

Paper 163- 27

SAS® Solutions and Emerging Technologies: An Oxymoron or Intuitively Obvious? You Decide

Don Henderson, PWC Consulting, Bethesda, MD

ABSTRACT

SAS has long been a provider of robust technology tools and solutions that its users have been able to use to build state of the art applications that address their organizations business needs. Recently those solutions have leveraged technologies like the Internet, XML, portals, collaboration, etc. Whether SAS is truly leveraging these technologies to their fullest advantage is an interesting question. There are users who insist that SAS is lagging in innovating such technologies and leveraging those that have already gained some mind-share. There are others who insist that SAS is on the bleeding edge. However, a more appropriate question than, "how new or revolutionary is the technology?" Is whether new and emerging technologies have been bundled and integrated so as to effectively address an organizations needs.

This paper will address these different questions and whether SAS solutions can leverage truly emerging technologies.

INTRODUCTION

When evaluating whether SAS is fully leveraging new and emerging technologies, there are (at least) two different perspectives that are appropriate:

- Adoption of new concepts that change the way we look at and address implementing solutions to the requirements for any computer system
vs.
- Implementation of specific new technologies
- Development of packaged solutions that embed these new concepts and technologies
vs.
- Making those concepts and technologies available to users so that they can develop applications/solutions leveraging those new concepts and technologies

The call for papers for this section:

The Emerging Technologies section includes contributed and invited presentations on technologies—evolving, newly developed and futuristic—that affect the SAS community. We are seeking papers that focus on new and cutting-edge technologies, approaches and methodologies. We are especially interested in papers that cover Web-based, wireless and alternative methods of information and knowledge delivery. Discussions around how people will make use of core SAS technologies in the context of open platforms, quantum computing, adaptive technologies and "wearables" will help make Emerging Technologies a "must see" part of SUGI 27.

demonstrates the inherent conflict surrounding the desire to have a large enterprise platform (i.e., SAS) be on the cutting edge and does this by noting that the key is *how people will make use of core SAS technologies*.

This paper will provide a brief overview of these ideas and then will review (from the author's perspective) where SAS has been on the leading edge, as well as where SAS has perhaps fallen

behind the *state-of-the-art*. And last, the paper will highlight some of these issues by reviewing the comments/questions/issues posted on the SAS-L listserv.

A LEGACY OF NEW AND EMERGING IDEAS

SAS has a long established history of a number of new and emerging technologies that time has proven were on the mark. The following is a short list of some of them:

- Integrated Systems
- Client Server Computing
- Portable Systems
- The Internet
- Integrated Solutions

There have also been a number of technologies where SAS can be considered to be either on the *bleeding* edge or at least not lagging behind:

- Message Queuing
- XML
- Linux

INTEGRATED SYSTEMS

SAS' roots lie in its analytic capabilities, from linear models, forecasting, through data mining. What made SAS unique is the basic idea that data management capabilities needed to be integrated with those analysis tools. Today this is a concept that most users treat as a given. However, SAS was a pioneer in this area in the late 60s and early 70s. In fact, for many years, the SAS system (the Statistical Analysis System as it was known by then) was the only such product. This fact is perhaps one of the most compelling reasons why the SAS system remains a dominant platform for analytic systems.

Thus, it was an *emerging technology* that led to the birth and popularity of the SAS system.

CLIENT SERVER COMPUTING

When client server computing first became popular, again SAS was there with several products:

- SAS/SHARE
- SAS/CONNECT

These two products addressed different, but related, niches of the new (in the 1980s) landscape that came to be known as *client-server* computing. At that time SAS was just one of many products that allowed for a user/developer to access data and compute power from their desktop. SAS was primarily reactive in developing its client-server capabilities. However, the concept of distributed computing is an area where it was on the leading or emerging edge. The concept that you could write an application that:

- Remotely accessed data from another platform
- Do some of the processing remotely
- Download a subset or summary to the local platform
- Do additional processing
- Present the results locally
- Interact with the user
- Upload the result set to the remote platform
- Continue processing

was truly unique.

PORTABLE SYSTEMS

The idea of write-once, run anywhere/everywhere, was first promoted and popularized by the Java community (and SUN Microsystems). The idea that you could write an application on one platform, with one operating system, and then deploy it to other platforms and other operating systems became very popular very quickly. To SAS users however, this has been (mostly) a fact of life for many years, as this is a concept that many SAS users have become accustomed to ever since SAS first ported its platform from the IBM mainframe environment to minicomputers and finally to personal computers.

THE INTERNET

The Internet is perhaps the most revolutionary technology that our industry has seen since the inception of computers. While other technologies and concepts have had dramatic impacts, none of them equals the impact of the Internet. The Internet has changed:

- How software is delivered
- How software is evaluated
- How software is supported
- How it works

Virtually no software vendor could today consider delivering a product that did not have at least some sort of web capability, let alone being fully web-based.

SAS released its first web-based product in 1997. This was, perhaps, two years after the web started to become a dominant force. So SAS was clearly not the first, or even an early, vendor to develop and deliver a web-based product. However, SAS was somewhat unique in how it structured its offerings. While some may (and most certainly will ☺) argue that SAS' offerings are not appropriately packaged or priced, it is also clear that SAS has offered a broad range of functions/products that leverage the Internet and Internet related technologies:

- The output formatters which could be used to produce HTML formatted output so that it could be accessed over the web.
- The Output Delivery System which allowed for a number of web-compatible output formats to be directly created using SAS.
- The SAS/IntrNet Application Server which allowed for new (and existing) SAS applications to be executed, via the web, on a remote server with the results delivered back to the user's browser
- Java tools, including webAF (a java development environment) and webEIS (for web and java based point and click EIS applications development)
- JSP (Java Server Pages) as Java evolved from a platform for downloadable applications to a server based development platform
- Integrated Technologies as a single open back-end server that can encompass all of SAS web/Internet based tools.

INTEGRATED SOLUTIONS

SAS has recently begun to package its core technologies into *solutions* that address specific trends or business requirements. This is a trend that other vendors established long ago. Some of those solutions however leverage some of the *core emerging*

concepts that are at SAS' foundation as well as some *Emerging Technologies*. As just one example is the Strategic Vision product which bundles several SAS products (e.g., Warehouse Administrator) as well as leveraging emerging technologies (e.g., XML and the Internet)

OTHER TECHNOLOGIES

SAS has a number of technology components that could be considered to be *Emerging Technologies*. Some of the technologies might include (and clearly this list could be much longer):

- **Message Queuing**
Message Queuing has been a long and well established mechanism for systems to interact. SAS has had a number of tools that support such technologies (e.g., MSMQ). Interesting, these technologies have not been widely recognized or utilized.
- **XML**
XML is everybody's pet technology today. It has been suggested/used for problems ranging from web-based deployment, metadata definition, data storage, etc. At its core, XML is nothing more than a specific format for text files. Thus, SAS has always been able to read/write XML, as text files. Recently however SAS has announced tools that specifically read and write XML files – including the ability to store SAS data sets as XML files.
- **Linux**
Next to XML, Linux is the next hottest topic. While it was longer in coming that many SAS users would have preferred, SAS does support Linux.

TECHNOLOGIES NOT FULLY LEVERAGED

A number of different technologies can be deemed to be *Emerging Technologies*. The list of such technologies could be very long. But the following two illustrate the fact that despite all of the areas where SAS is addressing this space, there are still areas where it is lagging. Note that these two are provided as just an example and are not intended to be a complete list.

ACTIVE SERVER PAGES

Microsoft has long been positioning Active Server Pages (ASP) as a defacto standard for the web. Surprisingly/interestingly SAS has yet to support or embrace ASP, instead preferring to concentrate its efforts on JSP (a competing technology). More support for ASP from SAS would likely accelerate its use in a number of areas

.NET AND SIMPLE OBJECT ACCESS PROTOCOL (SOAP)

Comparable to the issue with ASP is the new .NET architecture that Microsoft has been promoting. Included here would be technologies like SOAP and web services which a number of organizations have started to utilize and embrace. But again, SAS is lagging behind in the support these new and *Emerging Technologies*.

AN EXAMPLE OF EMERGING TECHNOLOGIES

SAS-L is a well-known forum where SAS users discuss a full range of technical (and other issues). The last 100 threads on SAS-L (i.e., the last 100 threads with one or more comments, regardless of how old the first posting was) were queried and are shown in Figure 1. A SAS program, which leveraged several *Emerging Technologies*, was used to query google.com.

Thread	Postings
problem with comparing digits	21
"R" the end of SAS?	17
transfer copy variable labels from one dataset to an...	13
Name prefix lists	13
The fastest method of finding the maximum?	12
Assistance	11
array vs. transpose	9
SAS-L FAQ	9
SAS Programmers	9
macro parameter in date variable	8
SAS/Connect signon problems	7
SASTRAP: Macro Quoteing Functions	7
EURO conversion	7
Dunnnett's Test	6
Implicit merge on PROC	6
SAS prices?	5
help with SAS Log Message	5
Too Many Errors	5
list of oracle tables	5
URLDECODE function in version 6.12?	5
Reading from Excel: Character vs Numeric	5
Here's one for the Cube gurus...	5
less efficient code ?	5
Source Code Revision Control Systems and Auto-	5
Generating SCL-Entries with a string as content	4
proc format cntlin=class2, when there are missing va...	4
Statistical Significance of Change in Virus Levels	4
SAS Mainframe to Excel multiple worksheets -- possible?	4
Bad Install?	4
How to suppress SAS system window and Batch SAS window	4
Date/time of execution of program	4
WHERE x in (0.25, 4.00, 5.00)	4
ALT-F4 under SAS/AF on VMN?	3
QUERY: Excel to SAS: what is the state of the art (V...	3
how to delete a macro variable from the memory....?	3
No Contents Online Documentation	3
SAS/AF passing parameters from frame to frame	3
Insightful.com	3
SAS-L FAQ?	3
UNIX SAS 9: need Solaris 2.8	3
Matching amounts	3
test post	3
Creating Folder Dynamically in SAS	3
%do;%end;	3
array inside do loop inside macro?	3
more limitations of user defined formats uk1006826	3
proc logistic: odds ratio and UNITS statement ?	3
Can variables be controlled for?	3
Passing a text file to where clause in SQL	3
Taborder in Composites	2
proc format: customize date.	2
efficient search advice needed	2
DOS copy command with %sysexec	2
Parsing Browser Agent Strings	2

Thread	Postings
ODS: How to choose the format for Pearson Correlatio...	2
How to switch character format of TIME to Numeric in...	2
Can You Do This Match-Merge In PROC SQL?	2
Selling bridges	2
Subtotaling in Excel using SAS	2
another test	2
maxis value height on gchart	2
MDDDB Questions - Need experiences	2
Name prefix lists???	2
tip: SYMDEL parameters	2
Guinea Pigs Needed - NON SAS related	2
clash of two SAS jobs	2
pc file extension for v6 sas dataset	2
many record for each id	1
Dictionary Tables - new feature in v8.2	1
SAS programmers - based BERKSHIRE (silicon valley of...	1
job opportunity about PhD in statistics	1
Job Posting SAS Programmer Analyst - CA, Bay Area	1
PROC TEMPLATE title size	1
data analyst sas programmer in colorado	1
Error with ADX.	1
array vs transpose	1
GEZOCHT: Data Movement Programmeur (SAS/base)	1
QUERY: Two-way ANOVA -- Linear trend within levels ...	1
Training of IT Employees	1
download from BigIron	1
FW: macro parameter in date variable	1
Lead Project Programmer Position/NJ Pharmaceutical	1
SASTip: Simple program scheduler using a SAS macro	1
www/homage to Subject: SASTip FROM: "Mas...	1
Sas Programmers wanted!!	1
Options statements (not Name Prefix Lists)	1
mvs spanned datasets	1
?????????????2002?1?28?????	1
Eli Lilly SAS and Biostatistical Consultants -Just 1...	1
System abend AF3 occurred outside of the SAS environ...	1
PNWSUG Call for Papers	1
Proc IML and BY groups	1
Looking for a position in Canada	1
Appropriate Method to handle replicate values in Pro...	1
Why was I removed? Has this happened to anyone else?	1
SYMDEL parameters	1
Appropriate Method to handle replicate values in Pro...	1
Strategic Vision	1
Clinical Database Administrator, Job Posting, San Fr...	1
Thank you - RE: COB2SAS	1
	352

Figure 2. Last 100 Threads on SAS-L as of 08JAN2002 (from google.com)

```

filename google url
'http://groups.google.com/groups?num=100&group=comp.soft-sys.sas&start=0&group=comp.soft-sys.sas';

data sasl;
  keep thread articles;
  infile google lrecl=500 pad truncover;
  /* code to read and parse the HTML - snipped
     as the code details are not relevant to
     the topic at hand
  */
run;

proc sort data=sasl out=sasl;
  by descending articles;
run;

ods rtf file = '\directory\sas-l.rtf';
proc print noobs label;
  title;
  Label thread = 'Thread'
        articles = 'Number of Postings'
        ;
  sum articles;
run;
ods rtf close;

```

WHAT EMERGING TECHNOLOGIES?

This program illustrates two fairly simple technologies that have been combined into a simple little application that solves a problem:

- The URL access method which allows for a SAS program to use web/Internet access methods to access data on a remote server and read it in as *just another data source*.
- The Output Delivery System which allowed the author to directly create the content shown in Figure 1 in *Microsoft Word* format. The idea that output format should be independent of the data source as well as the tool used to create the report is a powerful concept, albeit one with a simple/straightforward implementation.

This example illustrates the use of such simple, yet emerging, technologies, combined with a business need or requirement. Interesting/emerging technologies are only of value if they add value.

THE RESULTS

What do the results shown in Figure 1 illustrate? The users who participate in SAS-L (which is admitted not a representative or unbiased sample of SAS users) appear to be more interested in standard technologies. There are a number of possible explanations for this. However the bottom line is that the user community needs/wants support from SAS for such *old-line* technologies. Lets review the titles for the threads that have 10 (or more) articles or postings:

- problem with comparing digits (21 articles)
This thread was a rather extensive discussion of issues surrounding numerical precision – a very well known and old issue.
- “R” the end of SAS? (17 articles)
A discussion of an alternative analytics tool that focused quite a bit on pricing and packaging issues. The concept of an integrated environment (as mentioned above) was touched upon lightly.

- transfer/copy variable labels from one dataset to another (13 articles)
The thread title says it all. This is a rather common data processing requirement that is addressing an issue of standards.
- Name prefix lists (13 articles)
Basically an extensive discussion of syntax
- The fastest method of finding the maximum? (12 articles)
Efficiency is always a popular/common topic that has little to do with Emerging technologies
- Assistance (11 articles)
The most entertaining thread – but one that had little to do with either Emerging Technologies, or even SAS software. Its genesis was a common Internet scam email that the SAS-L participants enjoyed poking fun at.

There were only two threads that (in the author’s opinion) were directly about an *Emerging Technologies* issue:

- URLDECODE function in version 6.12? (5 articles)
The encoding of data due to the onset of web technologies is an issue of Emerging Technologies since, without the Internet; there would be no such requirement. In SAS favor, this function has indeed been available from SAS for a number of years (including Release 6.12)
- Strategic Vision (1 article)
Strategic Vision is one of the new SAS integrated solutions that include (as mentioned above) several emerging technologies.

And two articles that directly address the use of SAS technologies for current, or topical, issues:

- EURO conversion
A requirement driven by the business/political/economic reality of a single European currency.
- Parsing Browser Agent Strings
Again, a requirement that is driven by the revolution that the Internet has fostered.

One possible interpretation of these results/observations is that we SAS users are perhaps more interested in SAS responding to more traditional requirements and technologies. Of course, that then leads to the rhetorical question of whether we would even be here if not for *Emerging Technologies*.

CONTACT INFORMATION

Your comments and questions are valued and encouraged. Contact the author at:

Don Henderson
PWC Consulting
Work Phone: (301) 897-4312
Fax: (301) 897-4302
Email: Don.Henderson@us.pwcglobal.com