

Positioning SAS® for Corporate Effectiveness

John M. LaBore, Eli Lilly and Company, Indianapolis, IN
Thomas H. Burger, Eli Lilly and Company, Indianapolis, IN

Abstract

Accelerated research and development has increased industry reliance on Information Technology (IT). Biopharmaceutical IT divisions increasingly require an infrastructure capable of providing global enterprise-wide business solutions. However, when the application of IT innovation to business solutions occurs at an insufficient rate, business needs go unfulfilled. Of particular importance to accelerating research is the implementation of application software for decision making. SAS® software provides powerful tools for data warehousing, decision support and presentation, but their effectiveness is directly proportional to an understanding of business issues and how SAS can solve them. A strategy for the integration of these tools into the business streamlines and accelerates critical processes.

Introduction

Competitiveness in the biopharmaceutical industry increasingly requires globalization. Research at this scale is necessary to offset the high cost of compound identification, evaluation and manufacturing. Additionally, drug development involves screening, testing, analysis and reporting which may last up to ten years. This process generates large volumes of information on which to base scientific decisions leading to product-launch. Efficient management of this information is essential for viability.

To achieve enterprise-wide information delivery, a strategy is needed for the integration of software solutions into the business. Here is a simple model for corporate success using SAS: *Exploit all resources to achieve a stable-state where current uses are both well done and well supported to establish a secure foundation for future growth and success.*

A common dilemma in biopharmaceutical research is the poor alignment of information delivery with business practice. Business complexity, breadth of implementation and sheer magnitude create this difficulty. Organizations face a glut of software products requiring evaluation, selection and implementation. Often there is disagreement on how to fit IT solutions to business problems. IT practitioners recognize that solutions are more than just software, but may lack a clear strategy or the business knowledge to identify solutions that fit business needs.

The Mount Wilson Observatory sits where there is an inversion in the atmosphere that makes the air clear and still. Located in California, it is the best place in North America to view the night sky. Built in 1917, original components of the Observatory were a 100-inch Hooker telescope, a precisely ground 9,000-pound mirror, a 100-ton telescope tube and a vast dome built in Chicago, disassembled, transported and reassembled on Mount Wilson. These parts had to be hauled up the mountain on a road that was barely more than a trail. Edwin Hubble sat night after night at the base of the telescope during the 1920s photographing the heavens. From his cold perch, he determined the universe is infinite, expanding and extending far beyond the Milky Way, which he determined was but one of hundreds of billions of galaxies.

Adapted from *Patchwork of Old and New*, Virginia Postrel, Forbes ASAP.
www.forbes.com/asap/98/1130/200b.html

Problem Identification

Issues in solution delivery are revealed by identifying the problem domain of business needs. The range of tasks to perform should be identified, such as data migration, warehousing, consolidation, presentation, analysis and reporting. Also, the variety of needs arising from diverse and/or remote business units must be recognized. End-users themselves can provide excellent insight into the effectiveness of IT solutions to their business needs. The method of solution delivery may depend upon the target customer. Some end-users prefer an easy-to-use, generalized user interface (UI) that is versatile (e.g. JMP). Others seek customized tools requiring collaboration in applications development (custom apps). Performance is important to both -- one end-user trades task-specialization for flexibility, whereas the other sacrifices ease of use for functionality.

Such preferences are real and legitimate; the goal is a solution which balances the relative value of variations on these and other considerations. Inevitably, the *build-vs-buy* decision may be confronted. However, a value proposition should ultimately prevail. Given a combination of customer expectations and income opportunities, what will be the optimal method of solution delivery ?

Push/pull information systems are becoming more adaptive -- as object-designs focus on accessibility and functionality, implementations blend web and traditional environments. The utility of web-enablement is taken for granted as environments become networked. Groupware and email has led to new levels of accessibility through the formation of self-managing virtual groups. This accelerates the rate of information assimilation which, in turn, speeds knowledge formation.

Today, in what is its 82nd year, the Mount Wilson Observatory is (choose one):

- (a) A fine museum that captures those thrilling early days of modern astronomy.
- (b) Reduced to rubble, with various components hauled off to scrap heaps and salvage yards.
- (c) An observatory with state-of-the art instruments performing cutting-edge research

Within an organization's corporate culture, there may be reluctance to deviate from traditional uses of certain software for business solutions. However, great strides in product acceptance can occur when motivated individuals champion product use from *both* IT and end-user perspectives.

Problems can arise in software selection when a centralized source of guidance does not exist. Or, the perspective of decision-making software may be poorly integrated in IT. Alternately, the IT infrastructure may be tool- or data-centric rather than knowledge-centric, which skews decision-making software selection away from the optimum.

Answer: (c) An observatory with state-of-the art instruments performing cutting-edge research.

Question: With the emergence of the space program and the deployment of the Hubble space telescope, how could something built in 1917 still be state-of-the-art in 1999?

Licensing arrangements often play a key role in management's acceptance of application software. In such cases, a willingness to *think outside the box* can produce the solution. For example, if there is concern that SAS software is cost-prohibitive as a business solution, effort should be spent working with SAS Institute (SI) account managers to identify options for developing flexible agreements.

SI is widely regarded as customer-focused and has a recent history of creating win-win arrangements resulting in

appreciable increases in the SAS software user base. Experience has shown that building a good record with the Institute through tracking and monitoring product use is beneficial. Doing so substantially improves the chances of developing win-win arrangements.

Monitoring actual usage of products by platform may yield secondary benefits, since this will reveal whether there are products that could be eliminated or substituted. Bundling separate licenses into a single, comprehensive licensing agreement, while allowing for future growth, is another way to significantly decrease unit costs.

Rapid and effective in-house support of SAS software can also yield dramatic benefits. Users frustrated with software due to technical problems can decrease its effectiveness in at least two ways: first, they may never fully realize the power of the software as it applies to their business problem, and second, through negative feedback they can squelch both support and adoption of the software by others.

Obstacles

A difference in perspective may exist between the technology culture of IT and the functional view of end-users seeking business solutions. This quandary results from IT's dual charter to meet business needs and also set strategic direction. While end-users may be unconcerned with the distinction of 4GLs and 5GLs, the IT practitioner must be wary of obsolescence.

In seeking business coverage, tool proliferation may result in insufficient support leading to frustrated end-users. While IT seeks interoperability, business customers want reliability, an easy learning curve and quality support. When users face tool inadequacy, the IT-push and end-user-pull of technology may become reversed.

The cycle of tool adoption is accelerated by early adopters and slowed by late adopters, underscoring the importance of synchronizing tool replacement. Thus, it is essential to maintain clear and consistent communication between IT and users regarding technologies and business needs.

Answer: Because progress is not a series of discrete and static stages, each obliterating the past, as some may believe. Rather, progress occurs and civilizations learn, through adaptability, resilience, experience and experimentation.

IT must carefully facilitate its vendor relationship to capitalize on opportunities available through the customer-vendor partnership. Strict adherence to license agreements

establishes a track record of compliance that may eventually result in vendor flexibility..

Horace Babcock, an astronomer at Mount Wilson in 1953, envisioned how starlight images could be sharpened by measuring the constantly-changing distortions caused by the Earth's atmosphere, then correcting for them in real time.

Resources

In-house technical support should serve as a centralized source of rapid product assistance on a 24x7 basis. Often, knowing *where* to get the answer is key to providing helpful guidance. While on-line static resources are valuable, an often overlooked resource is users; typically, there are many knowledgeable people in an organization willing to share their experience to help others. Countless times, current and former SAS programmers, analysts, developers and statisticians have provided the insight to solve difficult problems faced by other users. Dynamic electronic means, such as SAS-L and in-house listservs, can help facilitate this process between users that are geographically remote from each other.

The knowledge of systems staff can be a tremendous help when supporting software on multiple platforms. And, when establishing a RDBMS connection, the local DBA can be a handy person to know. A recognition of when to escalate matters to SI tech support is also important.

In-house technical support should provide user assistance in a way that fosters technical independence. Explaining the steps taken (such as online searching of SAS Notes, doing a search of the SAS-L archives, checking the Master Index of SAS publications, etc.) to a user will help them begin solving problems on their own.

In 1995, the Mount Wilson observatory realized Babcock's vision by modifying the processes used to capture images. These changes allow the instruments at Mount Wilson to see *as sharply as the Hubble space telescope*.

Dissemination of product information is essential for building a knowledgeable user community. Intranet web pages are ideal for providing seminar, demo, discount and reference information. Use of group e-mails is a great way to provide information to distinct subsets of (known) users. Certification or on-going training is essential for maintaining up-to-date skills. Other useful resources are SI account reps, systems engineers, consulting services and a variety of services provided by third-party vendors.

Advocacy

To establish enterprise-wide solutions, it is essential to cross organizational lines in building advocacy among business units. This requires skill in both identifying business problems and persistence in seeking solutions. Advocacy must also be built across IT/customer lines through the consistent delivery of timely business solutions. Accomplishing this builds advocacy in *both* IT management and business unit management by establishing trust and credibility through a reliable track record.

Cross-Disciplinary

The development of a cross-disciplinary perspective is among the most important aspects of a successful software implementation strategy. "Business knowledge" involves familiarity with the issues facing disciplines important in the industry: IT, Statistics, Pre-clinical, Clinical, Medical, Manufacturing and Marketing, among others. A cross-disciplinary view is manifest in individual staff through educational and professional experience and corporately through cross-functional teams.

Expertise

One effective use of resources is the identification of IT business-area experts having specialized knowledge of particular business units. Business Integrators abridge business issues with IT solutions through significant knowledge of operational intricacies. Of additional importance are IT Subject Matter Experts (SMEs), i.e., *gurus*, who contribute specific product technical knowledge

Tools

Issues in tool use and adoption arise from the range of business issues and the abundance of available products to solve them. Some advocate a best-of-breed approach. Platform standardization is a desirable goal, but when not possible, portability issues come into to play. In either case, the need exists for an architectural framework to place application compatibility and integration into perspective. Application software standards can provide a delineation of the functional breadth and depth of an organization's tool use.

Technology

In regulated environments, technology exists in the form of *Policies*, such as Computer Systems Validation Policy (CSVP) and *Best Practices* (GxP), as well as in *Methodologies* (SDLC, etc). Consensus (through explicit agreement to follow CSVP, GxP, SDLC, etc.) increases the

probability of success when executing plans to resolve business problems.

The key to progress at the Mount Wilson observatory was the development of an adaptive-optics system. This system interprets incoming light, refracts it into hundreds of beams, then computes *how to warp the mirror* so that the beams come out straight.

The adaptive-optics system consists of a distortable mirror that sits where Edwin Hubble placed his photographic plates. This mirror rests on top of 250 computer-driven electronic pistons that wrinkle the mirror surface a few wavelengths at a time. The system instantaneously takes the blur out of starlight, providing clear images where previously there were only blobs of light.

For more information on the adaptive optics system, see <http://www.mtwilson.edu/Science/AdapOpt/>

Procurement

Licensing SAS software is unlike licensing for most software products. By the very nature of the standard licensing structure, SI makes it clear their objective is a long-term relationship with customers. As a result, their post-licensing support and training is far better than the industry norm. End users, IT staff and managers are often amazed that calls to SAS Institute technical support reach within seconds a person having technical knowledge. The Institute views renewal fees as not just a contractual obligation with customers, but also an affirmation of its products' value. The annual license renewal serves as a means of keeping SAS Institute staff focused on delivering useful and reliable products to customers.

The #1 way to promote use and awareness of SAS software is through endorsements from productive users. However, for better or worse, the satisfaction of end-users often correlates with the quality of in-house support and the availability of training. Because SAS software is complex, it may intimidate or frustrate users lacking good technical support and training. The Institute's distinguished services are of little use to novices unaware of their existence. Therefore, it is critical that organizations have a mechanism to point end-users in the right direction. Training is critical to exploiting software value through the knowledge of others. It is important to offer a range of services to provide product information to all users. Instructor-based training (IBT), Computer Based Training (CBT) and Video Based Training (VBT) though costly, are perhaps the most useful. Additionally, web-based resources and "tips, tricks and how-to's" provided via (electronic) white papers are invaluable. Other forms of instruction include User Group conferences, product demonstrations and users simply sharing their experience

with others. And, the support person or end user with a well-stocked library is always popular.

Knowledge Transfer

From a corporate perspective, the transmission of knowledge through an organization is critical. Communication channels are essential to this process, especially for conveying information about new or improved technology. All potential avenues should be explored and used where feasible.

Since word-of-mouth is so critical, the value of *influence* as provided by opinion leaders within an organization cannot be overstated. However, limited benefit results from the exposure of opinion leaders to potentially useful technology, unless the technology is shown to be consistent with the needs, attitudes and beliefs of the individual opinion leader. Thus, successful adoption of SAS technology is more likely to occur when those driving the process focus their efforts on opinion leaders who recognize, champion and benefit from the technology and its application.

The new adaptive-optics system is incredibly cost-efficient. Images from the ground-based Mount Wilson observatory are now as clear as those provided by a space-based telescope:

Cost of the adaptive-optics system:	\$3 million.
Cost of a space shuttle launch:	\$400+ million.
Cost of unmanned rocket launch:	\$100 million.

As a taxpayer (or a shareholder), which bill would you prefer?

Economics

A technology shift is redefining the fundamental business paradigm. Economic history shows that such an event invariably leads to a shift in economic power. A rapid rate of innovation leads to a reordering of the key players. Recent changes in technology are reshaping the research-development-production-distribution process. New patterns of economic activity are emerging, often originating from initial efforts to streamline internal operations.

Pharmaceutical firms are in the midst of reorganizing business structures to optimize automation and innovation. An important aspect of this is *disintermediation*, the removal of middlemen from a process. Just as the web has increased the information available about consumer goods, shifting power to the consumer, so will the delivery of technology information from vendors to customers. The

second stage, between in-house IT and in-house customer, will also be affected.

Consumers now can find links to valuable information (such as Consumer Reports data) on the same sites where they can buy a product; users needing technology in an organization eventually will do the same. As a consequence, quality software technology that users can rapidly *assess and access* will outpace software with limited capability and accessibility.

Object Lesson:

The old system's basic technology, its inherent strength, was still best-of-class; however its control interface was dramatically improved. Users understanding the technology had only to learn the new interface. Bugs in the underlying technology had long been purged.

Where was the greatest short- to mid-term return on investment -- the \$3 million adaptive-optics system or the space telescope project with a net investment well into the billions of dollars?

Industry Direction

Globalization is frequently used, but less often defined. If an enterprise is "global," precisely what does it mean? Global sales and perhaps global affiliates? Regardless of definition, globalization efforts are ultimately judged in terms of shareholder value. To create value, globalization must provide a point of differentiation and advantage.

Progress is often dynamic and the sum of countless parallel searches, each aimed at greater knowledge, rather than the unilateral destruction or scrapping of an old system, in the expectation that a (new) alternative will be better.

Many practices can result in differentiation and advantage. One method is to break the mindset that intellectual assets must be co-located with physical resources. If a company's plant is in one location and its key R&D staff is in another, technology should be used to bring them together, rather than physical relocation. Another method is to target research at specific needs. Once the target is achieved, search laterally for additional opportunities to leverage the initial investment

Further, it is clear globally effective companies:

- embrace change
- have highly plastic networks, not rigid hierarchies
- are interdependent with partners; and

- view *new construction* as building technological advantage, not bricks and mortar.

To enhance the effectiveness of SAS software within a company, it must be recognized that:

- initial acquisition of software (by end users) must be swift
- appropriate training must be timely
- delays associated with software use must be eliminated
- rapid reconfiguration must occur in response to changing needs/priorities
- technical support must be 24x7, with response and resolution times measured and constantly decreasing, and
- *the only profit source is a customer (whether external or in-house) whose check doesn't bounce*

Past progress is frequently categorized for ease of discussion (i.e. *industrial age, digital revolution*). But, it is a mistake to think that progress can be controlled or mandated. Progress historically has resulted from countless individuals (teams) attacking common problems from different angles. In the real world, since people have many different goals, diversity and choice are important; and, because there is no silver bullet, there is no alternative to experimentation.

Summary

Like the Mount Wilson Observatory, SAS technology is built around a core competency considered "best-of-class." Similarly, SAS Institute has refined the way users access technology. Graphical user interfaces, portability, technology co-evolution, new solutions (IT Service Vision, CFO Vision) and new products (SAS/IntrNet, Warehouse Administrator) are analogous to components of the distortable mirror that focus its power and provide value to the customer.

Just as the observatory user envisioned the changes that enhanced the original system, so do SAS users. SI relies heavily on user feedback to add improvements and select development paths. A similar approach can be used at any organization; listening to users, aligning priorities and balancing the push-pull technology process. But, one job should come first -- providing superior software installation, configuration, technical support and training for current software.

Technology is quickly redefining the boundaries of organizations and industries. Using current network and internet technologies, a corporation can make the world not just its marketplace, but also its virtual office. As the SAS

product suite moves from tool- to solution-based services, benefit will be greatest where these services are seamlessly integrated into the business. SAS software can play a vital role in a global organization, *but not by accident*.

Trademark Notice

SAS is a registered trademark of the SAS Institute Inc, Cary, NC and other countries.

Acknowledgment

The authors would like to thank Eli Lilly and Company[®], under whose auspices this work was performed, and Janette E. Thomas for reviewing content and Linda E. LaBore for editing assistance.

Author Contact

John M. LaBore	Thomas H. Burger
Eli Lilly and Company	Eli Lilly and Company
Lilly Corporate Center	Greenfield Laboratories
Drop Code 2133	Drop Code GL43
Indianapolis, IN 46285	Greenfield, IN 46140
Phone (317) 277-6387	Phone (317) 277-7266

References

Byrne, John A. 1998. The Corporation of the Future, BusinessWeek, 31 August, 102-106.

Drucker, Peter F. 1998. The Next Information Revolution. Forbes ASAP, 24 August, 47-58.

LaBore, John M., Janette E. Thomas, and Eric A. Slinkard. 1998. Leveraging Resources to Maximize SAS and JMP Support. In Proceedings of the 1998 MidWest SAS Users Group Conference, November 1-3, 1998. MWSUG Inc. and SAS Institute Inc. 307-312.

Postrel, Virginia. 1998. Patchwork of Old and New, Forbes ASAP, 30 November, 201-204.

Richards, Bill. 1998. "A Total Overhaul." Wall Street Journal, 7 December, R30.

Rogers, E. M. and F. Floyd Shoemaker. 1971. Communication of Innovations, A Cross-cultural Approach New York, NY: MacMillan.

Stewart, Thomas A. 1999. A Way to Measure Worldwide Success, Fortune, 15 March, 198-199.