilled and "business savvy" SAS programmers is an important part of the strategy that will bring SAS to the forefront in your organization. A successful plan should re-enforce management's commitment to SAS by extolling the benefits of rapid development, increased productivity, and reduced development costs. In this paper we will show how you can employ all the tools currently used for dissemination of information such as seminars, in-house classes, an accessible library of SAS publications, email notifications, and the Intranet to implement your training plan. Training materials should emphasize solid design and standards of coding. ISS standards can serve as a model but will generally have to be modified for the SAS environment. Whether you employ a mainframe or network of PC's, centralized repositories for data and code can speed up development and assist novice programmers in increasing their skill level. An effective training plan for SAS programmers is easy to implement and can increase your bottom line significantly.

INTRODUCTION

No matter what size your organization is, large or small, productivity can be increased with an effective training plan for SAS programmers and users. To effectively implement a training program you need to develop a training strategy within your organization. Simply put, you can not expect to increase the level of expertise in SAS without consciously planning and striving toward that end. Each individual should be stimulated and rewarded for increasing their knowledge of SAS systems. As the knowledge level increases so will productivity. As productivity increases management will be more apt to acquire the new leading edge SAS products. As the newer jazzier leading edge products are implemented employees won't be looking for greener pastures in other shops. The first step in an effective plan is to obtain a commitment from upper management that

SAS is an effective tool to be used in the organization. The second step is to utilize all the avenues of learning available to the community. The third is to create and implement a set of design standards for SAS programming in your shop.

As standards become adopted and efficiencies are realized continued adherence to the strategy will be understood and more readily accepted.

MANAGEMENT COMMITMENT TO SAS TOOLS.

Before you can develop an overall strategy emphasizing SAS you must get 'buy in' from management indicating their willingness to support your program. Barriers to this are:

- Reluctance to use new products.
- Belief that SAS is more complex than programming in MS-Excel or MS-Access.
- Hesitation to spend more money on SAS.
- Belief that SAS is inefficient.
- Annual License Fees.

Most of the facts necessary to make your case are presented by the SAS Institute in their product literature but here are a few to reinforce your position.

Flexible Tool

SAS is always a flexible tool for data gathering and manipulation. With the data step alone you can pull in data from SAS files, flat files, various database files and spreadsheets. With the addition of the SAS/ACCESS® engines you can read and update many database files directly such as Oracle, Informix, and DB2. You can utilize data that is already developed and maintained by your IS department and save space by not duplicating data in a SAS format. Once the data is read by SAS you can manipulate and transform the data as needed. Programmers or business analysts can then perform analyses on the data to derive the information needed. In many applications there is no need to create formal requests and schedule jobs for every question the business analysts require since they can look at and analyze the data directly. SAS has a myriad of statistical and graphic solutions as well as procedures that can simplify analysis and reporting.

Information Delivery

Methods for delivery of information have changed since they invented punch cards and green bar paper. SAS provides us with many options for reports, graphs, spreadsheets, and direct transmission of data through SAS/CONNECT® or Email. Products such as SAS/AF® enable direct input and output from SAS data files. Products like the AppDev Studio™ and SAS/IntrNet™ enable us to interact directly with web applications. However probably the most promising new feature is the Output Delivery System(ODS) which enables output from procedures in base SAS to be distributed in many formats including HTML. Now your SAS applications producing tabular reports can be transformed directly in to web-ready HTML pages. SAS has multi-platform architecture so that a program written on Unix will work on the OS/390 platform. Data and reports can be transferred between platforms with ease using SAS Connect and shared between users with SAS/SHARE®. In our work we typically sort large data sets on tape in the OS/390 environment and then extract smaller SAS files to be transferred to Unix. SAS/CONNECT permits us to read and write mainframe OS/390 files directly from Unix SAS sessions. This cross platform interaction brings us to a new era in information delivery.

Decision Support

The ability to make intelligent decisions quickly is essential in today's environment. Whether it is in retail sales, budget analysis, or research SAS can assist in quick decision making. With the proper systems in place SAS can provide an excellent decision support system. SAS Institute states in its literature that: "Online Analytical Processing (OLAP) enables better decision making by giving business users quick, unlimited views of multiple relationships in large quantities of summarized data. OLAP offers high-performance access to large amounts of summarized data for complex multidimensional analysis and easy reporting. With OLAP managers and analysts can rapidly and easily examine key performance data and perform powerful comparison and trend analyses, even on very large data volumes. Data comparisons can be used in a wide variety of business areas, including sales and marketing analysis, financial reporting, quality tracking, profitability analysis, manpower and pricing applications, and many others". With OLAP systems in place you can free up your IS staff from a myriad of adhoc requests that the business side can handle themselves. Developing OLAP systems will give business users more tools to perform their everyday tasks and enable them to perform analyses and queries never before possible. Training business users to understand all the tools available will free up programming staff to develop new applications and optimize existing applications.

Data Warehousing

A data warehouse or repository of corporate data complements a good decision support system. If an enterprise wide warehouse sounds too challenging a small localized data warehouse or data mart can be set up for each department or focus group within an organization. An effective data warehouse solution can take many forms. It can range from complex multi-platform and MultiVendor Architecture™ to simply a set of files in a central location. SAS has many features and products that will enhance the data warehouse including the Scalable Performance Data Server®, SAS/MDDB® software, and the SAS/Warehouse Administrator®. Even with just base SAS software an effective and productive warehouse solution can be developed and keep everyone working together with less duplication of effort. Business users should be provided training as to where and how to get at the data in the warehouse. They already know what they want; Your job is to show them how to get it. In the process you will be freeing up valuable IS resources.

Rapid Development Environment

SAS software provides an excellent environment for rapid development of applications. SAS enables the novice user to be productive in days rather than months. Tools such as SAS/Assist® enable the new user to learn in a friendly, non-coding environment. As they learn they can start to code modules directly. In any development effort you should build your system with a modular design. By building and debugging small, reusable modules you can reduce your overall development and testing time. SAS has always been used for quick answers and descriptive statistics but with newer tools it can be the core of an application or production system. It lends itself well to modular design. It is very easy for programmers to become familiar with and productive in SAS. Management will see that shorter learning curves, reduced development time, and more maintainability can bring costs down. With reduced development times and cost, management will more readily stand behind SAS development efforts rather than more traditional IS approaches. SAS enables the business user to do some system development as well as the analyses they normally perform, thus even further reducing development time. We caution, however, that the business users and IS programmers must use appropriate techniques in their rapid development process. We will discuss this in more depth under the heading of Design Standards.

Effortless User Interface

The SAS system is certainly a very powerful tool for

data warehousing, data manipulation, decision support, information delivery, and simple reporting but the newer user interfaces make it simpler than ever for information systems professionals and business users to interact with the system and ultimately their data. SAS/EIS® software provides a syntax-free environment for building user-friendly enterprise information systemsand applications that are as easy to develop as they are to use. Web/EIS™ enables us to distribute the same functionality over the web. Enterprise Reporter™ software enables the user to visualize data from SAS sources and eliminates the need for developers to code each report or view separately. Developing these applications and training users to work with them can increase productivity and reduce costs.

If SAS is already installed at your site then there is already some commitment. These SAS features can strengthen management's commitment to SAS and put you on your way to developing a flexible support and training program within your organization.

ENTERPRISE WIDE TRAINING AND INFORMATION STRATEGY

A successful training and support plan should utilize a multi faceted design with two desired outcomes:
   a. Keeping management and business users informed about what SAS can do.
   b. Keeping the programmers informed about how to do it.
While all strategies are not feasible for every one you should consider each one for their own merits before determining how best to implement at your organization.

External Strategies

User Groups

SAS user groups are a valuable source of information about SAS products, SAS solutions, and tricks and techniques to implement these solutions. Novice SAS users can benefit from the beginning tutorials, managers can benefit from management tracks, and even the most accomplished SAS programmer can learn a new technique or better way of utilizing resources. The energy, excitement, and knowledge taken home from a conference are a benefit to all. Attendance at conferences should be a part of your training plan. If it is too costly to send everyone in your organization then set up a rotation schedule between local and national events.

SAS Institute Training

Training courses given at a SAS Institute facility or at your own site provide technical hands-on learning for all SAS products. The courses are designed well and provide a structured environment in which to learn. Employees generally like to take courses and see it as a fringe benefit, but the benefit to the organization far outweighs the cost. Users will learn the best way to do something rather than just a way to make it work. Some sort of formal training should be a part of your training plan for novice and experienced personnel.

Seminars

SAS Institute offers many seminars on various products. These can be useful in deciding if a particular product or strategy would be helpful to your organization. It is important to attend these seminars to keep up with the latest techniques.

Certification

SAS Institute has developed the SAS Certified Professional Program. As stated by SAS Institute on their web site this program has been developed with the following goals in mind:
- establishing a universal standard for measuring SAS software knowledge.
- developing an internationally recognized certification program.
- Increasing the level of SAS software knowledge in the marketplace.

While certification is relatively new it may turn out to be a helpful way to evaluate prospective candidates and keep your current staff up to date. It is set up in four levels of increasing difficulty and measures various aspects of the user's knowledge.

Web or Computer Based Strategies

SAS institute Website

The World Wide Web and Intranets have become an integral part of corporate and government institutions. A great deal of SAS information can be obtained or distributed through these vehicles. The SAS Institute official web site www.sas.com contains much information on products, solutions, and techniques. It maintains lists of consultants and, of course, information about SAS consulting services. It has demos and downloads of fixes and some neat macros. It also occasionally has free downloads of beta releases of new products. Your training plan should encourage users to visit this site often for valuable information. Of course information about SUGI and regional users groups can be found here. Other web sites contain SAS information as well and you can find them by specifying 'SAS' in your favorite search engine.

SAS-L List Server

News groups and List Servers have become very popular. The `SAS-L` list server run in cooperation with the University of Georgia maintains running discussions of SAS problems and techniques. By sending an email message to: `listserv@uga.edu` with the word 'subscribe' in the subject field and the words "Subscribe SAS-L your name" in the message text you can subscribe to this prolific discussion group. Users are encouraged to ask questions and receive answers. I have seen responses appear minutes after the questions have been entered. It is like having a worldwide SAS help desk. Another informative list server is `TSNEWS-L`. It is run by SAS Institute and can be subscribed to by sending the message "Subscribe TSNEWS-L" to `listserv@vm.sas.com`. This listserver posts messages about bugs or fixes in SAS products and recommends work arounds or patches when available.

SAS OnlineTutor™

SAS has developed a Web-based interactive series of tutorials. These offer a convenient way of learning basic concepts and techniques through interactive web sessions. It is also available in a CD version. While computer based training (CBT) is helpful for some people it generally does not replace the instructor based training that SAS offers. You should consider these tutorials for your overall training plan if you use other CBT's.

Publications

Traditional

SAS Institute supports several types of publications including the traditional SAS Manuals, the proceedings of SUGI and regional conferences, Books by Users[SM], and white papers on special topics. Develop a corporate SAS library of your own. Even if it is only one shelf in a bookcase, start a central location for SAS publications where users can go to find solutions to problems. SAS has recently instituted a program named "Books by Users" whereby they promote books developed by SAS users on various topics. These books are generally presented in a less formal and more readable format than the SAS manuals and can be helpful to new and experienced users alike. Try to add a few of these to your corporate library.

Electronic

The latest form of documentation from SAS Institute is SAS OnlineDoc[®]. This electronic version of SAS documentation is published on CD-ROM and can be installed on a workstation or corporate Intranet. It is also available on the web at several university sites. While it may not be a complete substitute for paper based documentation it does have the advantage of being less expensive and more accessible. It is supplied on a single CD-ROM and contains all the traditional manuals in a searchable, printable, browser based format. A pdf format version is also available. The proceedings for SUGI and many regional conferences are also available on CD-ROM. These CD's are a continuing source of information for problem solving and basic techniques.

Solutions@Work[®] is another item that SAS produces containing various solutions and examples. Several areas in which sample solutions are provided are applications development, business geographics, and SAS/IntrNet. Here you can find complete solutions to various applications. The code can be copied and modified for your situation. Even if the example does not meet your needs the samples provide interesting techniques and ideas. Samples are available on the web site and are worth looking into.

In house Strategies

Many organizations have chosen to develop in house classes to train novice users. This is a good way to get novice users or non-SAS programmers up to speed with techniques and standards. Classes can be developed for novice or experienced users for specific problems or concerns in your institution. A good starting class should contain information about your specific platform or operating environment. We have had success with a basic JCL course for novice users of the mainframe. The material should contain the very basics of logging on to the system, using the TSO editor, and some sample JCL that the novice can use to submit SAS programs. Similarly in a Unix environment you should explain how to login and set up basic profiles and how to access the SAS system. Course material should emphasize standards such as naming conventions for libraries and projects and straightforward program design. Programs written to some sort of standard will be much easier to maintain. Some topics could include:

a. Basic JCL
b. FLAT file vs. SAS file
c. Efficient coding techniques
d. Basic Macros
e. New features in Version 8.

Another avenue of approach that can be done in house is to set up an in house users group. Ideally it should consist of all the SAS users who join in periodically for discussion of problems or new techniques. Experienced programmers can offer their advice to the more novice people. It can be as formal as inviting a local speaker or paper presenter

or as informal as a brown bag lunch roundtable discussion. Generally experienced programmers are happy to show off their skills and assist others, while beginners are eager to learn advanced techniques. Some typical topics for discussion would be:

a. How to handle large datasets efficiently.
b. What is the best way to merge several files (Merge vs. SQL).
c. How to interpret error message.
d. Problems with a particular type of data used by your organization.

DESIGN STANDARDS

Design standards have long been a part of traditional centralized mainframe Information Systems shops. Cobol by its very nature requires us to create structured and modular programs while SAS in its 4th generation style is more forgiving. Networked and client server environments relax the standards for coding and implementation contributing to an overall laxness in programming style. SAS lends itself to developing quick adhoc solutions to common data problems. These so-called adhoc programs have a way of becoming mainstream production modules that run on a regular basis. The idea we would like to present in this section is that coding standards should be applied to all programs and systems in a shop, especially SAS systems. It is easier in the long run to assess, design, and build standardized documented systems than build adhoc systems and wrestle with the maintenance or redesign later. Design and coding standards will increase programmer as well as program efficiency. A standardized design will provide for simpler and controlled maintenance if there is personnel turnover. Novice SAS programmers or those new to your shop will get up to speed quicker if standards are in place and they attend a few short design and standards classes given by your more experienced staff.

Coding Standards

Keep the style of programs similar. Begin each program with a standard comment section describing at least the purpose, input, output and modification date of each program. Supply a standard template in a common library for all to use. Emphasize simple top-down design of programs where the files are described and identified in the beginning of the program and results are produced at the end. Very long programs should be broken up into simpler pieces with well-defined purposes. These types of standards are excellent content for in house classes and discussion groups. Large shops might document such standards and place them on an Intranet web location for easy reference. Some examples of the most important standards follow but by no means are an exhaustive list.

Central repositories

♦ Code

Central repositories for code are known as copylibs, include libraries, or catalogues. Plan a central location where common code elements can be stored. These can be directories on directory based systems (UNIX, windows) or libraries on mainframe systems. There should be several types of libraries for macros, file descriptors, utilities, passwords, sample code etc. Many shops organize by project as well and maintain many libraries or directories. Of course there should be indices or descriptions for each library so items can be found easily. Consider using 'copylibs' or sections of code that can be included as needed in other programs. Typically file layouts, report headers, and standard calculation routines are candidates for copylibs. The `%include` statement will bring these sections back into your programs quickly. When an input data layout changes you need only to change the code in one place not in every program that utilizes that input data source. Standard routines can be compiled as macros and stored in an autorecall library. Copylibs will make the programmers job easier, more productive and more rewarding.

♦ Documentation

A LAN directory for each project with notes, descriptions, designs, flowcharts and other pertinent information will help tremendously. Entries in this folder can direct individuals to where the code, data, and libraries for this system are stored as well as assist in developing similar systems.

♦ Data Dictionaries

These are descriptions of data sources and fields. The traditional data dictionary is very helpful and should be a part of every system. A well-defined data dictionary will be have consistent naming conventions and data values across multiple data sources or data storage files. Programmers will complain about building it but will reap benefits from a properly maintained dictionary. A good data dictionary can prevent invalid reporting of data. The coder must understand how the data is used and what it represents. It is important to realize that any system documentation including a data dictionary should be designed and regarded as a living, changing document. Very few systems have been designed and utilized without modification.

CONCLUSION

A successful training and support plan should include training of programmers and end users of the system. By keeping management and business users informed about what SAS can do and training programmers in the latest techniques about how to do it you have a win-win-win situation. The business users will get what they want, the programmers will be more efficient and productive, and both sides will appreciate the environment and results.

TRADEMARKS

AppDev Studio^{TM} , Books by Users^{SM}, Enterprise Reporter^{TM}, MultiVendor Architecture^{TM} , SAS$^{®}$, SAS OnlineDoc$^{®}$, SAS OnlineTutor^{TM}, SAS/ACCESS$^{®}$, SAS/AF$^{®}$, SAS/ASSIST$^{®}$, SAS/CONNECT$^{®}$, SAS/IntrNet^{TM}, SAS/MDDB$^{®}$, SAS/SHARE$^{®}$, SAS/Warehouse Administrator$^{®}$, Scalable Performance Data Server$^{®}$, Solutions@Work$^{®}$, webEIS^{TM} are registered trademarks or a trademark of the SAS Institute Inc. in the USA and other countries. $^{®}$ indicates USA registration.

The authors may be contacted at:

Michael G. Sadof
MGS Associates, Inc.
Bedford, NH
mgs@mgsnet.net

Larry W. Lutz,
Independent Consultant
PO Box 2384
Reston, VA 20195
(703) 481-9379
Larry_lutz@yahoo.com