"The Future for SAS Software"

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This paper discusses what's on the horizon for SAS Institute products -- the development directions planned, new SAS System components on the way, and new supported hardware platforms.

As a framework for discussion, it's helpful to review the barriers that the SAS System overcomes for your organization -- first, you have diverse data sources you have to deal with; second, you have a variety of applications that you need integrated; third, you have a variety of users with differing degrees of computer experience; and finally, you have your own unique hardware requirements, whether it's a single platform or a combination of several. All the technological discussions we have at SAS Institute center on these four barriers and our own four key strategies to overcome them.

First, to overcome diverse data sources, our Data Integration Strategy gives your enterprise access to data, regardless of their source, We currently do this a number of ways -- including offering a family of database interface products -- the SAS/ACCESS family of interfaces; and providing relational tables and storage mechanisms within the SAS System -- our Information Data Base.

"Data Warehousing" is a term that getting's a lot of play in the trade press these days. It's getting a lot of play at SAS Institute as well. We're now adding new capabilities within the SAS System that will give us the capability to be able to act as the warehouse, or repository, for your enterprise data and service your applications, whether they are SAS applications or some other vendors. There are a couple of ways we're doing this.

One key method is by "opening" our architecture so it will be a "true" data warehouse framework. We've accomplished this with the release of the ODBC driver. This will make the SAS System open -- and SAS data available -- to any other application supporting Microsoft's open data base structure, ODBC. So, for example, if your organization uses Excel spreadsheets, and you want to bring your SAS data into that spreadsheet, you can do so very easily. With the ODBC driver, you would no longer have to output your SAS data into a format that Excel could read. You can move it there directly.

In addition to the ODBC driver, we're also expanding our Information Data Base. Our developers are working to make sure the Information Data Base contains all the features you'd expect in a data base, while still providing the capability that makes the Information Data Base unique -- it helps you clean up your data, summarize it, and add value to it. Some of these data base features we've already put in the Information Data Base include indexing and compression. But we're also working to add more security features and an integrated data dictionary.

Other development projects we're working on in the Data Integration area include adding to our long list of SAS/ACCESS software interfaces. We currently have about 40 individual interfaces on 15 different platforms that provide the SAS System with direct and transparent read and write access to the most widely installed databases, such as DB2, ORACLE, Rdb, IMS, SQL/DS, and the list goes on. We will continue to add to this line of software with interfaces currently in testing for ORACLE under OpenVMS AXP, Informix under Solaris, AIX and HP-UX, and ODBC under Windows, just to name a few.

Our strong links with database vendors, such as IBM, Oracle, Computer Associates, DEC, and Microsoft, helps us achieve another goal we have in our Data Integration strategy -- supporting emerging access standards. This includes supporting industry standard API's for access to enterprise data sources, such as Microsoft's ODBC and IBM's distributed relational data access strategy DRDA; as well as supporting client/server relational data base technology from vendors like IBM, Oracle and Informix. We are able to stay on top of these standards since many technologists here at SAS Institute have prominent roles on a number of standards committees such as: ANSI C and C++, C standards groups that define the C library functions; ANSI SQL, responsible for developing SQL standards; the Institute of Electrical and Electronics Engineers

standards, or I-triple-E, which sets norms for professional software engineering practices; International Organization for Standardization, which promotes the international sphere of standardization; and, the Software Engineering Institute's Capability Maturity Model, which provides a model-based approach to software process improvement; among others.

The second SAS strategy is Application Integration, which overcomes the diverse applications obstacle. The SAS System is able to transform your enterprise data into meaningful information thanks to the broad range of applications it provides through a single, integrated software environment. Practically everything you'd want to do with software -- from accessing your data, to managing it, to performing all types of analysis, to presenting your results -- are all available with the SAS System. And all this functionality is surrounded by a rich and powerful applications development facility.

This relates to our first development project in the Application Integration arena -- Rapid Applications Development, or RAD. When we shipped our FRAME technology in the most recent SAS System releases, we crossed the line to become a rapid applications development tool -- containing object-oriented capabilities and many of the features you'd expect in a RAD product. Now, we're enhancing this functionality even more. Upcoming applications development enhancements include: "composite widgets" which allow you to create new re-usable widgets by combining one or more widgets -- such as bar charts and tabular reports. support for OLE Automation and OLE 2.0 We will support bitmaps and images in FRAMES The ability to use different fonts in your text entry widget -- and, multiline text entry is also supported Support for your favorite native fonts And the ability to create widgets from your Screen Control Language. This allows for runtime creation of applications.

Other applications our developers are working on include:

New graphical capabilities. We have plans to enhance our SAS/GRAPH software product -- the information and presentation graphics component of the SAS System -- to include new imaging capabilities. When available, it will allow SAS/GRAPH users to access, store, manage, manipulate and display many types of images within the SAS System. It will support both document and graphical image processing.

We're also developing graphical software for multidimensional data visualization and analysis capabilities for real-time animation, contour cutting planes and Iso-surface generation. A product for image compositing and transformations, pixel editing and color correction and masking. And, in the very near future, we'll release SAS/GIS software, a highly interactive tool for the display and analysis of spatially related data.

Along with all these new products, our development crew is also spending a lot of time these days integrating multimedia capabilities into the SAS System. We want to give those of you who choose, the opportunity to combine text with graphics and sound for more effective information delivery. Currently, we support multimedia under Windows 3.1 and OS/2 2.0 through OLE and Multimedia Presentation Manager/2. However, besides simply supporting other vendor's multimedia capabilities, we're working on a few of our own. In fact, currently under development is a new package for integrating live video with titles and graphics, video playback with audio on a workstation, non-linear editing of video clips and adding CD-quality audio to video clips.

SAS/PH-Kinetics software gives pharmacokineticists a customizable, menu-driven environment for the access, analysis and presentation of concentration data from pharmacokinetic studies. The software provides non-compartmental pharmacokinetic analysis of plasma/serum and urinary concentration data from single- and multiple-dose pharmacokinetic studies.

Emulus software is a 3270 emulation software package that provides workstation users with quick and easy access to their corporate mainframe. The product lets AIX, Solaris and HP-UX users access 3270 applications on IBM

mainframes using TCP/IP.

SAS/INFOTAP is a new point-and-click graphical interface for information retrieval and document management. It allows you, through a single online document manager, to access information in the form of newswire stories and other live data feeds, ASCII text, email messages, and office correspondence.

In addition to these products, we have several other projects on the drawing board, including a human resource application, oil & gas environmental application, interactive document creation tool, and virtual reality product.

Our third strategy is Interface Versatility. This overcomes the Diverse User Needs obstacle by delivering critical business information to those who need it -- when they need it -- through a variety of interfaces tailored to the needs and experience of the individual computer user.

Our major development effort in this arena deals with the re-tooling of SAS/ASSIST software -- the menu-driven front end to the entire SAS System. We're now working on an enhanced version of SAS/ASSIST that uses the desktop environment for the development of reports and applications. This allows you to create folders for your files and applications, and use drag and drop to manipulate these objects.

Release 6.10 of the SAS System provides an even tighter integration with the industry's graphical user interfaces, making the SAS System appear more "environment-like", or more comfortable in the various environments.

SAS Institute's Hardware Integration strategy is simple -- if there's a piece of hardware out there, and you need to use that hardware to perform your business, we'll support it. And, a strong benefit for you is that the SAS System the same on all these platforms. So, as you move from one environment to another, you don't have to re-learn the SAS System, you'll know how to use it.

Currently the SAS System supports mainframes, minis, PC -- including OS/2 and Windows -- numerous varieties of UNIX, and even Convex supercomputers. We're expanding this list by supporting Digital's Alpha AXP systems running OSF, Win32s, MIPS ABI, Intel ABI, OS/2 2.1, the PowerPC platforms and the Apple Macintosh. We'll also be optimized for Pentium, meaning that if your hardware includes the Pentium chip, you'll see increased performance improvements in the SAS System.

Another significant area of change for SAS Institute is the support we'll be able to offer you through one of the ever-growing list of SAS Institute offices. Currently, we have offices, subsidiaries and distributors in nearly 60 countries on 6 continents. In the U.S. alone, this year we've added offices in Atlanta, Boston, Denver, San Francisco, Pittsburgh, Minneapolis, and Detroit. In other words, where ever you are, there will be a SAS office somewhere nearby.