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Supporting SAS® in a Research Organization

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Abstract

Westat utilizes SAS software as a core capability for providing government and private industry clients with analysis and characterization of survey data.   Staff programmers, analysts, and statisticians use SAS to manage, store and analyze client data; as well as to produce tabulations, reports, graphs and summary statistics. Because SAS is so widely used at Westat, the organization has built a comprehensive infrastructure to support its deployment and use. This paper provides an overview of Westat's SAS support infrastructure, which supplies resources that are aimed at educating staff, strengthening their SAS skills, providing SAS technical support, and keeping the staff on the cutting edge of SAS programming techniques.

Introduction

Westat is an employee-owned research corporation serving agencies of the U.S. Government, as well as businesses, foundations, and state and local governments. We have used SAS software since the late 1970s, due to its unparalled power and flexibility and its relevance to our capabilities as a leading statistical survey research organization. Since then, the role of SAS at Westat has grown dramatically and become even more critical, given the increased scope, breadth, and complexity of our projects. So, over the years, we have found it in our best corporate interests to build a strong SAS support infrastructure.

The Westat SAS support infrastructure is composed of seven main elements:

- SAS Resources Web Pages
- SAS Technical Support
- SAS Training
- The Westat SAS Users Group (WesSUG)
- SAS Conference Participation
- SAS Outlook Information Forum
- Corporate SAS Macros

These elements have proven to be extremely effective in providing a structured, nurturing, professional environment for our SAS programmers. This paper begins by summarizing the overall corporate structure that coordinates and manages this support, and continues by discussing each of the seven elements of our support infrastructure.

Readers should note that though this paper characterizes Westat's SAS infrastructure, it is not meant to be a statement of the organization's official policies and procedures.

Coordination and Management

Supporting SAS in a large corporate environment can be challenging. The more than 300 programmers, analysts and statisticians who use SAS at Westat are dispersed throughout the organization's main campus buildings and at several offices in other states. Many have SAS loaded on their workstations, some use SAS on shared Linux or VAX servers, while others deploy SAS/IntrNet-based web applications. To meet the needs of all of our projects and clients, more than one version of SAS must be supported and maintained.

Over time, we have come up with a number of mechanisms in order to manage all of the elements of our SAS support infrastructure efficiently and to maintain a robust two-way flow of communication about SAS-related issues. At the heart of the management and communication process is the SAS Resource Planning Group (SRPG), which is a small group of senior managers and technical staff who have extensive SAS experience and responsibilities. This group meets once a week to discuss all SAS matters that affect the organization. Issues typically include:

- The deployment of SAS hot fixes on the various computing platforms

- Migration to newer versions of SAS software
- SAS training issues
- SAS conference participation planning
- Upcoming Westat SAS Users Group (WesSUG) meetings, topics, and speakers
- Novel SAS technical problems reported by staff members

In the weekly SRPG discussions, technical directions and strategies are initiated, discussed, and set into motion. One of the SRPG members manages a small support team, called the SAS Unit, that provides SAS logistical services and technical support. Members of the SAS Unit install new versions of SAS on the various computer platforms, install SAS service packs and hot fixes, administer our SAS/IntrNet platform, and manage SAS on the Linux servers. They oversee SAS licenses on the various SAS platforms and ensure that the proper SAS products are available to users. The senior manager directs the SAS Unit staff to carry out the initiatives discussed in the SRPG meetings.

Our corporate SAS planning and communication is also greatly facilitated by our SAS Technical Coordinating Committee (TC), which is a group of about 12 persons representing all of the corporate study areas where SAS is used. Each person on the committee is heavily involved with SAS as a manager and/or programmer and typically serves as the "point person" for SAS in his or her group. The goal of this committee's monthly meetings is to make Westat project staff aware of SAS changes and issues, and to get feedback from them on various SAS initiatives being considered by the SRPG (whose members also attend the meetings) and the SAS Unit. The area representatives provide input to discussions at the meeting and bring information back to their groups afterward. Consequently, there is a direct flow of information concerning SAS software issues and practices directly into the project groups that use SAS the most.

We also make sure that our SAS planning activities are closely coordinated with senior corporate IT management. One of Westat's vice presidents who has extensive SAS experience attends all SRPG and TC meetings and provides corporate oversight to Westat's SAS planning and support activities. He also brings emerging SAS issues and directions to the attention of the other members of Westat's IT management group. This enables the key corporate IT officers to participate in the SAS planning process and to keep abreast of important SAS initiatives and issues.

Whenever possible, we take advantage of existing corporate communication mechanisms to inform Westat staff about SAS capabilities and issues. For instance, we work with the editor of our corporate newsletter to include SAS-related material in each issue, such as news about upcoming SAS classes or user group activities, and we coordinate with the managers of our corporate intranet so that SAS items are included in their rotating "Tip of the Day" section.

SAS Resources Web Pages

It is important for programmers to have a central source that they can easily access to get information about SAS—both at the corporate level and at the more global, world-of-SAS-programming level. We provide a home page for such information on our corporate intranet. Our SAS home page is named *SAS Software, Documentation, and Resources*, and is one mouse-click away from the main corporate intranet home page. See Figure 1, below.
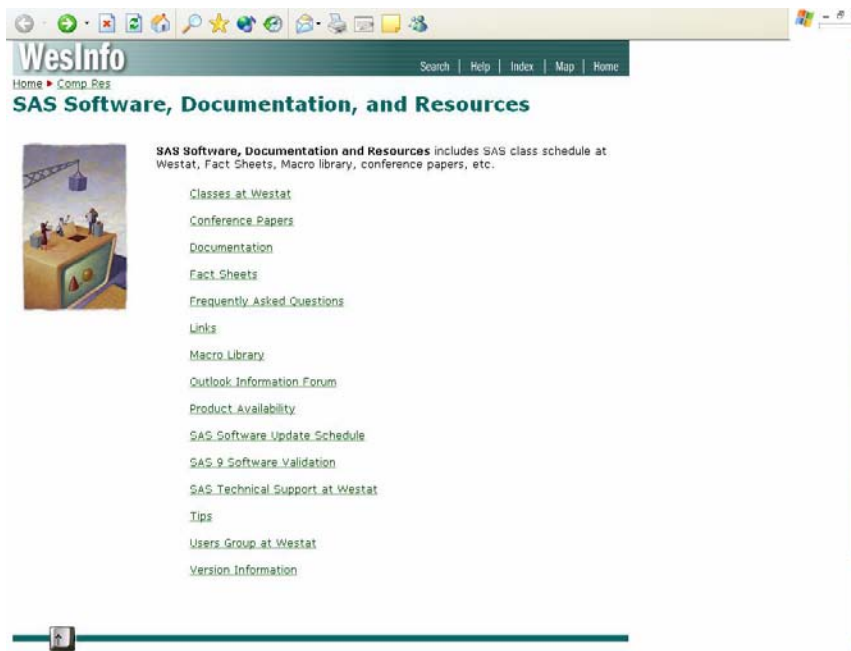
Figure 1 – The Westat SAS Resources home page.

The *SAS Resources* home page has links to sub-pages that describe everything from upcoming SAS classes, to SAS Frequently Asked Questions (FAQ), to the SAS products available on corporate servers, to links to SAS web sites on the Internet, to SAS tips. Programmers can stay attuned to upcoming events such as SAS classes and user group presentations, and they have a plethora of SAS information at their fingertips.

There are fifteen links available to corporate staff on the *SAS Resources* web page. The links take them to the following pages:

- **Classes at Westat** – This page provides a list of upcoming in-house SAS classes. It includes dates, times, how to sign-up for a class, class prerequisites, and class descriptions.
- **Conference Papers** – This page lists all of the organization's SAS conference papers. Staff can choose a particular conference and view a list of all of the papers presented at that conference by fellow staff members. They may click on a paper title to read a particular paper online, or to print it for later reading.
- **Documentation –** This is a web page where programmers can link to online documentation of SAS for each version of SAS that Westat currently supports. Having SAS documentation online gives programmers easy access to it whenever they need it to research a particular aspect of the SAS programming language. There are also instructions on this page on how to order copies of SAS-related books.
- **Fact Sheets –** From time to time, corporate staff author in-house papers concerning various SAS topics and techniques. Papers range from how to use SAS/Connect to link to corporate Linux servers, to how to send emails via SAS, to how to migrate from SAS/Access to ODBC to SAS/Access to OLEDB. These papers are accessible from this web page.
- **Frequently Asked Questions** – Programmers can find the answers to commonly posed questions regarding the installation and use of SAS software on this web page. The FAQ is updated from time to time by members of the SAS Unit with new questions that have been frequently posed to the SAS Unit.
- **Links** – A number of universities, organizations, SAS user groups, and individuals have web sites that provide useful information on SAS programming. This web page contains links to over a dozen such web sites, as well as to the SAS Institute web site.
- **Macro Library** – Over the years, Westat programmers have created scores of SAS macros that solve common programming problems. These macros have been placed into the corporate SAS autocall library. Staff can review the macros on this web page. The entire SAS macro, including a detailed explanation of the macro's purpose, inputs and outputs, is available. Currently there are fifty SAS macros in the corporate SAS autocall library.

- **Outlook Information Forum** – This page describes how staff can use the SAS Outlook Information Forum, which is an internal public folder in Microsoft Outlook dedicated to discussing SAS issues.
- **Product Availability** – This page lists all of the corporate SAS platforms (Windows, Linux, and VAX) and the SAS software products that are installed on each of them. In the case of Linux and SAS/IntrNet servers, each server is listed separately, along with its list of SAS products. Programmers can use this list to determine if the SAS products they are interested in using are on the corporate server they are interested in using.
- **SAS Software Update Schedule** – This page provides staff with the schedule of when SAS hot fixes, and other system maintenance, are implemented on our SAS servers.
- **SAS 9 Software Validation** – This page describes the formal procedures the SAS Unit goes through to validate that SAS software has been successfully installed on corporate servers. There are validation procedures for installing new versions of SAS and for implementing SAS hot fixes.
- **SAS Technical Support at Westat** – Users access this page to read about how to obtain corporate SAS technical support. The write-up tells them about the SAS Outlook Information Forum, the SAS FAQ, and the SAS Tips links. It also supplies the email address and extension for obtaining in-house SAS Support.
- **Tips** – Over the years, senior staff programmers have compiled a number of tips that make SAS programming easier. These simple one-or-two paragraph tips are available on this page.
- **Users Group at Westat** – This page provides a general overview of the Westat SAS Users Group and a schedule of upcoming WesSUG presentations.
- **Version Information** – This web page has information about the versions of SAS software that the organization currently supports.

SAS Technical Support

An organization with over three hundred SAS programmers, and other SAS users, needs a strong structure for SAS technical support. Programmers, statisticians, and analysts should not be concerned with the fine details of which version of SAS they are using, what SAS hot fixes have been applied, and whether the versions of SAS are in sync across computer platforms. Nor, should they have to worry about odd SAS system errors and individually contact the SAS Institute's SAS Technical Support staff. Instead, they should concentrate on their job of processing data and returning result sets to clients. They should have a dependable, internal group that they can rely on for SAS-related issues, such as version control and technical support.

SAS Unit personnel answer calls and email messages from staff members who have experienced odd SAS errors and have SAS system problems and concerns. They research the problems, find a solution—where possible—and provide that solution to the original caller. When problems cannot readily be answered, SAS Unit staff open a problem ticket with SAS Institute Technical Support. They act as the liaison between corporate SAS users and SAS Institute Technical Support staff until a resolution has been found. If the problem is particularly noteworthy, the SAS Unit staff posts the problem and resolution to the SAS Outlook Information Forum. Contact with the SAS unit is initiated via either a special "SAS Support" telephone extension or an internal email message addressed to "SASHelp".

The SAS Unit is responsible for keeping SAS versions up-to-date and hot fixes applied on all of the corporate SAS platforms. They monitor software changes coming from the SAS Institute and evaluate which ones are relevant to the organization. We currently focus on applying service packs, and only apply hot fixes that fall between service packs when they are absolutely necessary. When SAS software upgrades are made, the SAS Unit staff applies the upgrades, verifies that they have been made successfully, and then posts a message to the SAS Outlook Information folder to document the upgrade. This last step provides a public audit trail of all SAS software upgrades to corporate computing platforms.

The SAS Unit also administers SAS/IntrNet software. Projects needing to use SAS/IntrNet contact the SAS Unit and discuss their needs. The SAS/IntrNet Administrator—a member of the SAS Unit—works with the projects: setting up project directories on the SAS/IntrNet servers, creating a SAS/IntrNet Application Server, making changes to the SAS/IntrNet broker, working with the systems staff to coordinate changes to the corporate firewall, and working with the project on SAS/IntrNet technical issues. This removes the burden from project programmers of having to be concerned with the SAS/IntrNet infrastructure.

The SAS Unit staff monitors postings to the SAS Outlook Information Forum. When there appears to be a SAS software issue involved in a problem, the SAS Unit staff contacts the original poster, gets more information, and

then contacts the SAS Institute's Technical Support staff with a detailed description of the problem. The SAS Unit staff works as the liaison between SAS Technical Support and the person reporting the problem until the issue has been resolved. Then, the SAS Unit staff posts the resolution to the problem to the forum.

The SAS Unit also supplies SAS expertise for various projects on an ad-hoc basis. Such expertise includes SAS program code reviews, answering non-technical SAS questions regarding the best way to code a particular business process in SAS, and questions about the best computing environments for a given project.

SAS Training

In an organization that makes heavy use of SAS software, it is important that SAS programmers at all levels receive formal training. Consequently, the mix of SAS programming classes should provide for the needs of all SAS programmers, covering both basic and more advanced programming techniques, including the latest programming tools and strategies.

We address SAS training with a two-phased approach. The first is to offer beginner and intermediate SAS programming classes throughout the year. The normal slate of SAS classes is:

- SAS Basics for Programmers
- Intermediate SAS Programming
- Introduction to SAS Macro
- Programming with SAS Macros

The courses above are designed to provide the basis for core SAS language competency for corporate SAS programmers. Most are designed and taught by senior Westat staff, who have years of SAS experience and are experts in SAS programming. The classes are taught hands-on, with lectures, workbooks, and exercises, in the corporate computer training center.

The second phase of SAS training is to offer several more advanced, or more topical, SAS classes during each year. These classes are usually taught in-house by outside SAS education vendors, though a few are created and taught by in-house SAS experts. Some classes that have been taught in the past include:

- SAS/IntrNet Basics
- SAS Programming Efficiencies: Tips and Techniques
- Proc REPORT
- Proc TABULATE
- Advanced Output Delivery Topics
- SAS Enterprise Guide: Administration and Support
- SAS Programming Standards

These classes are usually of greater benefit to more experienced SAS programmers. The classes frequently provide them with insights into more cutting-edge SAS programming techniques, tools, and software, while allowing them to stretch their knowledge and increase their capabilities.

We have had success with both SAS Institute and other training vendors for most of these more advanced or specialized courses. In particular, we regularly make use of the SAS Enterprise Professional Training Offer (EPTO), which is a SAS Institute program that allows discount training in pre-paid blocks, called units. The organization has found using EPTO to be a good way to save money while getting quality on-site training from SAS Institute trainers.

Occasionally, there is a need for SAS training that does not fit neatly into the schedule of corporate SAS classes. It may be that a new programmer needs an intermediate SAS class after the corporate intermediate SAS class has been taught, or perhaps a person needs a specialized SAS class such as SAS/AF training. Whatever the case, there is a mechanism to address this type of need. A senior analyst in the SAS Unit serves as the SAS Training Coordinator as part of his assigned tasks. This individual has access to information about SAS classes taught by the SAS Institute and by other vendors. These include traditional in-person public courses as well as other options, such as self-paced training programs and instructor-led courses that are taught over the Web. When ad-hoc training needs arise, the SAS Training Coordinator works with the individual and the individual's manager to recommend a class that fits the need. It is up to the manager and the requestor to decide whether or

not the class is necessary. When it is, the manager and requestor make the necessary arrangements for the requestor to attend the class.

The Westat SAS Users Group

The Westat SAS Users Group (WesSUG) is an official, registered in-house SAS Users Group, with membership consisting of all interested SAS users at Westat. WesSUG meetings are held at least once a month. Meetings are usually held at lunch time in the form of a "brown-bag lunch", where participants bring their lunches to the meeting and eat while they take part in the meeting. Between thirty-five and forty staff members attend a typical WesSUG meeting.

WesSUG meetings are webcast to remote offices in two other states. Staff members in those offices gather in meeting rooms which each have a large monitor and a sound system. They take part in the meetings via a broadcast over the Internet from the home office meeting room. Our webcast system also allows remote office staff to make presentations to the home office and other remote groups.

WesSUG meetings commonly feature some opening announcements, a fifty-minute presentation on a particular SAS topic, and then a follow-up question-and-answer session. The SAS presentations are usually presented by Westat staff, with occasional guest speakers. Staff members use the WesSUG meetings to practice presentations bound for SAS Global Forum, NESUG, and SESUG. This lets them try their presentations out on a live audience and get constructive feedback before taking them to a conference. Other SAS users give non-conference-bound presentations on SAS topics of general interest.

Three or four outside guest speakers are invited to give a presentation at WesSUG each year. They are usually well-known SAS conference presenters who are within commuting distance of corporate headquarters. Their presentations provide an authoritative perspective upon a specific SAS topic, and a break from the usual line-up of corporate SAS experts. In the fall, WesSUG usually gets a guest speaker from SAS Institute to provide an overview of a topical SAS subject.

The schedule for WesSUG presentations is posted in the SAS Resources pages of the corporate intranet, so that it is readily available to everybody in the organization. (See Figure 2.) In addition, a detailed reminder of an upcoming meeting is sent to all WesSUG members a week ahead of the meeting, and then again on the morning of the meeting. This provides enough notice for staff to be able to plan to attend presentations that they find interesting.

Westat SAS Users Group

Westat's in-house SAS Users Group meets approximately once a month, usually on Friday from 12:00 to 1:00 in an RW5 conference room (depending on room and speaker availability). Membership is open to anyone working at Westat who is interested in SAS. To join the group, send an e-mail to Michael Raithel, or sign up at one of the meetings. Announcements are mailed to all members one to two weeks before the meeting, with a reminder on the day of the meeting.

Tentative Schedule for Upcoming Meetings

Date/Time	Location	Speaker(s)	Topic
Monday Jan 14, 2008 4:00 – 5:00	RW5-A	Ron Cody	Advanced Features of User-Defined Formats and Informats
Friday Feb 29, 2008 12:00 – 1:00	RW5-A	Stuart D. Long & Ed Heaton Ed Heaton Sig Hermansen Sig Hermansen	• Using the DATA Step and PROC SQL to Create Macro Arrays • Many-to-Many Merges in the DATA Step • Evaluating Predictive Models: Computing and Interpreting the C Statistic • SAS Scripting of a Production Database into an Open Test Environment
Friday Mar 07, 2008 12:00 – 1:00	RW5-A	Sig Hermansen Michael Raithel	• Existential Moments in Database Programming • Powering Your Organization's Web Applications with SAS Software
Friday Apr 11, 2008 12:00 – 1:00	RW5-A	SGF 2008 Attendees	SAS Global Forum 2008 Wrap-Up

Figure 2 – A typical WesSUG presentation calendar.

WesSUG PowerPoint presentations and other meeting materials are posted to the corporate intranet. They are cross-referenced by the date of the presentation, the presenter, and the topic. Consequently, staff who were not able to attend a particular meeting can still access the presentation materials.

SAS Conference Participation

Long ago, Westat recognized the benefits of participating in SAS conferences. Attendees can learn SAS programming tips and techniques from SAS experts during ten, twenty, or fifty minute presentations. They may network with SAS Technical Support staff, SAS Sales and Marketing staff, purchase the latest books on SAS software, and talk to vendors about computer hardware that is compatible with SAS software. SAS conferences also afford the opportunity for personnel with SAS expertise to write technical papers and present them to their peers in a formal conference setting. In addition, SAS conferences provide a great venue in which SAS programmers can network with each other and exchange ideas. Consequently, staff members normally participate in the SAS Global Forum, North East SAS Users Group (NESUG), and South East SAS Users Group (SESUG) conferences, each year.

The number of staff that participate in a particular conference is often a function of the distance that the conference is from corporate headquarters. More staff attend local conferences held in the Washington/Baltimore area, while fewer staff attend out-of-town conferences. For instance, we sent forty people to a NESUG conference in nearby Baltimore, while only ten traveled to the SUGI 31 conference in San Francisco.

Staff members participate in SAS conferences in a number of ways. Many are attendees who simply go to the technical paper presentations, learn new SAS programming techniques, and return to the office to share those techniques with their colleagues. Another group authors and presents SAS technical papers. (Westat staff have contributed over 170 SAS technical papers to SUGI, SAS Global Forum, NESUG, SESUG conferences over the past twelve years.) Some have heeded the "call for papers" and have a contributed paper that was accepted for presentation; while a core group of others often serve as invited speakers. A number of staff members volunteer to help run conferences. Their jobs range from Session Coordinators, to Section Chairs, to Conference Chairs. Having recognized the value of SAS conferences, the organization supports these volunteers' efforts to help run the conferences.

Each year, the SAS Resource Planning Group works with senior Westat management to develop an overall SAS conference participation plan and budget for the year, taking into account such factors as past participation levels and conference locations. This plan then serves as the overall framework for reviewing staff requests for conference participation.

Individuals who are interested in presenting a paper at one of the conferences submit a paper concept and rough abstract, which are then reviewed by senior SAS Resource Planning Group members and by other senior IT management staff. For concepts that are approved, SRPG members then work with the staff member to finalize the abstract and the paper prior to their submission to the conference. Some papers also require review and approval by Westat project directors and/or clients.

For each conference, a "call for attendance" is also sent out to senior managers, so they may nominate staff to go to the conference as attendees (rather than paper presenters). These nominations are then reviewed with regard to the overall conference participation plan and budget to determine which individuals' attendance can be supported.

Staff who have had papers accepted by a SAS user group conference must present their papers to their peers at a WesSUG meeting prior to the conference. After the conference, the papers are posted to the *SAS Resources* pages on the corporate intranet. (See Figure 3). All conference attendees must prepare a brief presentation on their favorite tips, techniques, or papers from the conference. They then present this information to their peers at a WesSUG meeting held after the conference. This cycle of internal presentations ensures that SAS-based information going to and coming from a particular conference is shared with all interested members of the organization.

Figure 3 – Index of SAS conference papers on the corporate intranet.

SAS Outlook Information Forum

The SAS Outlook Information Forum is an in-house public folder in Microsoft Outlook used to discuss SAS programming issues. Programmers post SAS-oriented programming questions or problems to the folder and wait for a response. Senior SAS programmers and SAS Unit staff normally monitor the folder, watching for new questions. When appropriate, staff members respond to the questions, providing specific answers or possible solutions that the original poster may consider. This is usually enough for most posters to be able to resolve their SAS programming issues.

Programmers also have access to SAS-L listserv postings in a shared corporate Outlook folder. That folder is subscribed to SAS-L so that all postings to the listserv are sent directly to the folder. This allows Westat staff access to the latest techniques being used by SAS programmers around the globe to solve real-world SAS programs. Having a single, central Outlook folder for SAS-L postings—instead of having individual programmers subscribed to SAS-L—eliminates unnecessary duplicate email traffic coming into the organization.

Corporate SAS Macro Library

The corporate SAS macro library consists of about fifty staff-written SAS macros. It is a collection of SAS macros that provide an easy way to accomplish common tasks SAS programmers face. All macros were written by Westat staff and thoroughly reviewed by senior SAS programmers before being put into the macro library. The macros are available for all current versions of SAS on the Windows, Linux, and VAX platforms.

The corporate SAS macros are implemented as a SAS autocall library which is allocated in the corporate SAS AUTOEXEC file. Consequently, the macros do not need to be referenced in a %INCLUDE statement or copied into the Program Editor window. All programmers need to do is to call the macro with the appropriate arguments within their SAS programs. Here is an example of some of the corporate SAS macros:

- W_AGE – DATA step function to calculate exact integer age
- W_DOCAL – Macro to generate monthly and yearly calendar
- W_VARCHK – Check for presence of a list of variable names in a SAS data set
- WDISKDIR – Generate data sets and/or reports with disk space usage data
- WQUOTEIT – Put quote marks around each word in a space separated list

The corporate SAS macros are well documented in the *SAS Software, Documentation, and Resources* pages of the corporate intranet. Programmers can view the list of available SAS macros and a brief description of what they do. They can click on the macro name to link to a web page that displays the entire SAS macro. A detailed comment block at the beginning of each macro lists the author, the date it was created, the purpose of the macro, its parameters, its inputs and its outputs.   Armed with this knowledge, programmers can determine whether or not a macro suits their particular purpose, and how best to use the macro.

Conclusions

In an organization with a large number of SAS programmers, it is necessary to have a solid SAS support infrastructure. Westat has developed a strong SAS infrastructure with seven main elements that facilitate support to its over three-hundred programmers, statisticians and analysts. Those elements are:

- SAS Training,
- SAS Resources Web Pages,
- SAS Outlook Information Forum,
- The Westat SAS Users Group (WesSUG),
- Corporate SAS Macros,
- SAS Conference Participation,
- SAS Technical Support.

These seven elements have enabled us to successfully support SAS in a research environment. Every enterprise is somewhat different; but hopefully, the central ideas in this paper are ones that readers can use in their own organizations.

Disclaimer

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