

The Telecom Industry of the 90's: Gaining Competitive Advantage from Information Technology

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Abstract:

Like most other industries in an increasingly competitive business climate, the telecommunications industry is undergoing drastic changes. Market players are changing. Customer expectations are increasing. The business of telecommunications itself is evolving. In fact, the only constant in the telecommunications industry since divestiture in 1984 has been change. Indeed, if anything, this dynamic industry has become more unpredictable than ever, adding challenge and complexity to the tasks of industry workers, managers, and decision makers. To gain and retain competitive advantage, it is critical that the decision makers within the telecommunications industry have access to the right information at the right time regarding their customers, their products and services, and their competitors. Information technology will be the key enabler to this competitive advantage. This paper explores industry trends in the service sector and how they are changing the marketplace. It also addresses the core technologies of the SAS® System and how it can deliver the right information to address vital application areas. Finally, three case studies illuminate the power of the SAS System for effective decision making in order to better gain a competitive advantage through information technology.

The Telecommunications Industry: The Playing Field is Changing

The natural monopoly once enjoyed by the telecommunications industry is long gone. The divestiture of AT&T in 1984 was only the tip of the iceberg. The playing field, as telecommunications service providers knew it, has changed drastically. Who are the new players, who are the customers, and how will providers compete in this ever-changing environment? These are questions every successful player must answer—and quickly! The only way to answer these questions and ensure a competitive strategy is through the use of critical business information. The United States has become an information-based society, and telecommunication is central to this development. The availability of nearly "instant information" made possible by telecommunications technologies is changing how people perform their jobs, how organizations run their businesses, and how people live their lives.¹ More importantly to telecom organizations is how they can survive in this ever turbulent environment and provide the technology that is changing the way the world lives.

In addition to the business players, the customer marketplace is also changing. According to the Vice President of AT&T's Business Communications Systems, Karyn Mashima, during her keynote address at the TeleCommunications Association Annual Conference in September, 1995, one of the key ways to be successful in this market will be

customer orientation. Customers are requiring stronger relationships with their vendors. They are more informed decision makers by their own desire for information to make an intelligent decision. No longer will the territorial provider win out. The customer-focused companies will excel—leaving others behind. Telecom companies will need to focus on customer schedules. Decisions will need to be brought closer to the customer to eliminate delay. Workers, therefore, need to be empowered with authority to make decisions that affect the customer. Relationships with the customer, from both a business and personal aspect, will gain loyalty to the service provider. Once that ceases, the customer has a choice of providers and can seek elsewhere. Because of these choices, service to the customer will also be key to the customer relationship and the customer retention. More advanced customer service will be a mandate. Knowledge, speed, and accuracy will lead to customer satisfaction in the service criteria. Mashima concludes by describing key focus areas in which telecom service providers need to compete. Those areas are customer relationships, improved time to market, quality of products, superior service, and meeting customers' global needs.

The factor that is changing the playing field and the way telecom organizations do business most drastically is the pending telecommunications reform efforts and deregulation. By rewriting the rules for the telecommunications industry, the bill will establish

a "virtual free -for-all competition for cable, wired, and wireless phone service, and new information."ⁱⁱⁱ The House of Representative reform bill 1555 and Senate bill 652 seek to remove the barriers to competition originally set out by the communications act and continued through the divestiture judgment of the 1980's. These efforts come in the face of the growing realization that existing regulatory walls will soon be breached by the sheer momentum of advancing technology. Companies are already realizing the effects of this pending change. The largest effect will be greater competition. To address this inevitable increase in competition, telecom companies are acquiring or merging with what might be regarded as competitors. Telecom companies are teaming with cable companies and entertainment providers under the assumption that by joining them, they have eliminated them as competitors. Partially true, but the fact remains that they must still compete for the customer. In an article in *America's Network*, August, 1995, Bert Roberts, Jr., the Chairman and CEO of MCI Communications speaks of the many benefits of competition to the industry and the positive effects to the customers. He says customers have an insatiable craving for information, content, and entertainment. But they would not have the many benefits they enjoy if competition had not been invented by the challenging of the telephone monopoly, including unprecedented innovation that has improved the quality and breadth of services.ⁱⁱⁱ As this new competition continues to increase with new entrants, new technology, and new business services, customers will continue to benefit through potentially decreased cost, advanced technology and advanced services and improved customer relations. This will be an evolving effect as deregulation is only the start of the change to the industry.

Because of all this, telecom companies are scurrying to put themselves in the best position to compete. One prime example is the AT&T break up announced in September, 1995. This was a direct result of getting back to focused areas of business. The three separate companies that emerged can now focus more strongly on competencies versus the integrated goals of all three. Telecom companies are realizing the way to improve their organizations will be through information. "With changes come turbulence and uncertainty. But one thing is for sure in this new competitive environment: information technology will be at the core of everything the industry is and does."^{iv} It will drive the necessary changes. Several information technology trends are evident in the industry already. Some of these trends include: implementing data warehousing strategies to get to

the pertinent information, reengineering core processes to improve operational efficiencies, focusing on customer service, and using customer data for marketing to gain and retain market share both in and out of region markets. These information delivery strategies will be necessary to survive in what promises to be one of the most competitive markets in history.

Companies face several obstacles in obtaining the critical information to improve their business performance. Many information delivery strategies are a hodgepodge of tools addressing a subset of data, for a subset of information needs, for a subset of users--typically not the decision makers. Information must be made available to the appropriate people when they need it, and the information must be accurate based on accurate data and proper decision support tools. The first step telecom companies must do is evaluate their current information strategy, determine areas for improvement, and implement the appropriate tools, not as an end in itself but as the means to an end--improved business performance and a loyal and growing customer base.

The SAS System as a Decision Support Environment

The SAS System is an integrated suite of software for successful decision making.. The functionality of the system is built around four data-driven tasks common to virtually any application: data access, data management, data analysis, and data presentation. Surrounding this functionality is a powerful, productive environment for rapid applications development. Individual modules within the SAS System extend the capabilities of the software along any one of these dimensions--or within the applications development environment that surrounds them.

The SAS System provides strategies to help overcome the common barriers to effective information delivery. These barriers included diverse data sources, diverse applications, diverse users with varying levels of computing experience, and diverse hardware. While the needs of every organization are unique, the following are considered critical to delivering information for decision making and have been included in the breadth of capabilities in the SAS System:

- *An information database:* the facility to store and manage data for all appropriate information

delivery applications and all the necessary tools for a data warehousing strategy

- *Enterprise-wide data access:* access to all corporate information sources including the most widely used database management systems and data gateways
- *Applications integration:* abundant and ready-to-use tools for turning data into information
- *User interface versatility:* a range of intuitive interfaces to suit different levels of user skills
- *Hardware independence:* availability of the software on a wide range of platforms, from the latest advances in Desktop computing to the most powerful Data Center host machines
- *Connectivity:* the ability to share data and applications in a truly distributed environment

The SAS System has the strategies in place to provide the telecommunications industry with an end-to-end solution that minimizes and often eliminates the need for one-shot solutions that were never designed to work together in the first place. Because of the data intensive nature of the industry, SAS tools allow data to be transformed into the appropriate information for such applications as network management, switch monitoring, call center reporting, work force management, project scheduling, customer billing and exception reporting, enterprise report writing, applications development, human resources, financial reporting, executive information systems, quality customer service, process reporting and analysis—virtually any application that deals with data and the transformation of that data into information in order to make the appropriate decisions.

For the purpose of this paper, critical applications that can provide the necessary information for a competitive advantage will be discussed. These include data warehousing, reengineering core processes for quality service, and marketing intelligence systems.

The SAS System for the Telecommunications Industry

Data Warehousing

As the pressure mounts in the industry to become more customer focused, efficient and provide higher quality service, the need for knowledge of customers' characteristics, products, operations, and network performance is forcing all in the industry toward the building of data warehouses or smaller data marts. By utilizing a data warehouse strategy, a telecom

provider hopes to collect data from a multiplicity of sources, reorganize the data and derive information that can now be used for competitive success. For example, billing information can be derived from the mammoth billing systems to provide accurate information on customer profiles. With the deregulation bills in Congress, some in the industry are already looking at these data for local and long-distance customer purchasing patterns. In operations, maintenance data have been used to understand traffic patterns (including daily network volume and payload), network and component reliability, transmission quality, customer experience among many. Service order provisioning data, on the other hand, can be used to index growth patterns, monitor and forecast inventory and properly forecast work force load. These are only a few examples depicting the need for the data warehousing strategy within these organizations. As the competition continues to increase, the need will become more critical to the survival and ultimate success of each organization.

The telecommunication industry is well known for its ability to deliver the most complex software solutions. World-class research and development organizations, including AT&T Bell Laboratories and BellCore, have built some of the most sophisticated network management, analysis and telemetry software in the world. Unfortunately, these solutions are mostly stand alone and vertical and do not meet the needs of the business for information. The SAS System is well suited to provide a horizontal integration across systems.

A data warehouse, simply stated, is the physical separation of an organization's operational data systems from its decision support systems. It includes a repository of information that is built using data from various departmental sources throughout the enterprise so that the data can be modeled and analyzed by business managers.

The SAS System provides an end-to-end solution for building a data warehouse. The capabilities encompass all the critical elements necessary for optimizing data to support strategic decision making. These elements include:

- Coordinated access to the various operational data stores in an organization, along with the appropriate data access tools. Examples include legacy systems, operational support systems and network elements.
- A robust and integrated transformation engine for applying some logic to the data from various

operational environments...before delivery to the decision support environment.

- The ideal location and architecture for the decision support repository.
- World-class exploitation tools for business intelligence and analysis including multi-dimensional analysis, OLAP, query and reporting, modeling, and more.

By having up-to-date and readily accessible information, major business issues can be rapidly addressed. This enables organizations to support change in business structure, provide enhanced levels of service and offer a more rapid and effective turnaround, to customers—a key benefit in the telecommunications industry where quality customer service will be a strong differentiator among competitors.

Business Process Reengineering

Most, if not all, of the leading telecommunications providers in the US are undergoing business process changes of one form or another—sometimes referred to as business process reengineering. Some are enduring radical changes: AT&T Communications since 1988; U S West Communications since 1993; and Bell Atlantic since 1995. Others are engaged in less radical but equally as important process improvements. In preparing themselves to compete, telecom providers are asking themselves two fundamental questions:

- What do customers want?
- How do we provide it?

Business Process Reengineering(BPR) is the “fundamental rethinking and radical redesign of business processes to achieve dramatic improvements in critical, contemporary measures of performance such as costs, quality, service, and speed,” according to Hammer and Champy in their book *Reengineering the Corporation*.^v However, a typical approach is one that combines looking at a few critical processes for redesign and following up with continuous quality improvement. A radical transformation of the organization is a tough and risky business. An appropriate metaphor is the changing of an aircraft's engines while in flight. Given the enormous complexity of the business, coupled with heavy cultural and organizational heritage, a large scale transformation requires careful monitoring of process change output and performance. It is not a change that can be realized

overnight but one that takes several years to see improvement. A comprehensive data collection, management, analysis and reporting program should be part of the core process reengineering effort. In many cases, it will be the first instance of disciplined and systematic management, driven by data, in the corporation.

The first step in business process reengineering is for the business to define its core process areas. These would most likely include the groupings in the business that are key in retaining the customer base (the new processes then deliver those customer needs). There are typically three such core process areas in a telecommunications environment:

- New Service Provisioning
- Service/Product Maintenance
- Inventory Management

Once the processes are clearly defined, it is important to understand the measurement criteria in order to properly evaluate each process' efficiency and performance. These performance metrics, often referred to as quality or end-to-end indicators and process indicators, are defined early and tracked continuously throughout the transformation and beyond. They are the heartbeat of the effort. Because business process reengineering demands a clear and detailed picture of current organizational, financial, and commercial circumstance, it can not exist as a strategy without today's information technology.

SAS Institute Process Improvement Technology Manager, Ellen Joyner, says, “SAS Institute's strategies go hand in hand with BPR because they allow organizations to deliver applications, data, and functionality to every part of the organization, and to support, in a cost-effective way, the new streamlined structures and integrated business processes that result. SAS Institute's strategies for client/server computing, end-user data access, and rapid applications development provide the portability and flexibility that are necessary features in any modeling information technology solution.”^{vi} The SAS System tools allow for reporting against current processes, data analysis capabilities to measure the performance, interactive tools for the design of more effective tools, and process and quality analysis tools to monitor the progress and quality of the efforts. Finally, all the information can be communicated through the reporting facilities that enable enterprise

wide information delivery--all through the SAS System.

Marketing Intelligence Systems

Marketing intelligence systems have been around for decades. Their entrance into the telecommunications industry is, however, fairly new. The use of database marketing, market research analysis, and competitive intelligence combine to make a very powerful marketing intelligence system for any company. All companies in virtually all types of industries have utilized one type of marketing tool or another but typically have not implemented all three pieces fully to enable a complete look at the customers.

There is an imperative need to incorporate marketing intelligence as a key information technology strategy in order to accurately identify customers and begin the relationship building process. As mentioned in *Inform's™*, The European SAS System Journal Issue 14, telecom companies must strive to succeed by developing and marketing the products and services that customers are prepared to buy. This will become more difficult in time as customer expectations are inflated by the increase in choices via the number of suppliers, services and technologies. To survive, the service providers must know their customers, products and competition. U S West's CIO, David Laube is quoted in *Information Week* as saying, "...IT spending is focused on holding onto customers. Customer loyalty is going to be the future battleground."^{vi} Based on this assumption, telecom companies must begin by knowing their customers.

Key components of a marketing intelligence system include a customer profile, segmentation, predictive modeling, and competitive intelligence. Data to accurately profile the customer base will typically come from many sources that may include the billing system, service ordering, transactional data including meter usage and toll usage, all internal customer databases, and external demographic or firmographic information. For example, AT&T is now selecting a set of 15 to 25 data elements that will define a customer across the company's different product lines to enable different divisions to look at the same customer. This massive data warehouse will help AT&T segment and target their customers.^{vii} The Baby Bells are paying attention to database marketing also. Bell Atlantic is rolling out a system in 1996 that provides the carrier with quick access to both usage and financial data for specific customer segments. Pac Tel has already armed its sales force with

information about which customers are near a competitor's network, therefore identifying vulnerable customers that could switch carriers.

Segmentation allows for subsetting the customer base into smaller subsets in order to better understand customers' buying habits and usage to effectively target new customers or new services to existing customer sets. Typical questions for a marketing intelligence system may include:

- Who are the customers --looking at residential, small business, large business, government, and carriers? Who are the most profitable? Least profitable?
- What do they buy? What do they use? What services have been most successful?
- When do they buy?
- Why do they buy?
- Where are they located? Are they vulnerable to competition?
- How does the customer respond? How does the customer reach the provider? How do the telecom companies reach the customer?

To aid in more customized direct marketing to address customer needs and wants more accurately, market research tools need to be applied to allow for predictive modeling. The predictive modeling will enable the proper customer base to be targeted. The analysis will also uncover vital information in formulating marketing strategies and new promotional campaigns. A perfect example of understanding customers and marketing to their needs is the MCI Friends and Family Program. MCI was able to identify a subset of its customer base by frequent call patterns and devise a program to capitalize on this frequent calling pattern. The goal was to bring in new customers while at the same time retain current markets and add value by providing a discount for them, their family, and friends. These tools will enable a telecom company to compete for new customer markets, grow their existing markets with new services, and retain their markets by knowing and marketing to the customers' needs more directly.

The SAS System provides all the necessary tools to address each key element of an effective marketing intelligence system--from customer profiling to implementation and evaluation of specific programs.

For profiling the customer base, the SAS System has full data warehousing capabilities as explained above.

Emerging Technologies

The ability to consolidate different data sources, both internally and externally, is required to get a complete picture of who the customers are. This can be accomplished by using the SAS/ACCESS® software modules and internal data engines that allow for transparent access to the data regardless of its file structure. The data management tools allow for summarizing, subsetting, and merging data.

Segmentation is easily accomplished through the full range of SAS reporting and querying tools. The SAS System features a menu-driven interface for creating a variety of reports-- from ad hoc queries to detailed lists and summaries. Sample reports include break/total reports, detailed list reports, drill-down reports, summary reports and financial reports. These reports can then be communicated in a variety of ways with the graphical and presentation tools.

The SAS suite of analytical tools include SAS/STAT®, SAS/LAB®, SAS/TML®, SAS/INSIGHT®, and SAS/ETS® software. They can be used to analyze buying behaviors of the customers so a predictive model can be derived to target future customers. Common analytical tools include regression analysis, lifetime value analysis, and neural networks—all available within the SAS data analysis realm. Surveys and survey analysis can also be useful in further understanding the customer.

Finally, customized direct marketing programs can be developed with the use of the above tools. The SAS System's analysis and reporting tools can also be used to evaluate programs regularly, to monitor their success, and to allow for necessary changes.

Case Studies

The following case studies demonstrate the use of the SAS System in several of these key application areas that will facilitate a competitive advantage via information delivery.

Case Study #1

Nortel

Greg Gittins

Manager, Global Information Reporting

Application: Data Warehousing and Reporting

Business Background

Nortel is the leading global supplier of fully digital telecommunications systems. Nortel has sold or has on order the equivalent of more than 110 million ports of fully digital switching systems—more than any other company in the world. Today, the

company's goal is to be the leading architect of global communications networks. To accomplish that goal, Nortel has set its sights on other world markets. The corporation conducts business in more than 90 countries in North and South America, the Caribbean, Europe, the Middle East, Asia, and the Pacific Rim. Nortel provides products and services to the telecommunications and cable television industries, businesses, universities, governments, and other institutions worldwide.

Business Problem

Competition is fierce. To not only survive, but prosper in this environment, Nortel's focus is on putting the customer first, dedicating the efforts to satisfying requirements and using continuous improvement to increase the effectiveness and efficiency of Nortel's efforts. Re-aligning the organization to reduce the cost drivers and shorten time to market has intensified the need to have information at the fingertips of the decision makers in time to allow them to run the day to day business while also providing a basis for planning the future.

A case point is the Service Operations Organization. The consolidation of 2 separate functions leads to a situation where the data needed to run the business existed in many different places in many different formats and on many different platforms. The access and pure representation of that information was essential to the decision making abilities of management.

SAS Solution

The required solution, Data Access and Reporting Tool (DART), needed to provide seamless access to multiple data sources for a consistent base for reporting; provide drill down and subsetting functionality with the ability to "slice and dice"; and offer re-useable templates for short delivery cycles; and have an easy to use graphical user interface.

DART is a distributed application developed and implemented in functional modules. A central server collects and transforms existing system data, then distributes that information to application/data servers in various geographical locations around the country. The users access the data via their local area network from MACs and X-terminals. The functional modules delivered to date are Job Metrics and Workload Forecasting. Job Metrics focuses on consolidating data by products, territory, or functional organizations to provide cost by expense category, jobs started/in progress/completed by customer, product, or territory, inventory exposures, and

milestone and interval tracking. Workload Forecasting consists of a 13 week rolling forecast by product, customer, territory among many different variables.

Using SAS/ACCESS, we were able to connect directly to SQL/DS, ORACLE, DB2 production databases, and SAS databases, delimit the data at the source, and pull the results over into SAS data sets for a consistent reporting baseline. The application layer consisted of 2 basic types of report templates created using SAS/EIS expander and multicolumn objects. An interface allowed report variables to be passed and the ensuing online report format to be dynamically generated. SAS/EIS and SAS/AF are used to surface the information. At the touch of a button, each level of management is able to view their operation in summary or detail, reference the overall organization's operation, and quickly identify customer impacting issues.

As usage of the system grows and the user community becomes more comfortable with its functionality, the reporting abilities are endless. SAS/ASSIST software has become a very powerful tool for adhoc reporting due to the intuitive nature of its design. This enables more users to get to the data and transform it into viable information. Nortel can now respond to information requests in the necessary business timeframes to impact the decision making process.

Case Study #2

U S WEST Communications

Leigh Anderson

Manager, Business Performance Analysis

Application: Business Process Reengineering

Business Background

U S West, Inc. is a Regional Bell Operating Company (RBOC) which divested from American Telephone and Telegraph (AT&T) in 1984. It is one of seven RBOCs in the United States formed during the breakup of AT&T. U S West, Inc. was created from the merging of three telephone companies: Mountain Bell, Northwestern Bell, and Pacific Northwestern Bell. This merger created the geographically largest Bell Company, approximately one-third of the total United States. Denver-based U S West Communications is a major subsidiary of U S West, Inc. The business of U S West Communications spans across fourteen states (28 million customers), 26 work centers, 39 mainframes, nearly 400 Operations Support Systems, 1754 Electronic Switching Systems, and close to 45 million miles of copper and fiber lines of communications.^{ix} The

sheer magnitude of U S West Communications, and sweeping deregulation in the telecommunications industry, places that business at risk. Other market competitors are entering U S West Communications' territory at a rapid rate. U S West recognized this dynamic environment in 1992 and embarked upon a company wide reengineering initiative.

Reengineering Response: A strategic component of U S West Communications (USWC) reengineering effort is to effectively measure processes and increase operational efficiencies. To meet this challenge, reengineering enabled the Business Performance Analysis (BPA) program. This program is a comprehensive data collection, management, analysis, and reporting process with short and long-term deliverables. Short term BPA is transforming a myriad of rapidly outdated manual data collection, reporting and decision support efforts into a singular warehouse of corporate information. This is the scope of the Performance Analysis System (PANS)--an enterprise-wide information delivery system. Longer term BPA and PANS are instrumental in enabling a process management discipline that measures service and network performance for each market unit within USWC.

Phased Approach and Proper Scope: The success of PANS depended on collecting data from diverse sources and warehousing this data in the proper architecture. To successfully accomplish this challenge and meet customer demands, the BPA management team identified several phases with limited scopes. The first phase was proof of concept, a prototype application that had "real" data from live sources illustrating cost and benefits to executive management. The prototype's success allowed BPA to identify and deliver the vital metrics needed to run the business. For example:

- Daily number of calls processed by each Electronic Switching System, the type of customer they are routed to, and their associated defects per million.
- Daily number of fiber and copper line failures, their duration and associated mean time to repair--by customer segment.
- Daily number of opportunities for new service and percentage of time commitments for these services were met--by customer segment.
- Daily number of customers not receiving service in a timely manner and the average duration of these orders by customer segment.

Emerging Technologies

- Daily volume of calls to U S West business offices and the disposition (average length in queue, number of busies, number of abandons, etc) of these calls by customer segment.
- Daily forecast of work force and other key business activities[^]

These are several measures in PANS Release 1.0. This production and development environment delivers information to clients, as the needs of the business change, using a standard software development process. However, a standard software development process can take years, and USWC needed deliverables. The team's answer was to develop a rapid application prototype. This environment allowed users and developers to access data in a "pre-production" form and incorporate these into the next phased PANS release. This fostered a more robust, iteratively developed, production environment-- while delivering immediate process improvement to the clients.

Centralized Approach with a Distributed Architecture: Divergent data sources are a problem for any corporation formed by a merger, for example-- three different servicing systems on different hardware and software platforms. However, USWC brought the added obstacle of enormous data volumes. The receipt and storage of this data was a challenge for a distributed architecture and client/server environment. The PANS data layer receives close to 10 gigabytes of data daily. To date, there are about 400 gigabytes of storage distributed over four data servers (SUN Sparc 1000s). Another 400 gigabytes is planned for end of year. To transmit legacy system data to decision support information takes three logical architectural layers:

- **Data Layer:** Data are collected through either direct connectivity to network devices or by extraction from legacy systems.
- **Application Layer:** Critical summary SAS data sets affording different views of metrics as well as an array of analysis capabilities for the purpose of process improvement, root cause, and cross process analysis.
- **Presentation Layer:** Data sets and graphics distributed to user desktops across a variety of platforms including PCs, UNIX workstations, and Apple Macintoshes.

About 300 users of PANS were set up for the first release on 10 servers, and each phased release calls

for an added user community until U S West's management community is covered.

The SAS Solution

The SAS System provided the tools necessary to deliver each phase of the BPA project. Initially the SAS tools were chosen for their analytical superiority. However, during the prototype phase, the flexibility and strength of SAS/EIS®, SAS/QC®, and SAS/GRAPH® software was recognized. SAS/QC software enabled executive management to see data in more intuitive graphics that reinforced the process management paradigm. The tremendous flexibility of SAS/GRAPH software easily duplicated the graphics output familiar to management, and SAS/EIS software provided the graphical user interface that managers need to quickly display relevant information. These tools remain the mainstay of each phased PANS release.

The rapid application prototype gave developers and users the ability to prototype and trial new SAS tools that, if absent, would have made rapid development impossible. The SAS/ACCESS, SAS/STAT, and SAS/AF® application development tools were utilized in the rapid application prototype before a phased PANS release. The SAS/ACCESS tool allowed developers to limit programming by directing SAS to access the Informix relational database layer. The software increased the availability of valuable hardware and decreased development cycle time. Experimental designs were developed to optimize PANS production and pre-production environments utilizing SAS/STAT software. Finally, and most important, the users were able to give direct feedback to the PANS production graphical user interface months before release by developing the SAS/AF application in phases available for user community feedback.

Conclusion

Measurement of business process performance is a critical step in the ongoing transformation of U S West operations. In the pre-PANS environment, there were various organizations and systems responsible for the portions of the data collection, reporting, and analysis needed to assess the performance of our business. The BPA program is being implemented to provide an integrated and unified approach to management by facts. The prior infrastructure that supported process management could not facilitate the use of data on a daily basis, given the large amounts of such data and the prolific

use of manual intervention and collection required to serve the need for monthly reporting.

This BPA focus was on the U S West's customer experience, however, BPA catalyzed an unexpected surprise—internal cultural change. A year and a half ago, there was great resistance to and unease about the notion of automated process measurement. To most employees, it meant productivity measurement. Today, the understanding that BPA and PANS are about measuring processes, not people, has come about thanks to a number of demonstrated successes while in prototype. Today, its acceptance is almost general. Now meeting expectations is the better half of the battle.

Post full deployment, BPA will be a key enabler to the daily awareness of quality and performance indices of business, heightened customer service and much improved work force forecast. BPA will also be critical in determining root cause of failures through horizontal integration of process and technology.

Case Study #3

Telia Mobitel

Excerpted from *Inform, The European SAS System Journal*, Issue 14 (1995)

Interview with Bjorn Eriksson and Anneli Samuelsson

Application: Marketing and Data Warehousing

Business Background

Telia Mobitel, Sweden's largest mobile telephone operator, employs around 2,000 staff and has a customer base approaching 1.5 million. It is expected that by the year 2000, 90% of the population will have a mobile or cordless phone, an ever-growing market that Telia hopes to capitalize upon. When the Swedish telecommunications market was deregulated in 1992, Telia's monopoly ended and the company found itself in a very competitive environment. Telia quickly identified the need for accurate, up-to-date information-dealing with customers and with the market as a key element in defending its position as market leader. Anneli Samuelsson, market analyst at Telia Mobitel, adds "The marketplace is very competitive, so we need to know more about our customers."

Business Problem

Previously, the systems at Telia were difficult to use, information handling was time-consuming and manual processing produced errors. The need for

better information became apparent in 1992 and Telia realized they should be using the customer data in more ways. The customer database has records for 1.2 million customers, and Telia is unable to get at all the information.

The data are accumulated through Telia's subscription system, invoicing system, and from a system dealing with general customer information and statistics. Data cover both the NMT(analog) and the GSM (digital) phone systems that Telia provides. The old way of collecting data and reporting against it was difficult and awkward. The data came from the various sources and managers and employees produced a variety of reports. As the customer base grew, data volumes and the demand for information inevitably increased. The need for a core data repository tool and marketing reporting facility were vital. Typical questions the marketing group must answer, but were often difficult, include:

- Who are our best customers?
- How do we find them?
- How much are our individual customers invoiced?
- How many phones do they have?
- Which system do they use?

The SAS Solution

To address the need for consolidated data from different sources and the various querying and reporting needs within the marketing department, Telia turned to the SAS System. Telia decided to collect all the data into one place, handle the data there and deliver accurate information rapidly so they could respond more quickly to what the mobile users want and need. Eriksson believes Telia "can manage and plan the whole business better and be quicker off the mark with new ideas."

The core data repository runs on a Digital Alpha-based system with a storage capacity of 20GB and exploits the data warehousing capabilities of the SAS System. "The data warehouse is like an information 'one stop shop' where you can go in one door, put all your choices in a single basket, go to one checkout, and leave when you are happy," reports Eriksson.

With SAS software, Telia can now support salespeople and segment managers-- who need to know such things as which system is the most popular and how invoicing differs within and between different market segments. The marketing group can summarize and aggregate very large volumes of data

and report on customers by size of company, or study the private market by demographic criteria such as sex and age range. Telia also uses SAS software for target marketing communications campaigns, to monitor the success of new product innovations, and to find out why customers leave and how they can be retained. "Information is also provided to executives up to the board level, covering the market by different groups of customers, how much they use their phones, how many calls are made per day, variations across the country," Samuelsson states. These results are then used to formulate strategic decisions.

Conclusion

According to Anneli Samuelsson and her colleagues, easy access to accurate and timely information allows for stronger concentration "on their proper role-market analysis." The impact on productivity and the quality of work is considerable. "The SAS System helps Telia Mobitel to be more competitive," says Samuelsson, "because we can see market trends early and use this information to support our decisions relating to new products, market segments, communications campaigns and much more besides. Our customers benefit because we are better able to meet their demands for new products or services quickly."

The project has had three major consequences. Telia has seen considerable cost savings, improved efficiency resulting in enhanced productivity and earnings gains, and improved quality of information. In the long term, these will help to improve relationships with customers and increase profits.

Summary of using the SAS Solution for a Competitive Advantage

Information delivery for decision support will be the key enabler for telecommunications companies to compete in this rapidly changing and increasingly competitive environment. The use of the information will be to establish long-term relationships with the customers through improved service and product offerings and a customer-driven approach. The SAS System's ability to handle the diverse data, diverse users, diverse hardware environment, and diverse applications allows for one integrated decision support tool to be used throughout the enterprise. Several strategic application areas using the SAS System are discussed and illustrated in this paper to demonstrate how information technology can provide a competitive advantage. The SAS software can be

used for decision support throughout the telecommunications organization—it is the effective use of this information to make critical business decisions that can ultimately lead to success in this turbulent environment.

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^{iv} Mary E. Thyfault, "Carriers Answer the Call," *Information Week*, 18 Sept. 1995, p.184.

^v Michael Hammer and James Champy, *Reengineering the Corporation* (New York, New York: HarperCollins, 1993).

^{vi} "The Role of the SAS System in Business Process Reengineering," *SAS Communications*, Vol XXI, NO. 2.

^{vii} *Ibid.*, p.186.

^{viii} *Ibid.*, p. 186.

^{ix} 1995 Enterprise Computing Nomination submitted by U S West Communications.

^x *Ibid.*