

SAS Programmer Resources on the web Experiences Acquired Surfing the Net

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ABSTRACT

In recent years the Internet has accelerated the availability of information. It is possible to find practically any kind of information and to be able to quickly solve particular problems. This is particularly true for web sites dedicated to software languages and applications.

The SAS® web site (support.sas.com) is a good example of a technical support web site for a software product. It is well structured nicely presented and has plenty of useful technical information. However, the examples of SAS code are not always complete and re-usable, and in particular, few examples are available for the Pharmaceutical community.

Over the last decade the number of SAS community web sites and personal homepages with useful SAS information (tips, white papers, examples, etc.), has increased. This paper will report a contents review of approximately 100 such web sites. They were selected by searching google.com (using keywords such as SAS, tips, tricks, white-papers, user-group etc.) and then, directly from the institutional SAS webpage.

INTRODUCTION

Whether it is PROC SQL, PROC MIXED or PROC PRINT, the power of statistical programming in SAS is enormous. Its strengths lay within its core, SAS/BASE®, from which the user is provided with an extensive arsenal of code with which data can be generated and manipulated. SAS/STAT® equips the statistician and programmer with the potential to carry out practically any statistical analysis, and even SAS/GRAPH®, although not SAS strong point compared to other statistical analysis software, provides the user with the ability to create (albeit with some effort) graphs that would please even the most finical statistician.

The price to pay for all this versatility and capability however is the large vocabulary of programming code needed to perform even the simplest tasks. The average SAS programmer rarely gets through a full day's work without either having to refer to previous programs, a more senior programmer or the (not quite so user friendly) SAS user manual. Further help is required, especially in the form of relevant examples from the pharmaceutical industries. In addition to the online SAS help web site, other companies and freelance programmers are ready to share their experiences in the form of web sites readily available online. Some are no doubt better than others.

MATERIALS AND METHODS

The identification of the web sites was performed by means of searching for keywords using the most common Internet Search Engines (e.g. www.google.com). We used a number of keywords, each one combined by means of AND and/or OR operators: SAS, user, user group, macro, application, articles, white papers, presentations, slides, samples, newsletter, job, code, tips. In addition, another set of web sites were identified from the 'link' page (whenever available) of the web site already selected.

We then proceeded with the evaluation process. Three reviewers, with either SAS or programming or statistical analysis background were involved. For the main web sites we used a double evaluation approach.

The following items were collected during the evaluation of each web site:

- Title and Web address
- Country
- Type: User-group (USERGROUP), Company (COMPANY), Personal User Webpage (USER), University/Academic (ACADEMIC)
- Pharmaceutical Session: if it contains material related to Pharmaceutical/Clinical Research area (PHARMA)
- If it contains the following items:
 - Articles/White Papers, including help documentation and tutorials (ARTICLES/WHITE PAPERS)
 - Slides, from congress presentations or classes (SLIDES)

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- Samples, by means of SAS code (SAMPLES)
 - Applications, such as SAS/AF or SAS macro (APPLICATIONS)
 - Newsletters (NEWLETTERS)
 - Job Advice (JOB)
- Update: the level of contents update according to the last update clearly reported no later than 2005

Furthermore each web site was classified using a score ranging from 1 to 3. We then ranked the web sites in order to select the first ten, which will be briefly described in a later section of the article.

RESULTS

One hundred and fifty-seven web sites have been selected and evaluated. For two of them the English version was not available, therefore the contents could not be evaluated. Table 1 reports the distribution of the main characteristics of the 155 web sites evaluated.

Among the 155 web sites, 15 contain useful SAS programming information by means of samples, macro routines, full working and reusable applications (e.g. SAS/AF application). In another 19 web sites we found applications related to the SAS System (e.g. editor, stand-alone applications, add-ins). Furthermore, 32 contain useful information/discussion on the use of SAS System in the area the Pharmaceutical/Clinical Research Area. In 33 cases (21.3%) we found that the contents of the web sites were not properly updated (last update before 2005).

Finally, the majority of the resources were from the United States (79.3%).

Characteristic (N=155)	N	%
Country		
USA	123	79.3
UK	8	5.2
Australia/New Zealand	7	4.5
Canada	6	3.9
Germany	3	1.9
France	2	1.3
China	2	1.3
Others	4	2.6
Type		
User group	57	36.8
Company	36	23.2
Personal User Webpage	47	30.3
Academic	15	9.7
Containing the following items		
Article/White Papers	93	60.1
Slides	39	25.2
Samples	59	38.1
Applications	34	21.9
Newsletters	24	15.5
Job Advice	34	21.9
Pharmaceutical Section/Resources	32	20.7
Appropriate Update	122	78.7
Overall Rank		
3	6	3.9
2/3	12	7.7
2	38	24.5
1/2	49	31.6
1	50	32.3

Table 1: Frequency distribution of Web sites evaluated

THE TOP TEN

This is a short description of the top ranked web sites we have selected and evaluated, presented in alphabetical order.

CODECRAFTERS INC. (WWW.CODECRAFTERSINC.COM/)

[USER/COMPANY, PHARMA, ARTICLES/WHITE PAPERS, SLIDES]

Nice and 'funny' web site. This is the web site of Frank Dilorio, 'historical' SAS user. The web site contains also a scanned version of an 'antique' issues of SAS Communication of the '70s.

GLOBAL STATEMENTS (WWW.GLOBALSTATEMENTS.COM)

[USER, ARTICLES/WHITE PAPERS, SAMPLES]

The web site of Rick Aster (figure 1). From here you can download the "The Professional SAS Programmers Pocket Reference". Also useful the "Global Statements Dictionary", containing over 1000 computer terms related to SAS.

HOLLAND NUMERICS LTD (WWW.HOLLANDNUMERICS.CO.UK)

[USER/COMPANY, ARTICLES/WHITE PAPERS, SAMPLES, APPLICATIONS, JOB]

Phil Holland has a valuable experience in SAS. The web site, among the different resources, has a great FAQ section (figure 2).

LEX JANSEN'S HOMEPAGE (WWW.LEXJANSEN.COM)

[USER, PHARMA, ARTICLES/WHITE PAPERS]

The ideal place where you can browse and search SUGI, SEUGI (SAS European Forum), PHARMASUG, PhUSE, SESUG Proceedings and the SAS-L posts. For SUGI, PHARMASUG and NESUG, there is also a useful search engine. In addition for SUGI papers a search engine by author is also available (figure 3).



Figure 1: <http://www.globalstatements.com>

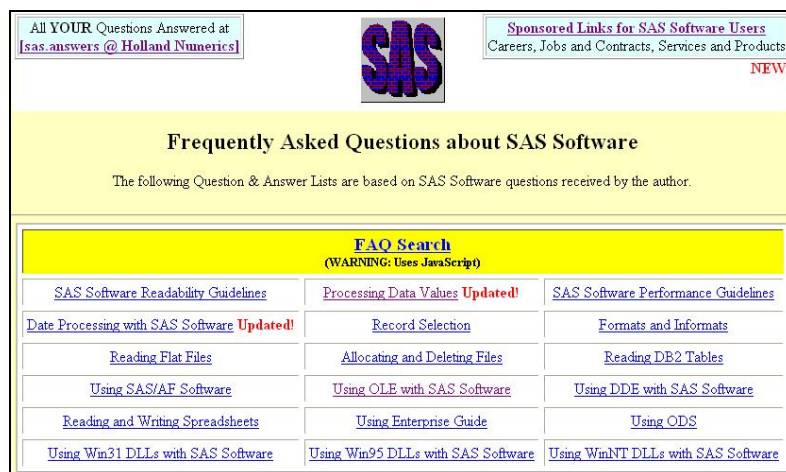


Figure 2: <http://www.hollandnumerics.co.uk/sasfaq/SASFAQ.HTM>

MICHAEL FRIENDLY - HOMEPAGE (WWW.MATH.YORKU.CA/SCS/FRIENDLY.HTML)

[USER/ACADEMIC, ARTICLES/WHITE PAPERS, SLIDES, APPLICATIONS, NEWSLETTERS]

A good resource for Graphical and Statistical Examples with a lot of SAS related code and applications (macro). A macro library is available and is well maintained and documented (figure 4).

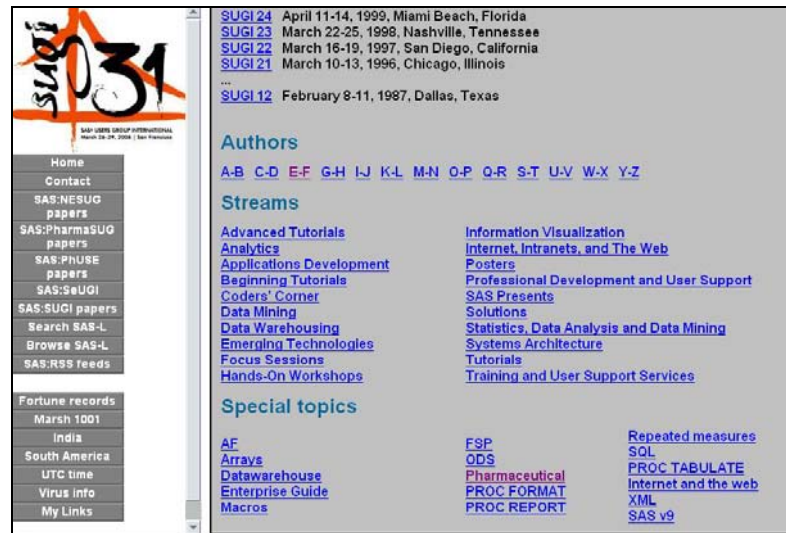


Figure 3: <http://www.lexjansen.com/sugi/>

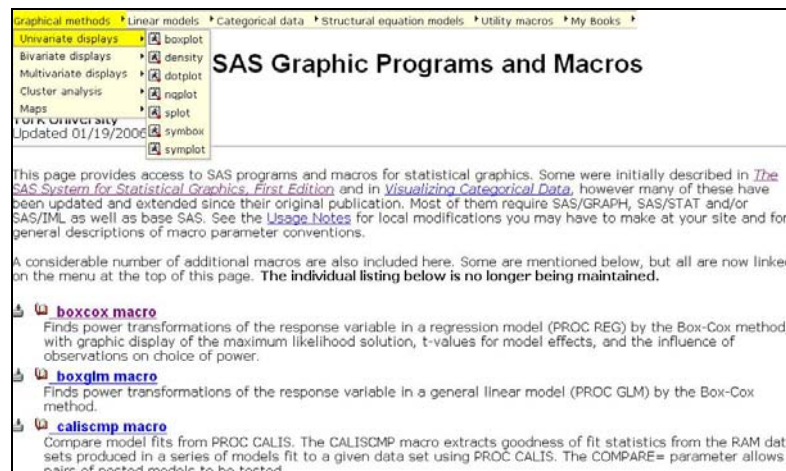


Figure 4: <http://www.math.yorku.ca/SCS/sasmac>

RATCLIFE TECHNICAL SERVICE (WWW.RATCLIFE.CO.UK)

[USER/COMPANY, ARTICLES/WHITE PAPERS, SLIDES, APPLICATIONS, NEWSLETTERS]

This company has experience that is well documented. The periodical newsletter (NOTE:) is considered very useful (figure 5).

RICHARD A. DE VENEZIA HOMEPAGE (WWW.DEVENEZIA.COM)

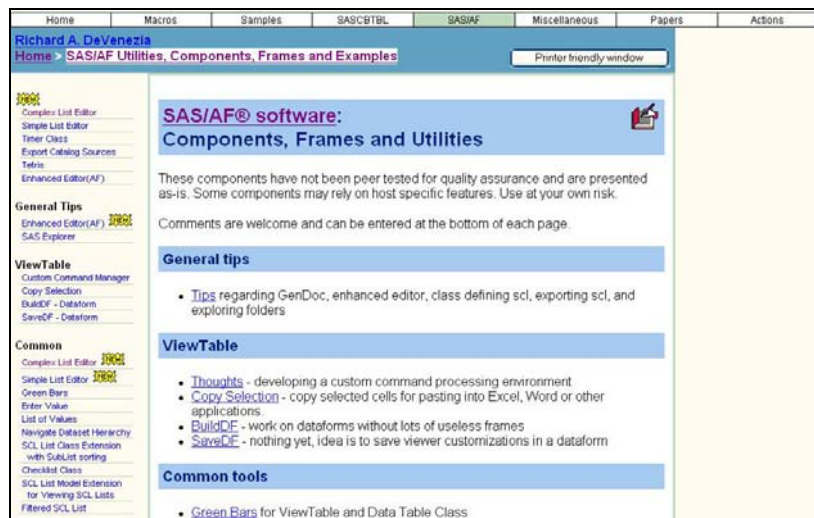
[USER, ARTICLES/WHITE PAPERS, SLIDES, SAMPLES, APPLICATIONS]

The author has years of experience in using SAS as well as other applications. The web site has plenty of useful information especially for SAS/AF (figure 6). Although the initial web page is pretty basic, the rest of the web site is well designed and things are easy to find.

ROBERT ALLISON SAS/GRAPH EXAMPLES ([HTTP://ROBSLINK.COM/SAS/HOME.HTM](http://ROBSLINK.COM/SAS/HOME.HTM))

[USER, SAMPLES]

The site contains a lot of advanced and fancy SAS/GRAPH examples with output preview and SAS code.

Figure 5: http://www.ratcliffe.co.uk/note_colon/note17.htmFigure 6: <http://www.devenezia.com/downloads/sas/af/index.php>**SAS CONSULTANT SPECIAL INTEREST GROUP ([WWW.SCONSIG.COM](http://www.sconsig.com))**

[USER, ARTICLES/WHITE PAPERS, SAMPLES, JOB]

The web site is maintained by Charles S. Patridge, an historical SAS programmer. Very useful are the resources related to the section on jobs for SAS Programmer, with a Salary survey and a list of common questions raised during an interview. Good collection of SAS tips. However the web site design is quite basic and it is not always easy to find some information (e.g. SAS Tips) (figure 7).

Figure 7: <http://www.sconsig.com/>

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UCLA SAS PORTAL (STATCOMP.ATS.UCLA.EDU/SAS/DEFAULT.HTM)

[ACADEMIC, SLIDES, ARTICLES/WHITE PAPERS, SAMPLES]

A good place where to start learning SAS. The web site of the UCLA made class resources available by means of Video Tutorials and Samples. There is also a useful link to the main SAS textbooks and corresponding web site wherever possible where you can find the samples used together with the data.

THE OFFICIAL SAS INSTITUTE RESOURCES

SAS Institute resources on the web remain the best web sites where you can find support and the right answer to your problems. Among the different resources we like to suggest the following ones in order to be always in touch with SAS Institute and their software updated:

- subscribe to the “SAS Tech Report” (<http://www.sas.com/news/newsletter/tech/index.html>).
- subscribe to the “SAS Solutions for Life Sciences” newsletter where, among the generic resources for life sciences industry, you can get updated on current support and solution for CDISC® (<http://www.sas.com/industry/pharma/index.html>).
- although the group does not seem very active with few articles posted (may be because the group is new and not very well spotted), have a look at the community forum for “SAS and Clinical Trials” (<http://support.sas.com/forums/forum.jspa?forumID=9&start=0>)

Additional SAS Institute resources can be found in Table 2.

SAS Resources	Address
SAS Customer Support Center	http://support.sas.com
SAS Documentation at SAS Customer Support Center	http://support.sas.com/documentation/onlinedoc/index.html
Samples at SAS Customer Support Center	http://support.sas.com/ctx/samples/index.jsp
Software Downloads at SAS Customer Center	http://www.sas.com/apps/demosdownloads/setupintro.jsp?listing=cat&sublist=none
SAS and Clinical Trials Forum	http://support.sas.com/forums/forum.jspa?forumID=9&start=0
SAS/BASE Community at SAS Customer Support Center	http://support.sas.com/rnd/base/index.html
Data Visualization Community at SAS Customer Support Center	http://support.sas.com/rnd/datavisualization/intro.htm
Migration Community at SAS Customer Support Center	http://support.sas.com/rnd/migration/
Statistics and Operations Research Community at SAS Customer Support Center	http://support.sas.com/rnd/app/
Web Technologies Community at SAS Customer Support Center	http://support.sas.com/rnd/web/
SAS Learning Edition	http://support.sas.com/rnd/le/index.html
User Forums at SAS Customer Support Center	http://support.sas.com/forums/index.jspa
SAS Usergroups and Users Conferences Worldwide	http://support.sas.com/usergroups/ww.html
SAS News	http://www.sas.com/news/index.html

Table 2: SAS Institute official support on the web

OTHER RESOURCES

We also like to suggest two good references of previous web resources review for starting learning SAS.

Wei Cheng [1], made a review of web resources. Although some of the links are not working anymore (the review was made on 2001), this is a good review of the available resources on the web, classified by topic. The links are published on The “INTERNET and Web Resources for SAS® Programmers and Statisticians” (<http://www.prochelp.com>).

Ginger and Helen Carey [2], made the most recent review (SUGI 2005) of useful resources to learn more about SAS, by means of Regular Books, Education, SAS Customer Support Center, OnlieDoc and SAS Help, Users Groups, Resources on the Web, SAS-L, Experience and Sample Code.

THE SAS WEBLOGS

Is there still someone who does not know what a Weblog is? Or has anyone ever had the chance to participate in a Weblog over the web?

For those not aware of what a Weblog is, the definition from wikipedia.com is as follows: “a weblog, which is usually shortened to blog, is a type of web site where entries are made (such as in a journal or diary), displayed in a reverse chronological order. Blogs often provide commentary or news and information on a particular subject, such as food,

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politics, or local news; some function as more personal online diaries. A typical blog combines text, images, and links to other blogs, web pages, and other media related to its topic. Most blogs are primarily textual although some focus on photographs (photoblog), videos (vlog), or audio (podcasting)".

To our knowledge there is no official SAS Blog. However, in recent years a number of unofficial SAS Blogs have been created [3]. The "unofficial SAS Weblog" can be considered the official SAS blog (<http://sas.weblogsinc.com/>), although technical information is quite rare [4]. Instead "Data Steps" (<http://datasteps.blogspot.com/>) has a valuable number of technical tips, while "SAS from Out in Left Field" (http://savian.blogspot.com) is designed to show various ways to use SAS with Microsoft technologies. Complete list of available SAS Weblog is shown in Table 3.

SAS Resources	Address
The unofficial SAS Weblog	http://sas.weblogsinc.com/
Coruscation	http://stylizedfacts.com/coruscation/sas/
Data Steps	http://datasteps.blogspot.com/
SAS from Out in Left Field	http://savian.blogspot.com
Stored Processes	http://auspiciouscoincidence.org/geek/
SAS BI-Orgsource	http://sas-bi.blogspot.com/

Table 3: SAS Weblogs

OPEN SOURCE PROJECTS

During our review we found many web sites, especially the user web sites, that made their projects available, either by means of a single SAS macro, or in a few cases, by means of a full working SAS application. However, the number of projects made available through official Open Source is still limited. For example at <https://sourceforge.net> we found only 19 SAS related projects (e.g. CGI script supporting for SAS).

USER GROUPS

Official (formally recognized by SAS Institute, see <http://support.sas.com/usergroups/ww.html>) and Unofficial SAS User groups, are the best place where you can meet SAS programmers either all around the world or from your local area. Table 4 lists the active user groups we have found during our survey. Other local groups may be available and active, but apparently they do not have an official web site. In addition, most of the regional SAS offices have their own SAS Forum, for example the SAS Forum Italia (see the 2006 web site at <http://www.sasforumitalia.it>).

NEWSLETTERS

Newsletter is a useful tool to be continuously updated on SAS, especially for technical aspects. Apart the official SAS newsletters, the candidates for this possible prize are:

- Systems Seminar Consultants Inc, with 'The Missing Semicolon' (<http://www.sys-seminar.com>)
- VIEW, a UK based SAS International Programmer Community (<http://www.views-uk.demon.co.uk>)
- NOTE:, the newsletter from Ratcliffe Inc. (<http://www.ratcliffe.co.uk>) already mentioned in the "Top Ten" Section

OTHER GOOD THINGS WE HAVE FOUND BY SURFING THE NET

During our 'virtual-trip' on the Net we also found some other good resources we like to spot.

David Franklin makes available on his web site a useful "SAS Cheat Sheet", a two pages quick SAS/BASE reference (<http://ourworld.compuserve.com/homepages/dfranklinuk/homepage.htm>). Insight Statistical Consulting Inc. gives some good ODS and pagination tips (<http://www.isc-ltd.co.uk>).

SAUSAG, the SAS Australia and New Zealand User group, is one of the most active SAS user group over the web, with a well designed web site with useful tips (<http://sausag.sasusers.net>).

SAS Users (<http://www.sasusers.com>) is a good place to approach the SAS environment because it give useful information on how to start (books, training, web sites, etc.).

We also found some good resources among the Academic web sites, for example:

- the Rochester Department of Biostatistics, where we found some good codes for statistical analysis (<http://www.urmc.rochester.edu/smd/biostat/Projects/Help/SAS/index.html>)
- the "Arizona State University, where we found some good white papers (<http://www.asu.edu/it/fyi/dst/helpdocs/statistics/sas>)
- the personal page of Michael Zdeb at the University of Albany where there are some good tutorials (<http://www.albany.edu/~msz03>)

UCL/STAT (<http://wwwsas.stat.ucl.ac.be/sasdiscute.html>) has a lot of information available, but unfortunately they are only in French.

The SAS Listserv <http://www.listserv.uga.edu/archives/sas-l.html> and comp.soft-sys.sas can be considered the official SAS mailing list and newsgroup.

A good link for SAS Job is the "SAS Jobs Web site" (<http://www.sas-jobs.com>).

Vendors such as DataCeutics Inc (<http://www.dataceutics.com>), Data Savant Consulting (<http://www.datasavantconsulting.com>) and PharmaStat LLC (www.pharmastat.com), propose some SAS based solution for output reporting.

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User Group	Web Address	Country
BASUG - The Boston Area SAS® Users Group	http://www.basug.org/	USA
Bay Area SAS Users Group	http://www.basas.com/	USA
BISUG – Business Intelligence SAS Users Group	http://www.bisug.org/	USA
BUGS - Birmingham Users Group for SAS	http://www.epi.soph.uab.edu/bugs/	USA
Chine SAS Users Group	http://groups.yahoo.com/group/Chinese_SUG/	CHINA
CinSUG - The Greater Cincinnati, Ohio Area SAS Users Group	http://www.cinsug.org/	USA
CISUG - Central Indiana SAS Users Group	http://www.indysug.org/	USA
CLEVESUG - Cleveland SAS Users Group	http://www.spssoft.com/clevesug/	USA
Club SAS Pharma	http://olivier.leconte.free.fr/	FRANCE
CONSIG - SAS® Consultant Special Interest Group	http://www.sconsig.com/	USA
COSUG - Central Ohio SAS Users Group	http://www.cosug.org/	USA
DCSUG - Washington DC SAS Users Group	http://www.dc-sug.org/	USA
DENVERSUG - Denver SAS Users Group	http://www.denversug.org/	USA
GVSUG - Genesee Valley SAS Users Group	http://gvsug.org/	USA
HASUG - Hartford Area SAS Users Group	http://www.hasug.org/	USA
HUGS - Houston Users Group for SAS	http://www.priemere.com/hugs/	USA
IASUG - Iowa SAS Users Group	http://www.iowasasuser.org/	USA
KCASUG - Kansas City Area SAS® Users Group	http://www.kcasug.org/	USA
MASUG - Memphis Area SAS Users Group	https://umdrive.memphis.edu/srthmpsn/public/MASUG	USA
MONSUG - Montreal SAS User Group	http://www.monsug.ca/index_eng.html	CAN
MSUG - Michigan SAS Users Group	http://www.misug.org/	USA
MWSUG - MidWest SAS Users Group	http://www.mwsug.org/	USA
NCWSUG - Northern Colorado and Wyoming SAS Users Group	http://www.unco.edu/ncwsug/	USA
NDSUG - North Dakota SAS User Group	http://www.sierrainformation.com/nodaksug.htm	USA
NEBSUG - Nebraska SAS Users Group	http://www.nebsug.org	USA
NESUG - North East SAS Users Group	http://www.nesug.org/	USA
NISUG - Northern Illinois SAS Users Group	http://www.nisug.com/	USA
NJSUG - New Jersey SAS Users Group	http://www.somerset-nj.com/njsug/	USA
NOTSUG - North Texas SAS Users Group	http://www.2wsystems.com/notsug.htm	USA
NYASUG - New York Area SAS Users Group	http://www.geocities.com/nyasug2002/	USA
Ottawa Area SAS Users Society	http://www.oasug.ca/main.html	CAN
PharmaSUG - Pharmaceutical SAS Users Group	http://www.pharmasug.org/	USA
PHILASUG - Philadelphia Area SAS Users Group	http://www.philasug.org/	USA
PhUSE - Pharmaceutical Users Software Exchange	http://www.phuse.info/	EU
PNWSUG - Pacific Northwest SAS Users Group	http://www.pnwsug.com/	USA
PSUSUG - Penn State SAS Users Group	http://help.pop.psu.edu/penn-state-sas-users-group	USA
Research Triangle SAS Users Group	http://www.rtpnet.org/rtsug/	USA
RRVSUG - Red River Valley SAS Users Group	http://www.und.nodak.edu/org/rrvsug/	USA
SANDSUG - San Diego SAS Users Group	http://www.sandsug.org/	USA
SAS Forum International (ex-SEUGI) 2006 web site	http://support.sas.com/events/sasforuminternational2006/home.html	EU
SASUG - Seattle Area SAS Users Group	http://www.sasug.org/	USA
SAUSAG - SAS Australia and New Zealand Users Group	http://sausag.sasusers.net/	AUS/NZ
SCSUG - South Central SAS Users Group	http://www.scsug.org/	USA
SESUG - South East SAS Users Group	http://www.sesug.org/	USA
SOFLSUG - South Florida SAS Users Group	http://www.simply-systems.com/soflsug.htm	USA
SUGI - SAS User Groups International	http://support.sas.com/events/sasglobalforum/	USA
SUGME - SAS Users Group of Maine	http://home.maine.rr.com/sugme/index.html	USA
SUNZ - SAS Users of New Zealand	http://www.sunz.net.nz/	NZ
SVSUG - Sacramento Valley SAS Users Group	http://www.svsug.org/	USA
TASS - Toronto SAS Users Group	http://www.torsas.ca	CAN
TCASUG - Twin City Area SAS Users Group	http://www.tcasug.org/index.php	USA
TCSUG - Tarrant County SAS Users Group	http://www.tcsug.com/	USA
UUSS - Utah Users SAS Group	http://www.utahsasusers.org/	USA
VALSUG - The valley of Sun Users Group	http://www.valsug.org/	USA
VASUG - Virginia SAS Users Group	http://www.vasug.org/	USA
VIEWS - International SAS Programmer Community	http://www.views-uk.demon.co.uk/	UK
WCSUG - Windy SAS Users Group	http://www.wcsug.org/	USA
WUSS - Western Users of SAS Software	http://www.wuss.org/	USA

Table 4: SAS Users Groups

CONCLUSIONS

The SAS community over the web can be considered one of the most represented software communities. The web contains plenty of useful freely available resources for both basic and advanced users.

However, at least based on our survey, apart from the formal SAS community such as PharmaSUG in the US and the recent launched PhUSE in Europe, few specific pharmaceutical resources are available. A number of limited web sites promote their specific solutions supporting some of the common tasks (e.g. output reporting solutions), but in most cases these are commercial solutions.

Though PhUSE in Europe is a new and good initiative as well as PharmaSUG in the US over the last decade, it is our opinion that there is still a lack of good resources being shared over the Pharmaceutical Community.

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