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AICPA

InfoTech

Practical Advice For Implementing Technology

UPDATE X106.1A
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PUBLIC ACCOUNTANTS
OF THE AMERICAS
N. Y. 10036-8775
In This Issue:

An Eye to the Future: AICPA Technology Division Announces Top 25 Technologies.

What technologies are coming down the pike that will affect the accounting profession and business in general? How fast will these technologies be used commercially? Will they affect auditors, CPAs in industry, consultants? With the explosion of technological changes, CPAs and corporate management are faced with momentous choices about implementing technology and technology's potential impact on their businesses.

The AICPA Information Technology Research Subcommittee is charged with monitoring future technologies and identifying their impact on the accounting profession and general business. The Research Subcommittee has used a group decision support system (GDSS) lab over the last several years to identify the most important among the myriad and complex technologies being developed.

This year, the Information Technology Research Subcommittee and the Practices Subcommittee met at the Ventana Corporation, developers of the GDSS package, GroupSystems V. Terry Campbell, a professor at the International Institute for Management Development in Lausanne, Switzerland, facilitated the decision support session.

Group Decision Support System

GDSS is a technology that enables the participants of a group to increase their productivity by enabling "better" decisions to be made. Group-work is a fact of life in professional services firms and at their clients and is becoming increasingly critical to the survival and success of these groups. Technology has begun to emerge which can aid the group deliberation and decision process. This is where GDSS comes in. The technology is usually software and a network of some type connecting a number of PCs with a file server with the capability of displaying results on large-screen monitors in a designated-purpose room. The display capabilities include not only the individual PC of interest, but also the aggregation of responses made during the session. The session may focus on any of a number of the following group tasks/processes: brainstorming, nominal group, Delphi surveys, assumption surfacing, policy formulation, issue analysis, alternative evaluation, stakeholder identification, strategic planning, or any other matter which a group would normally discuss. Group decision support facilities can assist in handling the need for consensus, while providing for anonymous input from all concerned.

Present examples of these group

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decision labs are located in universities (The University of Arizona and Minnesota are noteworthy in their leadership) and are just beginning to be found in industry settings. The general ambience of the labs varies from a minimal set-up to a very professional executive group room.

The Information Technology subcommittees began with an "electronic brainstorming" session on new technologies and technological concepts to be considered for subcommittee projects. The list that was generated was compared with the list of technologies from last year's session, using the "idea organization" portion of the GDSS software. This exercise identified new technologies, new definitions of previously listed items, and deletions of technologies. The group discussed the resulting list of technologies to ensure definitions were clear, and then, using the "group matrix" por-

continued on page 2

continued from page 1

tion of the GDSS software, voted on the implementation stages of each of the technologies on the list. The stages are described as follows:

Stage 1: New technologies in, or emerging from, research and development, but not to be widely used commercially for 5 years or more.

Stage 2: New technologies that are starting to be used commercially and should be in significant use within 3 to 5 years.

Top 25 Technologies

September 1993

Stage	Ranking	Technology	Ranking			
			Productivity	Audit Impact	Consulting Impact	Awareness
3.13	1	EDI	1	1	2	1
3.69	2	Area networks	2	8	3	2
2.69	3	Cooperative and client/server computing	7	6	1	5
2.63	4	Image processing	3	5	4	6
3.06	5	Quick response	4	7	9	3
2.69	6	Distributed database technology	5	4	13	13
3.73	7	Database technology	14	10	8	19
3.31	8	Communications technologies—general	15	12	14	10
2.44	9	LAN Interoperability	16	18	5	11
3.25	10	Automatic identification	8	15	24	14
2.81	11	EIS	11	17	11	16
2.31	12	Integrated multi-platforms	18	19	6	23
2.56	13	Open systems architecture	30	13	10	28
2.60	14	Business process re-engineering	28	24	12	17
2.69	15	Wireless networks	13	30	28	8
3.20	16	Security	48	2	23	34
2.56	17	Lotus Notes	9	36	32	4
2.50	18	Information-on-demand	20	21	30	15
2.44	19	Expert Systems	39	11	17	32
3.13	20	Decision support systems	26	23	22	24
2.50	21	Information repository	41	9	18	38
2.31	22	PDA's and PIMs	6	42	39	9
2.00	23	Information superhighway	21	39	27	7
2.63	24	Information warehouse	31	14	25	35
2.00	25	Middleware	27	25	7	41

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Editor

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Director

Philip H. Friedlander, CPA
Ernst & Young
Technical Editor

Stage 3: Technologies that are gaining in commercial use and should be used extensively in 1 to 3 years.

Stage 4: Technologies that are now used extensively, but are continually being enhanced.

The GDSS software showed when a consensus was reached on the implementation stages among the subcommittee members. Once the stages of implementation were discussed, the group voted on the significance of each technology according to the four technology filters:

- a. *Productivity and Quality Improvement.* Technologies that will provide opportunities for productivity and quality improvement related to accounting, auditing, consulting, and tax for members in public practice and in private industry.
- b. *Audit Impact.* Technologies that will have an impact on the control, security, or auditability of information systems and will, therefore, have an effect on internal and external auditors.
- c. *Consulting Impact.* Technologies that will provide new consulting opportunities (internal and external) for members.
- d. *Awareness.* Technologies that will have a current or potential impact on business and, therefore, would be of interest to members.

The object of this exercise was to rank each of the technologies or technological concepts in order of importance for the subcommittees' work, to the general AICPA membership, and for general business. Using the "group outline" portion of the GDSS, the subcommittees then electronically "met" in small groups to discuss the focus and coordination of activities for each of the Information Technology subcommittees.

The resulting 1993 Top 25 Technologies are included in the table on

page 2.

Note: The Editor would like to thank Terry Campbell for his input into this article.

IT

Join ITMS at the 1994 Midwest Computer Show

The Annual Midwest Computer Show, sponsored by the Illinois CPA Society, will be held May 25-27, 1994, at the Rosemont Convention Center in Rosemont, Illinois.

The Information Technology Section will be sponsoring a booth at this conference. A conference brochure will be mailed to all members in March. The cost of a 3-day CPE pass is \$175, and \$115 for a 1-day pass. There is a \$25 charge for attending the exhibits only, and Information Technology Section members will be eligible to receive a free guest pass to the exhibits.

For more information, call Karen Malone at the Illinois CPA Society & Foundation at (312) 993-0393, extension 279.

AICPA Information Technology Section Announces Discount Offering with ICP

Chances are that as a technology-aware individual, you are constantly looking for a software product—a utility program, an application for a particular industry, maybe even a small programming aid that makes life easier.

ICP has a product available that will be truly valuable to anyone faced with the task of researching or buying software: InfoROM, a CD-ROM disk containing descriptions of over 16,000 software products, from more than 4,500 vendors in 381 categories ranging from accounting to zip coding. In addition, InfoROM contains product presentations/demos, as well as digital advertising with a full text search engine. The following information is available for each product:

- Product Name
- Detailed description of features and functions
- Minimum machine requirements
- Price
- Vendor names
- Vendor address
- Vendor telephone number
- Contact person
- Operating platforms

The InfoROM database is published four times a year (March, June, September, December), and an annual subscription to this service costs \$296. However, Information Technology members are eligible for a special price of \$125. In addition, as an Information Technology member, you will receive shortly a complimentary copy of this service to evaluate which will be yours to keep.

The AICPA does not endorse the products or services of this or any other vendor, but we will from time to time call your attention to products and savings opportunities that may benefit your organization. We sincerely hope that these discount programs are of value to you.

Entering the Broadband Era of Data Communications

By David E. Nelson
and JoAnn Patrick-Ezzell

David Nelson is a product marketing manager for AT&T Data Communications Services in Bridgewater, New Jersey and JoAnn Patrick-Ezzell is a marketing vice-president for AT&T InterSpan Data Communications Services, Business Communications Services in Bedminster, New Jersey. The following article, which appeared in the Spring 1993 (Vol. 8, No. 1) issue of *AT&T Technology* has been reprinted with permission. Copyright © 1993, AT&T. In this article, Nelson and Patrick-Ezzell discuss new services and hardware that will be available to meet the growing demands of global and national wide-area networks in terms of complexity, capacity and size.

It's hard to believe that people who processed and moved data were once considered an elite class of technology experts who guarded an isolated facility known as the "computer center." Programmers and others had to make appointments to go there to do their work. The mainframe was king: Anything else was a toy.

That royal approach has been revised by the introduction of data networks extending across states, continents, and oceans. The growth of data networking was spurred by the development of PCs and economical versions of modems, the implementation of new data communications protocols, and the expansion of digital transmission facilities.

Personal computers now domi-

nate the workplace. As of 1990, an estimated 33 million PCs were in use in the United States. That number is projected to grow to 69 million by 1994, and the number of PCs connected to local area networks (LANs) is growing at 70 percent a year. LANs are growing at 20 percent a year. Some terminal equipment has a growth rate of more than 100 percent per year. This proliferation of information terminals is pacing data communications applications and spurring demands in the business and consumer environment.

The synergy of advanced technology, expanded applications, and lowered costs is helping to integrate the various approaches to data communications networks. Proponents of mainframe computers are partnering with the supporters of desktop computers, portable computers, and multimedia terminals that share data networks.

Data networks are more popular than ever today. They can be as large as the links among an international manufacturer's factories, warehouses, distributors and sales outlets, or as small as five personal computers located in a few rooms in an office. What is emerging now, however, is the desire to integrate many smaller networks into regional, national, or international networks involving various types of users, hardware, and protocols.

The first successful attempt to link a remote data terminal to a computer occurred in 1940, when a group of mathematicians attending a convention in New Hampshire used a teletypewriter to feed problems to a new "complex computer" at Bell Telephone Laboratories in New York City. Assembled from standard telephone

apparatus, the computer processed complex numbers and sent back the answers in the form of telegraph signals printed on the teletypewriter.

Today, the communications in a data network occur at speeds unimagined a half-century ago. Instead of transmitting the individual keystrokes of a teletypewriter, the modern data connection may be handling as many as 45 million bits per second. The data traffic can be anything from a brief electronic mail inquiry to hours of interactive product design changes originating from graphics terminals in multiple cities linked by a transcontinental conference call.

The Expanding Network

The wide-area network (WAN) of the recent past was actually often a patchwork of separate networks, each an entity within itself. Integrating these into one large WAN can be a herculean task, especially for a global-scale network. The task can become even more complex when the traffic involves a variety of computing applications and data communications protocols.

Today's corporate computing resources require the interconnection of hundreds, thousands, or millions of separate items in a reliable, accessible, flexible, and cost-effective system. WANs use many different but associated interface devices such as modems, bridges, routers, gateways, and front-end processors to tie together the computer hardware, software, network servers, and LANs that form today's corporate computing platform.

What's most important, however, is that the purchaser of a WAN be fully aware of the choices to be made when designing and making specifications for the project.

Choosing a Solution

The options available to network purchasers include both technology and services, but the basic consideration affecting the choices is total system

price/performance. No network designer wants to follow the dictum of "Buy the cheapest box on the market." Conversely, no sponsor is likely to declare, "Cost is no object."

With so many choices, how do you begin to approach a cost-effective solution? One way to start is by identifying the technology/service that is most likely to fit your situation.

WAN technologies can be segmented according to two key dimensions: bandwidth and degree of connectivity. Bandwidth is the capacity of the connection, stated in kilobits or megabits per second. The degree of connectivity is the extent to which network endpoints communicate with each other (see the figure below).

Bandwidth

A narrowband network based on low transmission speeds, ranging from 300 bits per second to 64 kilobits per second (kb/s), is served by x.25 packetized services or DSO circuits. It also can be served by dial-access services.

Wideband networks, ranging from 64 kb/s to 1.5 megabits per second (Mb/s), are best served by

switched digital services, T1 and fractional T1 services, and frame relay services. Broadband high-speed WANs, however, may justify the use of T3 or fractional T3 services or Asynchronous Transfer Mode services, provided in bandwidths up to 45 Mb/s.

Degree Of Connectivity

Dedicated, or private-line technologies and services (lower tier in the figure) are generally best suited to low connectivity environments, where end systems communicate mostly in pairs or point-to-point. A frequent characteristic of user applications is a relatively constant data rate from end to end, such as when transferring data between a pair of computers for several hours.

Packet technologies and services, including frame relay and cell relay (upper tier in the Figure), introduce more flexible bandwidth to the network. Instead of dedicating a circuit, whether or not data traffic is present, packet switching enables the user to send data to a variety of endpoints on an as-needed basis. This permits highly efficient use of bandwidth and

can reduce circuit costs. Packet solutions are typically best suited to high connectivity environments, where end systems communicate in a many-to-many pattern.

Temporarily dedicated technologies and services (switched digital services) can be applied in either environment, but are best suited to connections requiring large, relatively constant data transfer for defined intervals of time (for example, as in videoconferencing or periodic large file transfer). These services are what designers are referring to when they ask for "bandwidth on demand."

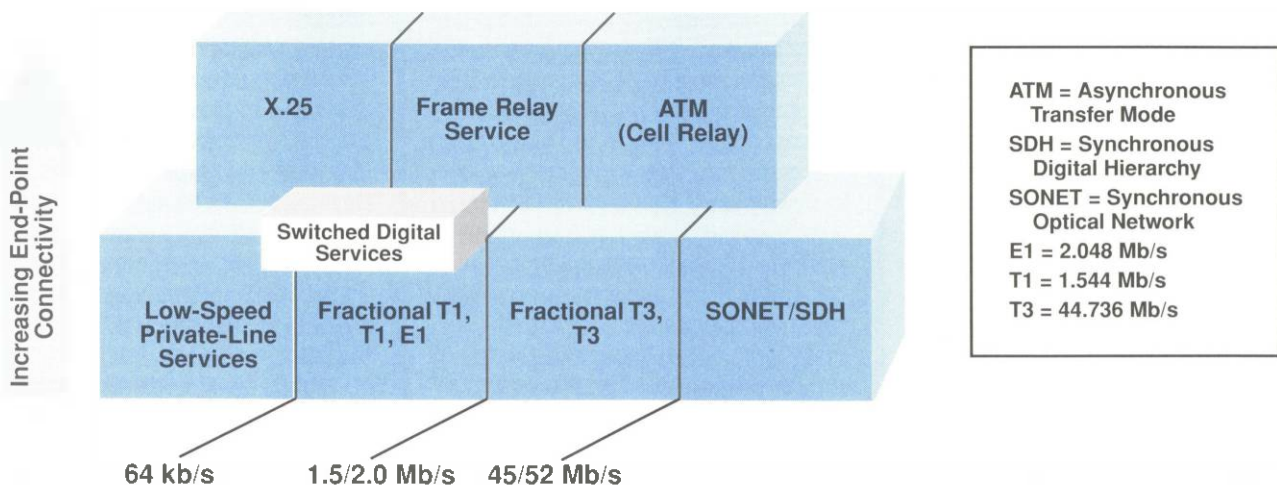
The Best Solution

Defining a specific data network solution also requires consideration of such factors as the investment in existing equipment, the protocols to be used, the response times desired, the geographic dispersion of the network endpoints, the application characteristics, the patterns of end-user and end-device intercommunications, the desired quality, the required performance, and ease of use.

WANs may be regional, national, *continued on page 6*

Wide-Area Data-Networking Universe

The data service to be selected depends on the required bandwidth and the degree of connectivity. Switch Digital Services and Packet Services (X.25, frame relay, and ATM) are most appropriate when the end systems require many-to-many connectivity.



continued from page 5

or global in scale, often based on facilities leased from carriers such as AT&T. The versatility, reliability, and cost-effectiveness of such networks depends on the willingness and ability of the interexchange carrier to maintain a state-of-the-art operation. Efforts to anticipate the needs of the data networking field have resulted in many innovations during the past several decades—including both networking systems and a broad array of services.

The modern versions of wide-area networking are increasingly international in scope. With the advent

of digital undersea cables, high-capacity data networking became far more feasible to such major markets as Europe and the Far East.

ATM will permit simultaneous switching of data, video, voice, and image signals over cell-relay networks. Cell-relay technology is better able to handle voice and video signals because the cells move through the network at much higher rates (45 Mb/s instead of 56 kb/s) with far shorter and much more consistent delays than those that occur with older data communications protocols. Future high-speed packet switching sys-

tems, now in the laboratory, will operate at speeds as high as 622 Mb/s via ATM systems.

Price/performance improvements, combined with enormous increases in global network capacity and reliability, as well as the digitization of global communications, are helping users to compete more successfully in the global world of broadband wide-area data networking. The exciting potential of frame- and cell-relay technologies, coordinated with new uses for video and other broadband signal streams, will probably revolutionize worldwide business methods. **IT**

Quick Response—An Overview

*By Kenneth D. Askelson,
CIA, CPA, CFP*

Ken Askelson is an Area Audit Manager with the JCPenney Company in Buena Park, CA. He is also a member of the Information Technology Research Subcommittee. In this article, Askelson identifies some of the key technologies needed in a Quick Response environment and discusses some of the benefits and implementation considerations for setting this strategy in motion.

Quick Response is a strategy that is starting to make an impact on many industries and companies in the United States and has taken off with the advent of information technology. It has also created many opportunities for those who understand and appreciate the competitive advantages this concept can bring to a company. These opportunities include: developing/modifying strategic business plans, goals, and objectives; imple-

menting the technologies needed to achieve Quick Response; identifying audit and control concerns/risks related to its development and implementation; and uncovering consulting opportunities in all phases of development and implementation.

What Is It?

Quick Response is a business strategy that attempts to identify and meet the demands of the customer by moving merchandise from raw material suppliers to customers in the most efficient way, and at the same time reducing the amount of inventory in the merchandise pipeline. Industries that are part of the pipeline and play a key role in the movement of merchandise include manufacturers, suppliers, warehouse, distributors, and retailers. Refer to the illustration on page 7.

Quick Response centers on creating new relationships or "partnerships" among retailers, manufacturers, suppliers, and distributors that historically did not exist in the past. Jerry Monday, manager of information systems for JCPenney, indicated that these relationships were too often ad-

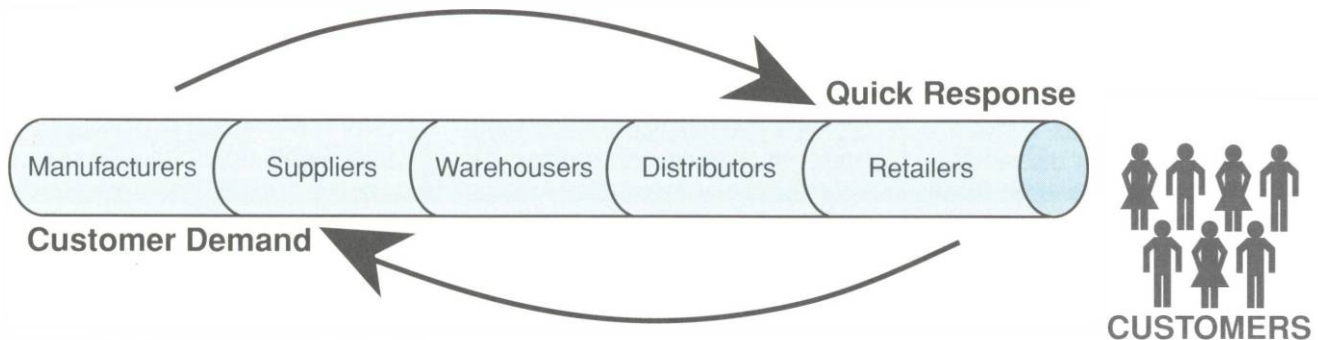
versarial with no sharing of operational data—resulting in the product taking a long time to get through the merchandise pipeline. A Quick Response partnership requires an entrepreneurial relationship that is built on trust, constant communication, sharing of operational data, high quality, and a shorter merchandise cycle. The partnership requires new business practices, starting with a cooperation that stems from a knowledge of each other's business objectives, opportunities, and constraints.

Examples of this new partnership arrangement include JCPenney sharing sales information and utilizing an automatic inventory management system developed and managed by VF Corporation for its Lee jeans (as described in *ComputerWorld*—June 14, 1993). Another example is the specialty apparel chain called Designs that sends Levi Strauss and Co. a sales data file every week in order for Levi to match the figures against the model stock and automatically send a replenishment shipment directly to the store.

In the past, sales information and inventory levels were not shared with others in the pipeline. With Quick Response, not only are current sales and inventory levels shared with others,

Quick Response
The Merchandise Pipeline

The Concept



Partnership Objectives

- Increase the flexibility of the merchandise pipeline to better respond to changing customer demands
- Maximize the efficiency of the merchandise pipeline to reduce the investments in inventory throughout the pipeline

future sales estimates that will allow the manufacturer/supplier to anticipate and meet the needs of the customer sooner are also made available.

The August 19, 1991, issue of *Industry Week* described Roger Milliken, CEO—Milliken and Company, as a pioneer of Quick Response with a mission to

- drastically reduce the time for a retailer/seller to replace merchandise that a customer just purchased at point-of-sale
- provide real-time information on what's selling and what's not selling at the stockkeeping unit level (SKU-level)
- replace hot-selling merchandise in time to ride the wave; drop non-selling merchandise and avoid markdowns
- reduce costs and improve profitability for all players in the pipeline
- improve the competitive position of industry in the United States against offshore suppliers

Benefits of Quick Response

Some of the benefits attributed to Quick Response include: increased

sales and turnover, more manageable finished goods inventory and work-in-process, better inventory balance, reduced markdowns, increased profits, improved customer service, cost effective manufacturing due to a smoother production cycle, and improved distribution efficiency from reduction or elimination of manual receiving and checking procedures.

Technologies Supporting Quick Response

The driving force behind this strategy is the technologies utilized to meet Quick Response's objectives. These increase the flexibility of the merchandise pipeline to better respond to changing customer demands and to reduce the investments in inventory throughout the pipeline. The key technologies that support the Quick Response strategy include:

Retail Point of Sale (POS)/SKU-Level Transaction Processing. Retail point-of-sale (POS) systems play an essential role by capturing and collecting sales and adjustment activity for merchandise and services purchased by

consumers. POS systems consist of hardware such as cash registers, and software that interface with other systems to accurately record the sales activity of the retailer. Under Quick Response's new partnership arrangement, this sales information would be shared with others along the merchandise pipeline in order to better manage inventory levels and anticipate customer needs.

The March 1991 issue of *Chain Store Age Executive* reported that the retailer must have SKU-level transaction processing systems in place before implementing other Quick Response technologies. A SKU-level, or stockkeeping unit, is the lowest level of item identification for merchandise. With SKU-level transaction processing systems, the retailer has the accurate and timely information on inventory levels that is necessary for forecasting and effectively managing inventory.

Bar Coding/Scanning. Bar coding is a technology used for automatic identification of inventory items and is a cost-effective and accurate method of capturing and tracking data. It is es-

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essential for practical implementation of real-time, transaction-oriented systems and has become a critical competitive strategy. Scanning facilitates data entry and capture into the computer by optical reading of bar codes and the translation of these into unique item numbers.

The bar code is a binary code with information—numbers, letters, and symbols—encoded in the widths of bars and spaces making up the bar code. Bar codes use different “symbolologies” with names like UPC, Code 39, and Code 128. There are some 50 bar code symbolologies, each having its advantages and disadvantages. By far the most commonly used symbology is the UPC code. UPC stands for Universal Product Code and is the one you see on most merchandise. The benefit of using bar codes is the high level of accuracy obtained for tracking inventory at the SKU-level.

Bar codes are also utilized in shipping and receiving functions for efficiently moving inventory through the merchandise pipeline.

Electronic Data Interchange (EDI). Electronic Data Interchange (EDI) is the electronic exchange of business documents in a standard format between trading partners. Those documents that were historically in hard copy form are now transferred electronically from computer to computer. Documents or transactions exchanged through EDI include the following: purchase orders, advance shipping notices, invoices, on-hand inventory position, order status inquiries, purchase order acknowledgements, product sales, payments, and numerous other documents unique to each industry.

All EDI systems require some type of computer hardware such as a PC or mainframe, plus software for the EDI application and translation software that converts the information to the standardized EDI format. A modem is required for transmission of information and software for the computer to communicate with the mo-

dem. The transmission of EDI documents can be either direct communication or via third-party networks. With direct communication, trading partners manage their own communications by transmitting directly to each other. With third-party networks, trading partners receive and send electronic documents through these networks that function like a clearing house with an electronic mailbox. For most companies, the third-party network is used and preferred.

Implementation of EDI was enhanced with the establishment of standard formats for business documents. This allowed trading partners to effectively and efficiently exchange these documents in a computer readable format. The most common standardized format utilized by retailers was established by the Voluntary Interindustry Communications Standards Committee (VICS) and the American National Standard Institute (ANSI), commonly referred to as VICS ANSI X.12 EDI standards.

The major benefits of EDI include boosts in sales, and reduced inventory carrying costs made possible by speeding the flow of information and merchandise through the pipeline. EDI also reduces clerical and administrative costs associated with data entry and tracking huge volumes of business documents.

Advance Shipping Notices/Shipping Container Marking. The Advance Shipping Notice (ASN) system incorporates EDI technology and bar-code scanning that interfaces with other systems such as electronic order files to provide for faster and more accurate online receiving and monitoring of outgoing/incoming shipments. In a Quick Response environment, suppliers are required to place Shipping Container Markings (SCM)—scannable bar-code labels—on cartons shipped, and to electronically advise the purchaser of the shipment by sending an ASN that details the contents of the shipment at SKU-level. The ASN also allows the supplier to send an order status code

incorporating backorders, partial shipments, substitutions, and other pertinent messages.

Automatic Ordering/Replenishment. Automatic ordering/replenishment systems constantly monitor inventory levels relative to sales demand in order to generate electronic purchase orders for inventory that needs to be replenished. *Chain Store Age Executive* indicated that this allows retailers or manufacturers to carry the most economical level of inventory and still provide superior customer service. In order to accomplish this, replenishment systems track the following information about inventory at SKU-levels: model stocks, supplier lead times, and forecasted sales rates and trends.

With the use of EDI technology and new partnership arrangements for sharing sales and inventory information among trading partners, the supplier is now capable of initiating a purchase order, known as a Reverse PO. The supplier simply notifies the retailer electronically of the order with a purchase order acknowledgement. Although this is not as prevalent as the retailer placing the order, the technology is available to accomplish this task.

Implementing Quick Response

How do you know if you need to develop and implement a Quick Response strategy? The March 1990 issue of *Discount Store News* made the following observation regarding that decision: It first requires the retailer not only to understand their company's internal operations, but also the structure of its competitors and other companies that are part of the merchandise pipeline. The article further recommends that when making the decision, ask the following questions:

- Does your business currently react quickly to shortages, stockouts, and new product lines?
- Are your markdowns in line with other retailers'?
- Are your inventory turns as high as they should be?

- Are your overhead and purchasing costs equal to or less than your competitors'?
- Is the information you send suppliers enough to let them provide the products you need, when you need them?

If you answered no to any of these questions, you should consider a Quick Response strategy.

Once a company decides to implement a Quick Response strategy, it needs the full support of executive management and employees. Although the technologies used for Quick Response do not need to be implemented all at the same time, it is important that a good business plan be developed identifying key tasks, responsibilities, and timetables. This document should

also include goals and objectives as well as plans for communications, integrated systems, operations, human resources, and testing.

Editor's Note: A technology bulletin on Quick Response will be published in the spring by the Information Technology Division for Information Technology Section members.

IT

Helping to Make the Bar-Code Connection

By Sheldon H. Eveloff, CPA,
CISA

Sheldon Eveloff is partner-in-charge of the management consulting services department of Goldberg/Rosenthal in Jenkintown, Pennsylvania. He is also a member of the Information Technology Membership Section. In this article, he discusses the role consultants can play in introducing bar-code technology. This article has been summarized from Eveloff's article that appeared in the Summer 1993 issue of *The Small Business Controller*.

Consultants can help manufacturing companies to remain competitive by introducing bar coding. The numerous benefits of switching to automation can significantly boost client bottom-line profits. Bar coding is a major tool for increasing productivity, and manufacturing companies of all sizes must implement it if they intend to remain competitive.

The Benefits

Integrating bar-code scanning and labeling creates an efficient, cost-effective materials handling system. The benefits are real and compelling:

- *You always know what you have and where it is.* Automatic identification systems provide instantaneous knowledge of material flow from receiving, through manufacturing, and on to shipping. This information enables employees to accurately control material resources, leading to increased productivity, reduced operating expenses, and improved product quality.
- *Costs can be a lot, not just a little.* Because handling-related expenses for bringing an item to market range from 30 percent to 80 percent of a product's total cost, the savings potential realized from improved flow and control is substantial.
- *Product quality and customer service can be improved.* Under automated control, material resources come together at the right time and place and in the right quantity, minimizing waste and production-line errors. And because you can track work in process, work in inventory, and delivery channels so easily, you can assure customers about questions of where, when, and how much with greater accuracy.
- *Automating need not cost an arm and a leg.* While many technologies are on the market, optical bar-code technology is probably most widely accepted because of its accuracy, simple operation, proven perfor-

mance, and reasonable price. Combining bar-code technology with programmable microprocessors has further increased system flexibility and reduced costs to the point where virtually every industry is already using the concept to some degree.

The Consultant's Role

Once management makes a commitment to implementing automatic identification, consultants can become highly involved in the automation process. It affects almost every area of a company, particularly transactions and operations. The consultant needs to examine how people work, how material moves, and what information about each variable should be captured to maximize tracking and control capabilities.

One of the consultant's first tasks will be to review the most typical manufacturing plant applications of bar coding to determine which ones offer the best opportunities for the client. As a start, become familiar with the following major applications:

- *Receiving.* Bar-code technology is a fast and accurate way to process material, with minimal labor.
- *Raw Material Storage.* Accurate counts and locations lead to savings through reduced inventory levels and knowledge of all available stock.
- *Production (fabrication and assembly).* Shop floor data collection applications include job costing, scheduling, project tracking, time and attendance, quality and statisti-

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- cal control, and downtime reporting.
- **Packaging.** Bar codes reduce manpower in this labor-intensive operation by performing on-line, real-time verification of package labels. Automatic systems, tied to computers or programmable controllers, increase productivity by defining the content of each package and gathering information to produce printed manifests.
- **Finished Goods Storage.** Automatic identification virtually eliminates misplaced products, facilitates the storage of raw material and finished goods, saves capital costs, and minimizes the turnaround time to pick orders.
- **Shipping.** Bar codes, in conjunction with tracking, weighing, and sortation systems, and computers, help guarantee that containers get into the right truck. Computers check a container's bar code against a stored manifest and print reports on the truck's contents and weight.

This summary suggests the many, dramatic efficiencies that bar coding can introduce including gains in productivity, cost efficiency, and customer satisfaction, all which translate ultimately to higher client profitability and better competitive performance. A note of caution is warranted, however: No universal, off-the-shelf solution exists for all. **IT**

InfoTech Update Wins Award

InfoTech Update recently won the 1993 APEX (Awards for Publication Excellence) award for subscription newsletters. The APEX award competition recognizes excellence in publication work by professional communicators. Nearly 3,700 entries for 88 categories were judged by Communications Concepts, the sponsor of the award and publisher of *Communications Manager* and *Writing Concepts*, both monthly newsletters. *InfoTech Update* competed against 586 entrants in the subscription newsletters category and was recognized for its qualitative subscription services.

INFOTECH Questions & Answers

Using Technology As A Marketing Tool

Q - I'd like to add some pizzazz to my reports and correspondence by using color. Can you tell me what obstacles I'll have to overcome?

A - You have touched on a problem facing many accountants. The marketplace is increasingly competitive and, in many cases, form is taking precedence over content.

The first problem you must overcome is your output device. There are three available types of color printers. Some dot matrix printers have the ability to print colors using a 4-color ribbon. This output may be fine for internal use or for drafts, however, even the best output is unacceptable for client use. Color ink jet prices have fallen over the past year, while the quality has dramatically increased. Ink jet printers work by "spraying" a dot of ink from 1 of 4 color containers. One of the drawbacks in color ink jets is that black and white printing generally suffers at the expense of quality color printing. Thermal dye transfer (also called dye sublimation) works by using a "wax" dye sheet and heat. These are generally the best option for photograph-type color printing.

The next problem to overcome is the software you use for document and graphics creations. I believe that the Windows products such as Power-Point, Harvard Graphics and Freehand offer more flexibility and usability than the current batch of DOS-based systems. As an accountant, you will need software that handles text and graphics. Desktop publishing may be the best choice for combining the two into a presentation-quality document.

Third, you will need to overcome the "we've always done it that way" mentality. The market is getting more competitive and is expecting more updated communications from accountants. Before attempting to create a style, contact your advertising agency and get their help designing a layout, selecting a font, and establishing a format for graphics use. This is also a good time to consider a change in report covers, letterhead, and logos.

Lastly, be prepared to spend a little money to achieve the desired results. Remember that your employees have been entrenched in the old way of doing things and will be reluctant to change software and style.

Contributed by Steven A. Pynne, CPA, Elliott, Davis & Company.

Changing CONFIG.SYS Files

Q - I changed my CONFIG.SYS file and now my system will not boot. What happened and what can I do?

A - You have either put commands in your CONFIG.SYS file that are invalid or you have a combination of commands that have caused DOS to load an incompatible combination of software. Your first step is to get DOS to reboot without looking at the CONFIG.SYS file.

If you are using DOS 5.0 or earlier, you should always have available a bootable diskette. A bootable diskette is one that contains DOS but no CONFIG.SYS or AUTOEXEC.BAT file. In this way, DOS will boot "vanilla," that is without trying to load TSRs, drivers, or other software. You can create a bootable diskette by typing "FORMAT A:/S" where A: is your disk drive. This tells DOS to

format a disk and transfer the system (COMMAND.COM) to the disk in bootable form. You reboot the system with this disk in the drive and DOS will boot from it instead of your hard drive. Then you can change the CONFIG.SYS file on your hard drive.

If you have DOS 6.0 or later, you have it easier because by pressing SHIFT-F5 during the boot, when DOS displays "Starting MS-DOS...", DOS will bypass the CONFIG.SYS and AUTOEXEC.BAT file totally, booting "vanilla."

Contributed by Philip Friedlander, CPA, Ernst & Young.

SMARTDRV.EXE

Q - What exactly does SMARTDRV.EXE do?

A - SMARTDRV is a disk-cache. That is, it caches, or stores, disk operations in memory to improve disk performance.

Think of your hard disk as a library. You, the librarian, are helping a student who is doing a research paper. First, the student asks for the September 1, 1987, issue of *Time* magazine. You go running across the room to the magazine rack and retrieve the correct issue. After a while, the student finishes, so you return the issue to its proper place. Next, the student asks for the September 7, 1987, issue of *Time*. Off you go, to the other side of the room again. Soon, the student finishes with the issue. Back across the room. Next, the student decides to look at the September 1st issue again. Then September 14th, 21st, and so on.

If the library is a hard disk and the magazines are data, then SMARTDRV would be a librarian helper who retrieves all of the September 1987 issues of *Time* the first time the student asks for the September 1st issue. SMARTDRV does this on the gamble that the student will need more than just one issue from September. Not only that, but SMARTDRV doesn't return any issues to the rack until either it is sure that the student won't need them anymore or it runs out of disk room.

SMARTDRV achieves this by intercepting disk operations and storing the data that is retrieved in a block of memory reserved just for that purpose. Then, on subsequent disk reads, SMARTDRV first checks to see if the data being requested is already in this block of memory. If so, there's no need to go back to the hard disk, especially since hard disk operations are much slower than memory accesses.

Of course, eventually, this block of memory fills up—that is, there's no more room for any new information. So SMARTDRV must discard some of the data already in the memory block to make room for the new. Generally, the data that it discards is the data that is the "oldest": i.e., it hasn't been used in the longest period of time.

This method of disk caching is known as "read caching" because it only improves the performance of disk reads. Data that is written back to a disk is written immediately.

However, starting with version 4.0 (the version that shipped with Microsoft Windows 3.1), SMARTDRV began to employ "write caching" as well as read caching. When caching hard disk writes (write caching isn't used on floppies), SMARTDRV doesn't actually write anything to the hard disk until the system is idle. Although the performance gains of write caching can be significant, the speed comes at a cost: safety. If the system goes down before SMARTDRV has had a chance to write back all of the data in its buffer, you could lose data—potentially with catastrophic results.

If you are using SMARTDRV (or any other caching software) with write caching, be sure to always properly exit all application programs and pause at the DOS prompt for several seconds before shutting off your computer.

You can tell if SMARTDRV is write caching on your system by typing SMARTDRV/S [Enter] from a DOS prompt, and, assuming that SMARTDRV.EXE is on your path, the program will list all of the drives in your system that are read and/or write cached.

Contributed by Todd Denlinger, systems analyst of Positive Systems, Incorporated.

Network File Updates

Q - How do software packages on the network handle updates when two people update the same file at once?

A - There are two major techniques used by manufacturers to control updates: file locking and record locking. Software that allows record locking is the most flexible and the most sophisticated. Two or more users can be in the same database or file and update different records concurrently. If he or she tries to update the same record, the slower accessor is either locked out or told he/she has a non-current version of the record. The user is then asked to refresh the record before proceeding with his or her update.

Software that allows file locking is more common and can work two different ways. In the first scenario, if two or more persons try to retrieve the same file for update, the software will allow the first person to update the file and send a message to the second to try later, the file is in use. In the second scenario, both persons can retrieve and update the file, but the second person is not able to save it because the file no longer matches what was retrieved. Both ways result in wasted staff time, either in lost updates or inaccessibility to data.

Each software package may vary slightly on the above techniques. You may want to set up a test to find out how your package handles updates. Set up a few "dueling employees" and document the results. Advise staff to avoid situations which may jeopardize productivity and data.

Contributed by Sandra Lynn Smith, CPA.

Do you have questions on information technology? Qs&As is designed to provide a forum for IT members to raise questions relating to technology. Send your questions to:

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Gadget of the Quarter— Wireless Mouse

*Contributed by Michael Harnish, CPA,
Crowe, Chizek & Co.*

OK, now you have arrived at the latest in presentation capabilities: You are using your computer and sending the image to an LCD projection panel sitting on top of an overhead projector. You have incorporated motion, flashy transitions, and dazzling color schemes, and set up your wireless microphone. Everything is perfect, right?? WRONG! Just where do you go with that wireless microphone when you are tied to having to operate the mouse or click the mouse button to proceed in the presentation?

What you need is a wireless mouse! There are various companies that offer wireless mice (e.g., AirMouse™ from AirMouse Remote

Controls) or infrared wands (e.g., Cyclops from Proxima). Each of

them works by bouncing an infrared beam off of the screen and into a special receptor unit. They can start in price around \$200 and go up to more than \$700.

They are not cheap and they take a bit of getting used to, but they can really add that last bit of capability and effect to your presentation.

IT

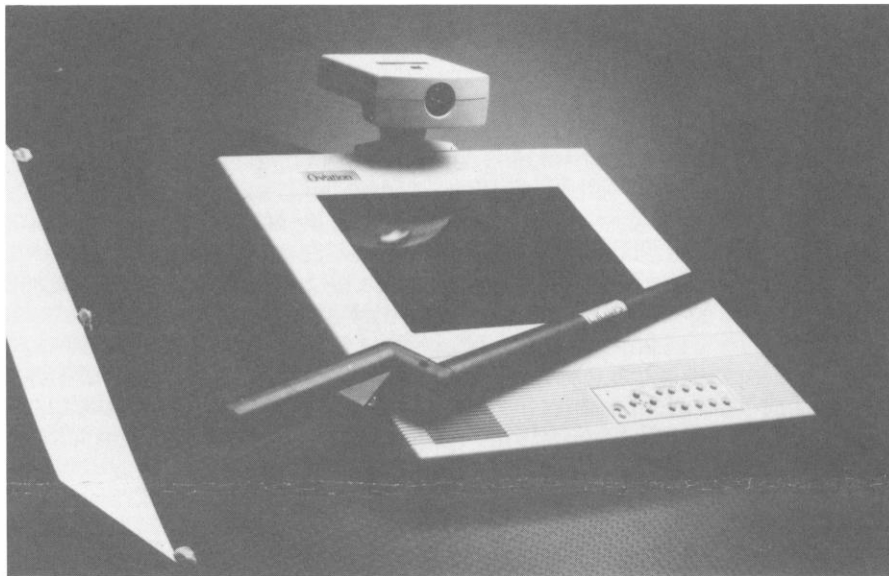


Photo provided by Proxima Corporation

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