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   Information Services Opportunities and Trends, 1995-2000
   Process Manufacturing (MVP5)

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III

Information Services Market Forecast

A
Market Overview

The market for information services in the process manufacturing sector is expected to continue to have healthy growth through 2000. The analysis in this chapter is presented for seven product and service groups. They are:

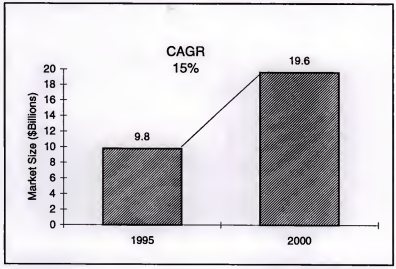
- Applications software products
- Network services
- Processing services
- Professional services
- Systems integration
- Outsourcing
- Turnkey systems

As shown in Exhibit III-1, the total market for these services is forecast at $9.8 billion in 1995 (a 14% growth over 1994), expanding to $19.6 billion in 2000, for a compound annual growth rate (CAGR) of 15%.

INPUT anticipates increased growth rates during the latter part of the forecast period as IS functions continue to automate business transactions, keeping pace with changes to company infrastructures. As manufacturers continue to reengineer their businesses in the drive to TQM, information systems must and will change.

Exhibit III-1

Information Services Market, 1995-2000



Source: INPUT

1. Driving Forces

Company Restructuring and Reengineering - The reengineering of business processes is driving demand for information services in this sector. As companies restructure, the information systems function within a process manufacturing company must respond with new techniques for providing immediate and accurate decision-making information. As traditional hierarchies are flattened and the focused-cell teams become cross-functionally self-sufficient, many support functions are migrating to line roles. The move to client/server environments is compatible with this new structure.

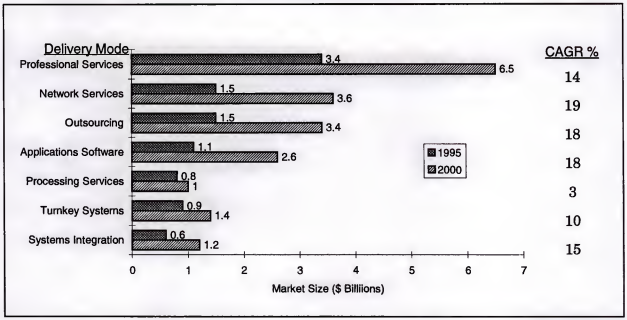
Transaction Analysis - As discussed in Chapter II, process manufacturers who depend on retail transactions for revenue are discovering an astonishing payoff from analysis of these transactions. The yield is in several areas (using the drug industry's prescriptions as an example).

- Increased sales based on analysis of who buys what and doctor preference patterns
- Shifting market share by interceding with the doctor when he prescribes a competitive product, but before the prescription is filled
- Cost containment by identifying wasteful drug prescription patterns

The very high payoff on these programs has led to major increases in the capital value of the information services vendors who can do the analysis.

Exhibit III-2

Market Size Forecast



Source: INPUT

C
Analysis

1. Professional Services

The largest category of information services expenditures is professional services. At just under $3.4 billion in 1995, and growing at 14% throughout the forecast period to $6.5 billion, it represents a substantial opportunity. INPUT expects IS consulting and software development to grow steadily, and education and training to accelerate slightly as manufacturers continue internal education efforts for new technologies such as client/server.

2. Network Services

Network applications and network management (outsourcing) are the two fastest growing market segments—a reflection of the growing importance of sophisticated telecommunications in this sector. EDI, the growing recognition of electronic commerce, and electronic filing of government reports are important facilitators.

The rate of growth is expected to accelerate from 17% to 19%, and expenditures to rise from $1.5 billion in 1995 to 3.6 billion in 2000.

Information Services Opportunities
and Trends, 1995-2000

Process Manufacturing

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- U.S. Federal Government
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  - Forecasts
  - Awards (FAIT)

Custom Projects

For Vendors—analyze:

- Market strategies and tactics
- Product/service opportunities
- Customer satisfaction levels
- Competitive positioning
- Acquisition targets

For Buyers—evaluate:

- Specific vendor capabilities
- Outsourcing options
- Systems plans
- Peer position

Other Services

Acquisition/partnership searches

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U.S. Information Services Market Analysis Program

Information Services Opportunities and Trends, 1995-2000

Process Manufacturing

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Abstract

This report examines the trends, events and issues that will have an impact on the process manufacturing industry and those vendors that supply information services to that market.

The document provides forecasts of the process manufacturing market for information services, for the period 1995 to 2000, for the following product/service categories: professional services, systems integration, outsourcing, processing services, network services, applications software products and turnkey systems.

Key topics discussed include: the industry's demand for immediate, accurate, integrated information; the impact of TQM and CIM on company structures; foreign competition; the effect of increased product life cycles; impacts of a return to profitability; ISO 9000 certification and de facto regulation; and the impact of these forces on information services and products. The analysis of technology trends and industry issues, together with other research, is used to project the growth in the telecommunications market for information services over the next five years—1995 to 2000.

The forecast update report contains 50 pages and 15 exhibits.

Table of Contents

Exhibits

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Introduction

This chapter identifies the purpose and scope of this report, notes the methodology used in its preparation, identifies the contents and organization, and offers an executive summary of key issues affecting information services expenditures in the process manufacturing market sector.

A
Purpose

The purpose of this report is to identify key opportunities and challenges for the users and providers of information services in the process sector of the manufacturing industry. INPUT's 1995 forecast for this sector is included.

B
Scope and Methodology

1. Scope

For the purposes of this report, the process manufacturing industry includes the following sub-industries: metal mining, coal mining, oil and gas extraction, mining/quarrying of nonmetalic minerals, food and kindred products, tobacco products, textile mill products, lumber and wood products (except furniture) paper and allied products, chemicals and allied products, petroleum refining and related industries, rubber and miscellaneous plastic products, stone/clay/glass and concrete products and primary metal industries. Specific SIC codes are contained in INPUT's *Definition of Terms.* A five-year forecast of the market for information services is provided, with detailed spending amounts for seven product/service categories. This report is a forecast update and provides five-year market data for both the 1994-1999 and 1995-2000 periods.

2. Research Methodology

Research - Much of the data on which this report is based have been gathered during 1994 and 1995 as part of INPUT's ongoing market analysis program. Trends, market sizes and growth rates are based upon INPUT research and in-depth interviews with users in the process manufacturing industry and the information services vendors serving the industry. INPUT maintains ongoing relationships with and a database of all users and vendors that it interviews. Interviewees for the research portion of this report were selected from this database of contacts.

INPUT Library - In addition, extensive use was made of INPUT's corporate library located in Mountain View, California. The resources in this library include on-line periodical databases, subscriptions to a broad range of computer and general business periodicals, continually updated files on over 3,000 information services vendors, and the most up-to-date U.S. Department of Commerce publications on industry statistics.

Financial Data - It must be noted that vendors may be unwilling to provide detailed revenue breakouts by product and service or industry. Also, vendors often use different categories of industries and industry segments, or view their services as falling into different product and service categories from those used by INPUT. Thus, INPUT must estimate revenues for these categories on a best-effort basis. For this reason, the product and service individual segment forecasts should be viewed as indicators of general patterns and trends rather than specific, detailed estimates for specific years.

Rounding - When displaying market forecast values in bar and column charts, INPUT rounds these amounts for ease of visual reference. Markets of $1 billion or more are rounded to the nearest $50 million; $100 million to $999 million to the nearest $10 million; and $50 to $99 million to the nearest $5 million. Actual values are shown in charts for markets of $49 million or less, in Appendix A tables, and in chapter text.

C
Contents and Organization

In addition to this introductory chapter, the report contains analyses of the information services market and competitive environment as described below:

- Chapter II, *Trends, Events and Issues*, discusses changes, market issues and activities, and competitive factors in the process manufacturing sector that can have an impact on the current and future use of information systems, including the impact of applications trends, environmental forces, new technologies and budgets for the U.S. process manufacturing market.

- Chapter III, *Information Services Market Forecast*, presents an analysis of the expenditures for information services, by product/service sector, for the U.S. process manufacturing market. This chapter also discusses key industry issues and considers the competitive positioning of major vendors. It identifies significant vendors by size and application area.

- Appendix A, which contains the forecast database, presents a detailed forecast, by product and service, for the process manufacturing vertical market. Also included is a reconciliation of the 1994 and 1999 market values (from the 1994-1999 process manufacturing forecast) with the 1995-2000 forecast.

- Appendix B offers profiles of selected leading vendors.

D
Executive Summary

We are witnessing the "discretizing" of process manufacturing, facilitated by information services.

Total quality management (TQM) practices, enterprise-wide coordination, and global competitiveness continue to cause the distinctions between discrete and process definitions to blur. The concepts of continuous flow, flexible manufacturing, process control, 100% quality, 100% service, reduced cycle times, and increased customer responsiveness require that managers blend the best of process and discrete practices. The implementation of these concepts indicates an increased use of automation and information services in the market; it also predicts a redirection of the marketing, development, and delivery practices for the vendors of such services. It is appropriate to note here that TQM measures *ALL* activities in a company in terms of a "process" environment.

1. Key Trends and Issues

Key trends and issues influencing the use of information services are noted below:

- There is a recognized need for immediate, accurate, integrated information availability. Networks, distributed computing, open systems, and relational databases offer those qualities for a reasonable return on investment.

- The implementation of TQM principles and computer-integrated manufacturing (CIM) elements is bringing about a new company structure, often referred to as business reengineering. The portions of that change considered in this report are:
  - Separation of the planning, execution and control functions, as those activities apply to achieving TQM objectives—often in smaller plant environments more responsive to customer requirements, yet defying traditional economies-of-scale concepts
  - Cellular structure and the team approach to continuous improvement
  - Outsourcing and building vendor relationships, both in information services delivery and partnering for manufacturing operations and the purchase of services and materials
  - The use of computers and information services to coordinate and promote the attainment of company goals, and the importance of new technologies as they apply to achieving the sought-after results
  - Availability of new enterprise-wide integrated management software that focuses corporate resources on customer needs and services. Suppliers includes SAP, BAAN, Oracle and Microsoft.
- The process manufacturing sector is being influenced by conflicting forces:
  - Foreign competition and new markets
  - Global needs and concerns with easier communication
  - Spill-over from the 1980s' merger and acquisition activity
  - The dramatic decrease in product life cycles
- All industries are predicted to grow at a comfortable rate through the forecast period, and personnel growth is projected at a slower rate than revenues.
- Profitability has returned for most companies, but there is still some uncertainty due to large company problems and restructuring costs.
- The regulatory environment will continue to be a major issue to most process industries. De facto self-regulation is appearing in the form of ISO 9000 certification as many U.S. manufacturers adopt the European quality standards.

- The proven new business practices inherent in TQM and CIM offer significant opportunities to process manufacturers. The elements necessary to achieve continuous-improvement tools and training are available, but it is not clear if they are fully understood; businesses are not investing fast enough to reap the benefits.

- Downsizing, especially to client/server systems, continues to be a particularly strong information product trend in this sector.

- Software vendors and systems integrators are scrambling to migrate their offerings to client/server and open systems technologies, a necessary move to compete in the current environment.

2. Information Services Market

The market for information services in the process manufacturing sector is expected to continue to have healthy growth through 2000. Total expenditures for information services is forecast at almost $9.8 billion in 1995 (a 14% growth over 1994), expanding to $19.7 billion in 2000, at a compound annual growth rate (CAGR) of 15%.

The reengineering of business processes is driving demand for information services in this sector. As companies restructure, the IS function within a manufacturing company must respond with new techniques for providing immediate and accurate decision-making information. The move to client/server environments is compatible with this new structure.

Strong competition among information service providers is aiding growth in the IS market. The market remains fragmented, with no single vendor dominating a category. At the same time, specialized vendors are entering the market and carving out their own niches.

Exhibit I-1 shows INPUT's forecast of expenditures and growth rates for each product and service category.

Professional Services represents the largest category of information services expenditures. At over $3.4 billion in 1995, and growing at 14% throughout the forecast period to almost $6.5 billion, it represents a substantial opportunity. INPUT expects IS consulting and software development to grow steadily, and education and training to accelerate slightly as manufacturers continue internal education efforts for new technologies such as client/server.

Network Services growth is a reflection of the growing importance of sophisticated telecommunications in this sector. EDI, the growing recognition of electronic commerce, and electronic filing of government reports are important drivers.

Outsourcing is divided into platform, applications and business operations, desktop services, and network management. Growth in this area is forecast at an 18% CAGR through 2000, from $1.5 billion in 1995 to almost $3.4 billion in 2000.

Applications Software, though growing at an 18% rate, has not enjoyed the same success in the process manufacturing sector as it has in discrete manufacturing.

Processing Services, at 3%, continues to be the slowest growing product/service category in the information services market, losing ground to more aggressive approaches tailored specifically to meet customer needs.

Turnkey Systems is expected to grow at 10%, fueled by the demand for applications software and professional services.

Systems Integration will grow at a CAGR of 15% during the forecast period as a result of increased demand for single-source responsibility on major IT projects. The professional services component of SI will grow the fastest.

3. The Role of the Internet

Process manufacturers have more to gain than those in other sectors from the transition to TQM/CIM.

The rush is on, and the Internet is being viewed as a source of low-cost networking services. The Internet is available now and can reduce the time required for corporate WAN usage.

EXHIBIT I-1

Process Manufacturing—1995 - 2000 Market Forecast

Product and Services	1995 ($M)	2000 ($M)	CAGR 1995 - 2000 (%)
Sector Total	9795	19625	15
Professional Services	3407	6490	14
Network Services	1526	3580	19
Outsourcing	1457	3354	18
Applications Software	1127	2629	18
Processing Services	840	978	3
Turnkey Systems	858	1413	10
Systems Integration	580	1181	15

Source: INPUT

4. Conclusions and Recommendations

Vendors who wish to achieve significant revenues in the process manufacturing sector will:

- Develop industry expertise and invest in industry training
- Target narrow market segments
- Acquire and develop alliances with niche vendors, and invest in improving their own products rather than re-inventing a successful offering
- Develop a sales approach that emphasizes the critical business needs of the customer, rather than the product features
- Focus sales people on selling value, not price
- Understand the concepts of business reengineering, total quality management, and value-added integration

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Trends, Events and Issues

This chapter presents the significant trends, events and issues affecting process manufacturers in the U.S. The conditions explored include the economy, the competitive picture, and the current business practices of re-structuring/reengineering and implementation of total quality management (TQM) principles.

As companies in the market continue to restructure, they are making greater use of available technology from information services (IS) vendors. Additionally, TQM implementation requires increases in automation, improved workflow, and immediate information movement and availability.

A
General Business Trends and Events

As documented by the U.S. Department of Commerce, economists and business journals, the U.S. economy ended 1994 on a high note—perhaps too high, from the Fed's viewpoint—with growth at approximately 4.6%. Because employment has also returned to an acceptable level, there is some concern that such strong growth increases the threat of inflation in 1995. However, January's gain in employment—134,000 people—was well below 1994's monthly average gain of 290,000. This decrease has generally been regarded by both economists and the financial markets as the first solid evidence of slower growth. Most economic observers now feel that growth should slow to around 2% by the third quarter of 1995, giving the American economy what some economists are calling a "soft landing." There is also general agreement that the economy seems to be in a mid-cycle slowdown, and that, long term, the risk of that slowdown becoming another period of recession in late 1995 is low.

From a financial markets viewpoint, in 1994 bond yields rose nearly 200 basis points, and the Federal Funds rate was up 250 basis points. In 1995, most market analysts expect the Fed rate to top out at 6.5%, bond yields to move sideways in the range of 7.5% to 8.0% and S&P 500 earnings to increase approximately 7%—an amount smaller than in 1994. In general,

most sectors of the U.S. economy should grow more slowly in 1995 than they did in 1994—the result of slight decreases in productivity and price/cost pressures. U.S. manufacturers are still restructuring, emphasizing cost-cutting and downsizing, and, coupled with the early-1995 weakness of the dollar (especially against the yen), world markets should find U.S. goods attractively priced. Imponderables remain the short-term impact of supports for Mexico's peso and trade disputes with China. Both situations have the potential for significant short-term volatility, but in the long run should have little effect on the U.S. economy's return to modest, steady growth. Inflation in 1995, as measured by the *Blue Chip* consensus of approximately 50 private-sector economists, is expected to be at a conservative 2.9%, growing slightly through the year 2000 to a maximum of 3.3% (1996 and 1997) and then declining to 3.0 % by the millennium.

The most encouraging sign of a healthy economy was seen recently in a statement by Federal Reserve vice chairman Alan Blinder, who noted on March 9 that "the U.S. economy is downshifting to a more sustainable growth rate." He agreed with Fed chairman Alan Greenspan that the Consumer Price Index probably overstates the rate of inflation by 0.5 to 1.5 percentage points, but did not indicate whether the Fed rates, which have been raised seven times since February 1994, would be increased again. Most economists and analysts believe that no further increases will be seen in 1995, unless there is a major change in the economy.

Overall, the outlook for the U.S. economy in 1995 is for controlled, steady growth in the 5.7% range, with inflation at about 3% and corporate after-tax profits at approximately 7%, down slightly from 1994's 10%.

According to the Department of Commerce, overall growth in the process manufacturing sector will keep pace with the growth of the U.S. economy in 1995. The basic industries of mining and crude petroleum and natural gas will grow faster than other industries in this sector.

B
Specific Industry Trends, Events and Issues

Initially, in the late 1980s, process manufacturers began to reengineer their business practices in order to fight foreign competition. Ultimately, they achieved more—they found themselves in "market leader" positions, and now other companies are championing "excellence."

Progress has been difficult because manufacturers have had to reengineer their business processes while implementing TQM. Those companies and/or industries that began the implementation of the new concepts early are now reaping the rewards.

The new principles are proven; they are being used and they are being implemented. For the buyers and sellers of information services, this is an extremely important trend. TQM has at its heart the use of automation and totally integrated information that is available immediately. Because of the new concepts, computer-integrated manufacturing (CIM) has become a reality in many companies. As workers become empowered, they are not only allowed to make decisions, they *must* make decisions. Immediate, complete and accurate information is required at all levels for decision making to be effective.

1. Reengineering the Manufacturing Company

Restructuring is continuing on a large scale throughout process manufacturing companies. Although it has many elements, the major factors are listed in Exhibit II-1.

Exhibit II-1

Elements of Reengineering

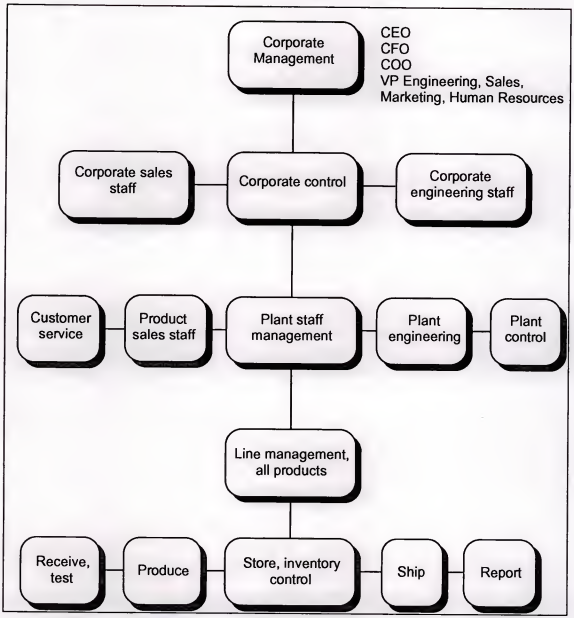
- Streamlining to focus on a company's area of expertise. Eli Lilly's 1994 decision to spin off its medical units and concentrate on pharmaceuticals is a good example of this kind of restructuring.
- Team assignments to perform complete operations, typically called "focused cells"
- Worker empowerment; moving decisions to the lowest level possible
- Continuous improvement in terms of:
  - Shortening all cycles in business operations
  - Working toward achieving 100% acceptable quality in all processes and products
  - Achieving 100% customer satisfaction
- Responsiveness to total market needs and individual customer needs

Source: INPUT

As shown in the 1994 report, the use of cellular concepts in manufacturing has brought positive change to the work environment. The old hierarchical structure is noted in Exhibit II-2. However, the old structure has given way to a new way of conducting business activity, as shown in Exhibit II-3.

Exhibit II-2

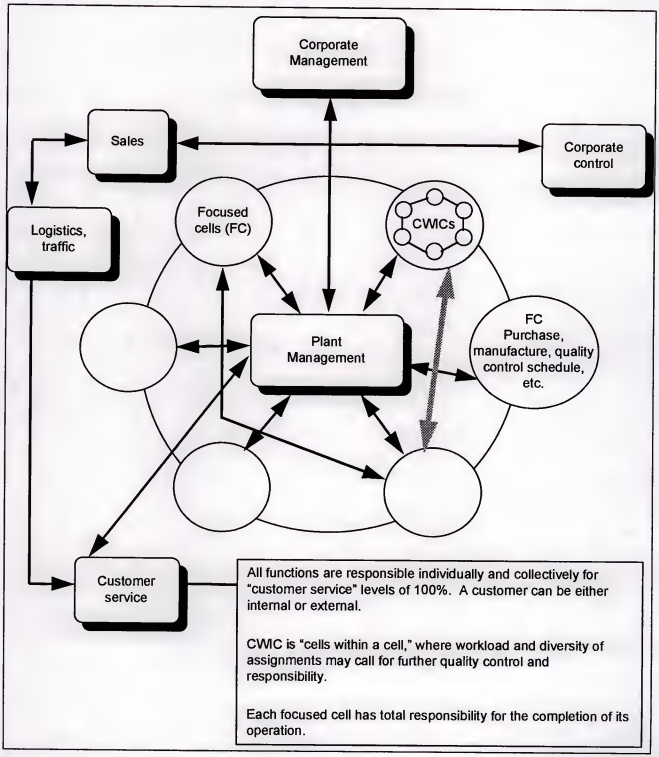
Old Hierarchical Structure



Source: INPUT

Exhibit II-3

Reengineered Structure



Source: INPUT

The new cellular structure leads to worker empowerment and accountability. With quality and service as the key watchwords, the ability to react must reside at the point of opportunity or problem.

As worker involvement and the team approach succeed, real benefits to companies are becoming evident in terms of continuous improvement. For instance:

- Product life cycles are shortening dramatically, and time to market for new products is keeping pace with the change. Most process companies are including plant engineering personnel in the product development teams to assure earlier delivery of new products.

- Order-receipt-to-shipping cycles have contracted rapidly. Large buyers and marketers are demanding the use of electronic data interchange (EDI) for ordering, acknowledgments, delivery schedules and even payments. Line-fill rates and hard delivery dates are increasingly common in purchase orders, particularly in consumer nondurables. Aside from better customer service, these improvements also offer financial benefits in terms of lower inventories and fewer returns.

- Quality improvement is often dramatic. Scrap is being reduced from the 3-5% range to less than 0.5%. This is particularly important in the process industries, whose raw materials usually cannot be eventually recovered for reuse.

- The cycle reductions and improved quality lead to higher customer satisfaction at the time of sale. The use of computers and automation to track production lots enables the manufacturer to provide better and quicker service after the sale, as well. Also, many of the process industries are *required* by statute to track and maintain production lots, i.e., foods, beverages, pharmaceuticals and chemicals.

- The improvements lead automatically toward satisfying total market and individual customer needs. Automation is aiding in this pursuit through the electronic interchange of data and through advanced network services, giving businesses a quick reaction capability. Exhibit II-4 shows key infrastructure applications that are helping process manufacturers better satisfy customer needs.

Exhibit II-4

Major Infrastructure Applications

- Computer-integrated manufacturing (CIM)
- Transmission of image data, CAD/CAM,
- EDI for purchasing and payments
- Low cost access to databases for information of all types
- Implementation of industry databases

Source: INPUT

As the restructuring has begun, a new phenomenon has occurred. Businesses have been able to streamline (or downsize) with a positive effect on overall performance. Operations that don't fit a company's normal practices are often outsourced. Product lines are being sold to implement more tightly focused corporate strategies. Professional services are being contracted out rather than requiring additional internal personnel. Middle management jobs are being eliminated. There are numerous reasons for all this:

- In the past, heavy taxes (50%) and high profitability made an employee's cost appear to be lower. With lower profits, extremely high benefits costs and lower tax rates, the picture has changed.

- The acquisition activities of the 1980s left many companies with too many diverse businesses, too much duplicated overhead, and heavy debt burdens (often causing losses simply due to interest charges). Streamlining and downsizing became necessary for survival.

- The commodity nature and low margins of most process products now mandate operation within the lowest possible cost structure. Most process businesses require heavy capital investment to enter a particular market; the key is to protect that investment and deter further market entrants.

These reengineering projects are leading to a re-emergence of the importance of computer-integrated manufacturing (CIM). The original attempts at implementing CIM were restricted to making computers talk to one another. Today's information needs to support the reengineered business call for true "information"-integrated manufacturing and service. Current technology for networking (local-area networks and client/server approaches), operating systems standards and relational databases are bringing true CIM closer to reality.

2. The Value of Timely and Complete Product Sales Data

Automation of claims processing is concentrating information in an accessible form never before available. For pharmaceutical firms, analysis of this transaction data is yielding significant marketing and selling information, building innovative competitive differentiation, and pinpointing cost containment steps that are reducing overall health costs.

a. Example: Drug Prescription Claims Processing

Prescription drugs are a key expense item in health care. This has been the first target for claims automation because the drug prescription delivery process is relatively simple, highly structured and involves just four parties: the patient, the doctor, the drugstore, and drug manufacturers/ wholesalers/distributors.

One of the companies that has led in the automation of drug prescription claims is PCS. Once a publicly owned division of McKesson Corp., as recently as three years ago PCS had a stock market value of $200-300 million. In 1994, Eli Lilly acquired PCS for an amount estimated at over $4 billion. How could such a tremendous valuation increase occur in such a short time?

Demonstrating that PCS was not an isolated incident, another drug prescription processor—Medco Containment, a mail order-oriented processor—was acquired by Merck in 1993 for about $6 billion. The third largest processor was sold for over $2 billion in 1994 and two smaller processors combined in early 1995 to form the fourth largest firm with a $1 billion valuation.

b. Value Justification

The high prices for these drug prescription automation companies are a direct result of high tangible benefits value created by processing the claims information for the benefit of drug manufacturers. The value-added benefits range from improvements in selling techniques to creation of strategies for improved market share. Major opportunities include:

- Improved Sales

Analysis of drug claims helps identify who buys what, doctor preferences, patterns and demographic information—all helpful to manufacturers in planning marketing and sales programs, advertising, emphasis, making doctor contacts, etc.

- Building Competitive Differentiators

Drug manufacturers who own drug claims processing divisions have found they can intercede in the prescription process by contacting doctors and

providing information (e.g., new information on side effects, etc.). This frequently causes the doctor to redirect prescriptions to the manufacturer's products and away from a competing company's products. This builds market share and competitive position relative to manufacturers that do not have this ability. This has yielded billions of dollars in incremental sales that were not available before.

- Cost Containment

Post-claims settlement processing of prescription information can yield significant data for improving treatment and reducing excessive drug usage. This responds to the government's attempts to reduce health care costs and improve the administration of drugs. It also places the manufacturer in a desirable position for winning competitive high-volume business with managed care providers such as HMOs.

- Strategy Implications

Longer term, knowledge that can be gained from the claims processing operation may yield information sufficient to allow drug companies and third-party processor companies to consider entering the health care maintenance and insurance businesses.

These are the critical reasons why the valuations of drug prescription claims processing companies skyrocketed over the last several years.

c. Impact

There is an impact on the long-range (five-year) processing services growth, and to the extent that drug manufacturers use third-party drug claims processing vendors (not in-house operations), such usage will slow the decline of the processing services market over the forecast period (in the process manufacturing sector) from less than 3% to the 3% noted in this year's compound annual growth rate (CAGR) projections.

3. Regulatory Issues/Events

Process manufacturers are heavily impacted by regulatory requirements. A variety of regulatory issues are involved, including the representative sample shown in Exhibit II-5 and discussed below.

Exhibit II-5

Regulatory Issues

Industry	Regulation
Chemical/Petroleum/Paper	EPA/Green Movement
Food/Beverage	FDA/NLEA 1990
Pharmaceutical	FDA/Electronic Filing

Source: INPUT

These industries in particular are affected by environmental regulations and the green movement. New regulatory requirements are constantly being introduced and modified. In the chemical industry, regulations support "right to know" requirements that provide information to the public. Material Safety Data Sheets (MSDSs) are required to provide information on every product for hazardous materials tracking. Companies face hefty fines if they are found to be out of compliance, so regulatory issues become a critical part of running these businesses. Much of the regulation relates to process safety measures that describe how to manufacture, how to train staff, and other safety-oriented concerns. Most process companies face constant EPA oversight on emissions into air and/or water.

For the food industry, different regulatory requirements and agencies are involved. A requirement of significant impact to this industry is the Food Labeling Law, introduced by the FDA and referred to as the Nutrition Labeling and Education Act (NLEA). Compliance with this regulation, which went into effect in 1994, is expected to cost the food industry $250 million to $350 million. There is concern that an overload on the FDA review process will result in a slowdown in getting products reviewed and a consequent delay in getting new products to market.

Many process manufacturers and information services vendors cited ISO 9000 as a key regulatory issue that will impact their ability to compete internationally. ISO 9000 will require companies that want to do business in Europe to obtain vendor certification. This will require detailed documentation of internal business processes. European customers will establish partnering arrangements and do business only with certified vendors.

Clearly, regulation can be a barrier to both global and domestic competition. This applies not only to the restrictions placed on companies by regulations, but also to the documentation required by government entities to provide proof of compliance. Advances in information technology at the PC/workstation level have allowed chemical companies to track waste and maintain Material Safety Data Sheet (MSDS) documentation. Electronic filing to the federal government in the pharmaceutical industry will require

companies to provide needed information on-line. The intent of this is to speed the approval process, allowing new drugs to be available for public consumption sooner. In the food industry, labeling software allows companies to rough out ingredients in new products and track changes, thereby reducing the need for chemical analysis.

The following quotation from *Law Magazine* (May, 1994) documents how a process manufacturer is responding to both reengineering and regulatory requirements and gaining competitive advantages in the process.

"Manufacturing plants are integrating their process control and business systems, as is illustrated by the example of one pulp fiber manufacturer. Process control systems handle such functions as managing shop floor production, materials usage and waste management. Conversely, business systems are used to perform product and resource management and handle marketing, financial and administrative functions. The manufacturing industry has started to link the two kinds of systems because of the impacts of government regulation and foreign competition and the need to contain costs and improve market position. For example, the Environmental Protection Agency will soon require that information on chemical products and safety procedures be available as close as possible to the site where the chemicals are being handled. Similarly, gaining ISO 9000 certification of products to be marketed internationally requires a complete genealogy of every product and universal access to that data."

4. Information Systems Issues

Exhibit II-6 shows responses to an INPUT survey question regarding key issues facing information systems organizations in the process manufacturing industry. The survey was conducted in late 1994; it included 133 interviews and addressed additional topics related to the process manufacturing industry.

Exhibit II-6

Major Information Systems Issues

Issue	Percentage of Responses
Migration to client/server	20%
Network integration	17%
Responsiveness	16%
Cost reduction	13%
Skills improvement	11%
Downsizing	10%
Standardization	8%
System upgrades	5%

Number of Responses: 133 *Source: INPUT*

Overall, the survey showed that as manufacturers reengineer their businesses away from the hierarchical model to focused cells (see Section B. 1), they must move the manufacturing information systems away from centralized mainframes toward work group-oriented systems and client/server architectures.

The data was coded into categories for analytical purposes, and a brief explanation of each category follows:

- "Migration to Client/Server" - Planning for, implementing or downsizing to client/server technology
- "Network Integration" - Network integration itself or the integration of applications across distributed networks
- "Responsiveness" - The ability of the systems environment to respond to changing application needs and end-user management requirements
- "Cost Reduction" - Downsizing or distribution of existing staff or general budget reductions within the information systems function
- "Skills Improvement" - "Re-tooling" in-house staff to deal with changing skill requirements brought on by new technology
- "Downsizing" - The need to deal with general downsizing of organizational structures in terms of the impact on systems
- "Standardization" - Improved connectivity, the portability of applications across multiple platforms and the adoption of common standards for workstation/PC and network interfaces

- "System Upgrades" - The need to upgrade existing systems to handle new requirements or increased capacity

Client/server and network integration issues top the concerns of respondents, accounting for nearly half of all responses. This reflects the movement of manufacturing information systems away from centralized mainframes toward work group-oriented systems and client/server architectures, as well as the distribution of applications and data across the organization.

This data provides a foundation for forecasting which information services process manufacturers will need most.

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III

Information Services Market Forecast

A
Market Overview

The market for information services in the process manufacturing sector is expected to continue to have healthy growth through 2000. The analysis in this chapter is presented for seven product and service groups. They are:

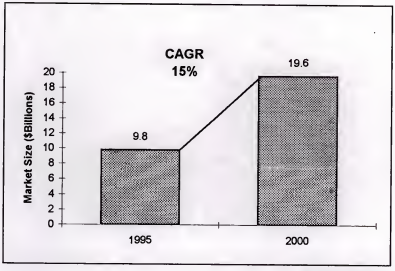
- Applications software products
- Network services
- Processing services
- Professional services
- Systems integration
- Outsourcing
- Turnkey systems

As shown in Exhibit III-1, the total market for these services is forecast at $9.8 billion in 1995 (a 14% growth over 1994), expanding to $19.6 billion in 2000, for a compound annual growth rate (CAGR) of 15%.

INPUT anticipates increased growth rates during the latter part of the forecast period as IS functions continue to automate business transactions, keeping pace with changes to company infrastructures. As manufacturers continue to reengineer their businesses in the drive to TQM, information systems must and will change.

Exhibit III-1

Information Services Market, 1995-2000



Source: INPUT

1. Driving Forces

Company Restructuring and Reengineering - The reengineering of business processes is driving demand for information services in this sector. As companies restructure, the information systems function within a process manufacturing company must respond with new techniques for providing immediate and accurate decision-making information. As traditional hierarchies are flattened and the focused-cell teams become cross-functionally self-sufficient, many support functions are migrating to line roles. The move to client/server environments is compatible with this new structure.

Transaction Analysis - As discussed in Chapter II, process manufacturers who depend on retail transactions for revenue are discovering an astonishing payoff from analysis of these transactions. The yield is in several areas (using the drug industry's prescriptions as an example).

- Increased sales based on analysis of who buys what and doctor preference patterns
- Shifting market share by interceding with the doctor when he prescribes a competitive product, but before the prescription is filled
- Cost containment by identifying wasteful drug prescription patterns

The very high payoff on these programs has led to major increases in the capital value of the information services vendors who can do the analysis.

Competition - Strong competition among vendors is aiding growth in the IS market. Marcam, Ross, Andersen, and Datalogix have all developed systems directed solely at this industry sector. CA/ASK and SSA have developed "off-shoot" hybrid systems to meet many process requirements. In each product and service category there are several strong competing vendors, and in general, no single vendor has gained dominance. In addition, highly specialized vendors are entering the market and carving out their own niches.

User Knowledge - The strong trend to client/server systems means that more users will be dealing with new systems. Users are being trained continuously in new methods of using information systems and are looking to the vendors to provide expertise. Training providers, including professional services firms, systems integrators and suppliers of turnkey systems, will all benefit.

2. Growth Inhibitors

Customization - Because open systems are not available across all applications, significant customization is still required to integrate new applications with existing ones. This slows both the implementation of systems and the realization of benefits. Although professional services vendors and systems integrators will benefit from such customization, total market expansion would occur more rapidly if there were less need for product modification. The allocation of dollars, by category, should change over the forecast period toward more product sales as open systems become available.

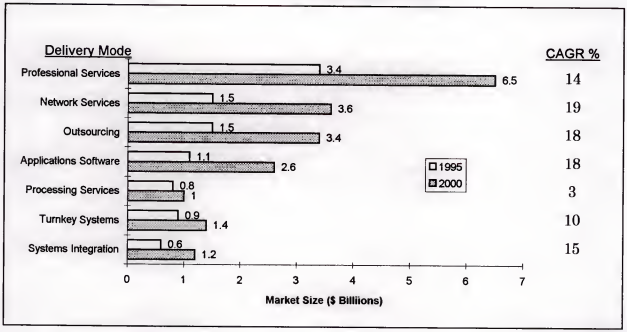
Wrong Vendor Focus - Product vendors' salespeople tend to focus on the features of their products, rather than the problems of the customer. A fundamental communications gap develops with vendors talking about product features and buyers trying to understand how all this helps them do their job. Third-party consultants are often hired to assist in the evaluations, adding another element to the decision process.

B
Forecast by Product and Service

Exhibit III-2 displays expenditures and growth rates by product and service category.

EXHIBIT III-2

Market Size Forecast



Source: INPUT

C
Analysis

1. Professional Services

The largest category of information services expenditures is professional services. At just under $3.4 billion in 1995, and growing at 14% throughout the forecast period to $6.5 billion, it represents a substantial opportunity. INPUT expects IS consulting and software development to grow steadily, and education and training to accelerate slightly as manufacturers continue internal education efforts for new technologies such as client/server.

2. Network Services

Network applications and network management (outsourcing) are the two fastest growing market segments—a reflection of the growing importance of sophisticated telecommunications in this sector. EDI, the growing recognition of electronic commerce, and electronic filing of government reports are important facilitators.

The rate of growth is expected to accelerate from 17% to 19%, and expenditures to rise from $1.5 billion in 1995 to 3.6 billion in 2000.

3. Outsourcing

Outsourcing is divided into platform, applications and business operations, desktop services, and network management. Growth in this area is forecast at an 18% CAGR through 2000, from $1.5 billion in 1995 to almost $3.4 billion in 2000.

INPUT's view is that client/server implementations and downsizing will create needs that can't be served in-house. Desktop services, specialized transaction processing and network management are expected to be the fastest growing components.

Process manufacturers are increasingly interested in outsourcing non-strategic EDP activities.

4. Applications Software

With mainframes increasingly being used as superservers in client/server systems, the decline in the use of mainframes for new applications is not occurring as rapidly as expected. INPUT expects expenditures to reach $2.6 billion in 2000, up from $1.1 billion in 1995.

5. Turnkey Systems

The growth of the equipment component of turnkey systems will decline as technology improvements drive costs down, but overall growth will continue at a steady 10%, fueled by the demand for applications software and professional services.

6. Systems Integration

Systems integration will grow at a CAGR of 15% during the forecast period as a result of increased demand for single-source responsibility on major IT projects. Manufacturers who are reengineering their businesses often find that they require specific knowledge in multiple disciplines, which is seldom available in-house. Consequently, the professional services component of SI will grow the fastest.

7. Processing Services

Growth in processing services will remain at 3% over the forecast period, but the expected decline in this growth (to less than 3%) is being offset by the increased use of marketing applications implemented in the drug and food manufacturing sectors (detailed in Chapter II).

D
Competitive Environment

Information services vendors serving the process manufacturing sector are briefly analyzed in this section. The section is divided into the following segments:

- Competitive Climate
- Participating Vendors
- Selected Vendor Profiles

1. Competitive Climate

Information services vendors in this market have shifted to delivering products that run in a UNIX environment with a relational data base and a graphical user interface. Although most of them can point to customer installations of such open systems, few have completed the process. The time and effort needed to develop new products is lengthening and product life cycles are shrinking.

In addition, vendors known primarily for their turnkey systems are shifting to become software companies that support multiple platforms.

The strategic focus for information systems projects continues to be integration, integration, integration. Systems vendors must offer systems that tie the whole enterprise together, moving from manufacturing resource planning (MRP) to enterprise-wide resource planning (ERP). Information systems and services vendors participating in this marketplace need to understand that systems decisions are being made in the context of business process reengineering.

2. Participating Vendors

Participating information services vendors, by product/service category, are noted below:

- Applications Software Vendors

As noted in last year's analysis, requirements for CAD applications to have both powerful software and high-performance graphics makes CAD/CAM one of the best uses of specialized open-design software and turnkey systems in process manufacturing. Although CAD/CAM was once the leading application product for turnkey systems in process manufacturing, there is a concerted move toward open systems that has unbundled CAD/CAM software from traditional platforms. Exhibit III-3 lists the leading applications

software vendors in process manufacturing. CAD/CAM software firms are not listed, as they are part of the INPUT report on cross-industry engineering applications. Cell controller vendors are listed because they have become an integral part of the reengineered business, and they have the ability to assist in the integration of plant devices with other business systems. Most process manufacturers have made extensive use of statistical process control (SPC) and automated product movement devices, and those devices can now be integrated more easily with the use of packaged products.

Exhibit III-3

Applications Software Vendors

- Computer Associates (ASK Products)
- BAAN International
- System Software Associates
- Marcam Corporation
- Oracle
- American Software
- SAP America

Source: INPUT

- Professional Services Vendors

Exhibit III-4 shows the major professional services vendors to the process manufacturing industry.

Exhibit III-4

Professional Services Vendors

- Analysts International
- Andersen Consulting
- Computer Sciences Corp.
- Computer Task Group
- Coopers & Lybrand
- EDS
- Ernst & Young
- IBM

Source: INPUT

Professional services vendors to this market are a diverse group, including Big 6 firms, subsidiaries of industrial firms, computer hardware makers, and vendors devoted solely to professional services.

The professional services market is the largest service mode in process manufacturing, and there are no vendors with a significant market share—the market is fragmented.

- Systems Integrators

The systems integration market is growing rapidly, and systems integration services offered to the process manufacturing market are characterized by increased competition and high margins of return. Successful vendors have knowledge of the key business issues in manufacturing and experience in implementing solutions in the industry. Exhibit III-5 lists the major systems integration vendors to the process manufacturing industry.

Exhibit III-5

Systems Integrators

- Andersen Consulting
- Computer Sciences Corp.
- Computer Task Group
- Coopers & Lybrand
- Deloitte Touche
- EDS
- KPMG Peat Marwick
- Price Waterhouse

Source: INPUT

- Outsourcing Vendors

This segment is also marked by an absence of clear leaders. Exhibit III-6 lists the larger outsourcing vendors in process manufacturing.

Exhibit III-6

Outsourcing Vendors

- Andersen Consulting
- Computer Sciences Corp.
- EDS
- IBM
- Litton Automation

Source: INPUT

Continued growth and effective alliance positioning have positioned each of these companies as strong competitors in the process manufacturing market.

3. Selected Vendor Profiles

The following vendor profiles are provided in Appendix B.

1. Computer Associates (ASK Products)
2. Marcam Corporation
3. QAD, Inc.
4. SAP America

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Market Forecast Database

A
Forecast Database

Exhibit A-1, on the following page, shows INPUT's 1995-2000 forecast for the process manufacturing sector.

B
Forecast Reconciliation

Exhibit A-2 offers the forecast reconciliation for the process manufacturing sector.

Differences between the 1994 and 1995 INPUT forecasts are as follows:

- The 1994 estimates for outsourcing were adjusted upward by 11% in the 1995 forecast, based on a continuous increase in new contracts, particularly for desktop services and network operations. This aggressive growth is reflected through 1999, resulting in an increase in the market size forecast for that year of 16%.

- Based on INPUT's continuing user surveys, the 1994 estimates for applications software were again adjusted upwards from $942 million in the 1994 report to $969 million in this report. Process manufacturers continue to look outside for application skills they lack in-house.

Exhibit A-1

Market Size by Product/Service Categories, 1994 - 2000

PRODUCT/SERVICE CATEGORIES	1994 ($M)	Growth 94-95 (%)	1995 ($M)	1996 ($M)	1997 ($M)	1998 ($M)	1999 ($M)	2000 ($M)	CAGR 95-00 (%)
INDUSTRY TOTAL	8568	14%	9795	11219	12869	14781	17027	19625	15%
Professional Services	2957	15%	3407	3897	4455	5068	5761	6490	14%
- IS Consulting	780	20%	936	1114	1314	1551	1815	2123	18%
- Education & Training	371	11%	412	457	512	573	648	739	12%
- Software Development	1806	14%	2059	2326	2629	2944	3298	3628	12%
Systems Integration	514	13%	580	675	774	879	1019	1181	15%
- Equipment	191	16%	222	256	292	330	384	447	15%
- Software Products	54	9%	59	68	77	86	102	121	15%
- Professional Services	245	11%	272	320	370	423	486	558	15%
- Other	24	13%	27	31	35	40	47	55	15%
Outsourcing	1234	18%	1457	1723	2038	2408	2845	3354	18%
- Platform Operations	349	11%	386	433	485	543	597	657	11%
- Applications Operations	502	19%	596	703	826	967	1131	1323	17%
- Desktop Services	151	20%	181	217	263	318	388	466	21%
- Network Management	131	29%	169	215	273	343	433	537	26%
- App. Management	56	20%	67	81	97	116	139	167	20%
- Business Operations	45	29%	58	74	94	121	157	204	29%
Processing Services	810	4%	840	871	900	929	955	978	3%
- Transaction Processing	810	4%	840	871	900	929	955	978	3%
Network Services	1305	17%	1526	1782	2100	2502	2975	3580	19%
- Elec. Information Svcs	1080	15%	1242	1425	1647	1922	2240	2650	16%
- Network Applications	225	26%	284	357	453	580	735	930	27%
Applications Software	969	16%	1127	1321	1555	1840	2190	2629	18%
- Mainframe	216	6%	229	244	260	277	297	320	7%
- Minicomputer	308	13%	349	396	449	509	575	655	13%
- Workstation/PC	445	23%	549	681	846	1054	1318	1654	25%
Turnkey Systems	779	10%	858	950	1047	1155	1282	1413	10%
- Equipment	370	10%	406	442	482	525	572	624	9%
- Software Products	281	10%	310	348	385	427	480	533	11%
- Professional Services	128	11%	142	160	180	203	230	256	13%

Exhibit A-2

1995 MAP Database Reconciliation

PRODUCT/SERVICE CATEGORIES	1994 Market				1999 Market				94-99 CAGR per data '94 Rpt	94-99 CAGR per data '95 Rpt
	1994 Market (Forecast) ($M)	1995 Report (Actual) ($M)	Variance From 1994 Forecast ($M)	(%)	1994 Market (Forecast) ($M)	1995 Report (Forecast) ($M)	Variance From 1994 Forecast ($M)	(%)	(%)	(%)
Total	8356	8568	212	3%	16447	17027	580	4%	15%	15%
Professional Services	2936	2957	21	1%	5856	5761	-95	-2%	15%	14%
Systems Integration	505	514	9	2%	1019	1019	0	0%	15%	15%
Outsourcing	1107	1234	127	11%	2456	2845	389	16%	17%	18%
Processing Services	817	810	-7	-1%	960	955	-5	-1%	3%	3%
Network Services	1281	1305	24	2%	2780	2975	195	7%	17%	18%
Applications Software	942	969	27	3%	2114	2190	76	4%	18%	18%
Turnkey Systems	768	779	11	1%	1262	1282	20	2%	10%	10%

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Selected Vendor Profiles

Following are brief profiles of a representative selection of information services vendors to the process mAnufacturing industry. A more comprehensive selection of detailed (10-12 pages) vendor profiles is available from INPUT's Vendor Analysis Program.

1. Computer Associates (ASK Products)

2880 Scott Blvd.
Santa Clara, CA 95052
Phone: (408) 562-8800

Status: Products of Computer Associates
Total Employees: 2,300 (est.)
Total Revenue: $400 million (est.)
FYE: 6/30/94

a. Company Description

Computer Associates (CA) develops, markets, and supports manufacturing and financial management applications for HP, DEC, IBM midrange, and UNIX-based computers, which are available as software products or turnkey systems, and via processing services. As a result of the acquisition of Ingres Corporation, CA also provides relational database management systems (RDBMSs) and application development tools for open systems.

b. Strategy

CA has pursued a strategy of diversification through the development and acquisition of core software technologies, intelligent relational databases, fourth-generation language (4GL) development environments, application development tools, and open application products, in addition to its traditional manufacturing and financial management applications products for Hewlett-Packard (HP), DEC and IBM midrange systems.

The company's development plans include moving its applications to an open systems environment with its software operating on all the major hardware platforms.

The company is also concentrating on selling software and services, and continues to de-emphasize low-margin third-party hardware sales. Marketing is focused on expanding both direct and indirect channels of distribution. The company's strategy is to sell directly only when it adds value, and in all other cases to leverage sales through VARs, system integrators and distributors.

c. Products and Services

Database and Connectivity - These products include the CA INGRES Intelligent Database, Knowledge Management, Replicator, Enhanced Security, Net, Star and Gateway products for Intel-based, DEC, HP, Sun Microsystems and IBM computers, minicomputers, workstations and PCs running proprietary and UNIX operating systems. In addition, Ingres products have been ported to operate with a range of computers from other computer system companies.

Applications - The CA MANMAN Information System is an on-line, interactive system that consists of integrated products for manufacturing, finance, marketing, customer service, decision support, and computer-integrated manufacturing functions. There are currently over 2,000 MANMAN clients worldwide. The products run on HP, DEC and UNIX systems.

CA SIM/400 supports manufacturing, accounting, bar code, distributed requirements planning (DRP), sales order management, multiple CPU distributed requirements planning, and EDI functions.

Tools - The tools products allow customers and systems integrators to adapt the manufacturing products to specific needs. They include Windows4GL and Vision, as well as query and reporting tools and imbedded languages.

d. Key Issues

- CA continues to de-emphasize its hardware reselling activities and focus on its software and services business. Prior to the 1990 acquisition of Ingres, about 80% of its revenue was from the U.S. and hardware resales accounted for more than 50% of total business. Now, over half of revenue comes from international markets and more than 75% is from software licenses and services.

- The company has expanded its client base to include not only manufacturing customers, but also customers in international banking,

government, transportation, telecommunications, advanced research and retail.

- Sales slowed in 1993-1994 and ASK began to suffer cash flow and customer credibility problems. As a result, Computer Associates acquired ASK in 1994.

- ASK attributed its problems to being slow to move its flagship manufacturing products away from proprietary operating systems for DEC/VAX, HP-3000 and IBM AS/400 computers. The company shipped 100 licenses of UNIX-based ASK MANMAN/X in 1993.

- Can ASK be turned around?

2. Marcam Corporation

95 Wells Avenue
Newton, MA 02159
Phone: (617) 965-0220

CEO: Paul Margolis
Status: Public
Total Revenues: $173 million
Total Employees: 965
FYE: 9/30/94

a. Company Strategy

Marcam is one of the few applications software companies focusing on process manufacturing. Marcam recognized the unique manufacturing requirements of the process industries, and the lack of software systems designed exclusively for these industries. To meet those needs, the company developed and currently markets PRISM, an integrated manufacturing, financial, logistics, and cost accounting software product. Marcam worked very closely with more than 50 process manufacturers, many of which are among the Fortune 100, to develop the product. Marcam also provides implementation support, custom programming and systems integration services for a total process manufacturing solution. As a result, the company has gained a good deal of respect from the process manufacturing industries and is recognized as understanding the specific problems that exist within those industries. The company has cultivated this image, and is reaping the rewards of being a vendor with a very close relationship to process manufacturing.

In April 1995, Marcam announced it would form a strategic and technology partnership with NEC in Japan.

b. Company Background

Marcam was founded in 1980 as an applications software company. It distributed and provided add-on products and consulting services to MAPICS, IBM's manufacturing system for midrange computers, prior to developing the PRISM product. In April 1991, Marcam acquired ShawWare Incorporated of Burlington (Ontario, Canada), adding six modules to PRISM.

In late 1992, Marcam purchased the rights to IBM's MAPICS, giving it a large customer base. That moved Marcam into the discrete manufacturing market for the first time, and one challenge will be to keep its attention on its primary domain, the process market. Marcam has also purchased Varnet, a small MRPII-type vendor, giving it access to a product and expertise in the UNIX, 4GL and RDBMS environments. The company announced its Object Technology Initiative in 1994, which will enable it to provide custom-configured application components to its customers.

c. Products and Services

The PRISM product family, introduced in 1986, includes an integrated planning and control software system targeted to process manufacturers. The software is designed for IBM AS/400, IBM System/38 and IBM PCs and compatible systems. Marcam has licensed over 3,600 PRISM modules for use at more than 650 sites worldwide. PRISM consists of 28 announced modules that are organized into four product lines—Production Series, Logistic Series, Maintenance Management Series, and Financial Series—as well as common functions or enablers.

3. QAD, Inc.

QAD, Inc.
6450 Via Real
Carpinteria, CA 93013
Phone: (805) 684-6614

President: Pamlea Lopker
Status: Private
Total Employees: 450
Total Revenue: $84,000,000
FYE: 12/31/94

a. Company Description

QAD, Inc., founded in 1979, develops, markets, and supports integrated manufacturing, distribution and financial applications software. The company's flagship product, MFG/PRO™, is targeted to discrete and process manufacturing environments.

In addition to its headquarters near Santa Barbara, California, QAD has direct sales/support offices in Atlanta, (GA); Boston, (MA); Chicago, (IL); Dallas and Houston, (TX); Grand Rapids, (MI); Los Angeles, and San Jose, (CA); Mt. Laurel, (NJ); Phoenix, (AZ); Portland, (OR); and Toronto (Ontario, Canada).

In Europe, the company has direct sales/support offices in Amsterdam, Berlin, London and Paris, and distributors in 14 countries.

In the Asia/Pacific region, the company has direct sales/support offices in Hong Kong, Sydney and Melbourne, and distributors in 10 countries.

A Japanese subsidiary was established in 1994.

One hundred percent of QAD's revenues are from manufacturing, both discrete and process, with 90% coming from applications software licenses and the remainder from associated professional services. Approximately 55% of the company's business is in North America, 30% in Europe and 15% in the Asia/Pacific region.

b. Strategy

QAD's principal strategic focus is the penetration of international markets utilizing a product set that was designed with an open systems architecture. This open design has given QAD a lead over competitors that are still investing heavily in reengineering their products.

QAD differentiates itself from its larger competitors by emphasizing the strength of its manufacturing modules, as well as its open system design. The company emphasizes its capability to manage the entire "supply chain": from customer demand, back through to shipping, manufacturing, receipt of materials and purchasing.

Because its products run on such a wide variety of hardware platforms, it can offer the customer the lowest total price by tailoring the network to fit the situation exactly.

The company concentrates on three industry groups: automotive; electrical and industrial products; and consumer packaged goods, specifically food and beverages, health and beauty aids, and medical/pharmaceutical products.

c. Products and Services

MFG/PRO is an integrated manufacturing, distribution and financial software product that addresses the entire process manufacturing spectrum, from repetitive to configure-to-order. Key features of the product are:

- MFG/PRO is written using the PROGRESS fourth-generation language and relational database system, and has a built-in report writer to facilitate customization. It runs on all operating systems and platforms supported by PROGRESS, which include UNIX, HP-UX, UTLRIX, VMS AND MS-DOS on over 400 hardware platforms.

- The product has multi-site, multinational, multicurrency and multi-language capabilities and supports repetitive, make-to-stock and configure-to-order manufacturing environments, as well as process and batch-process environments.

d. Key Issues

During 1993, the company released version 7 of MFG/PRO, which features a distributed database and a release management system. It continues to do well.

Though lacking the resources of publicly held competitors such as SAP, SSA and ASK, QAD, inc continues to grow at over 45% per year.

The company is increasing its emphasis on strategic relationships with CAP Gemini and Origin, as well as numerous national and regional firms around the world.

4. SAP America

International Court One
100 Stevens Drive, Suite 350
Lester, PA 19113
(215) 521-4500

President: Klaus Besier
Wholly Owned Subsidiary of SAP AG
Total Employees: 600 (est.) and contract support
Total Revenue: $367,000,000; SAP AG: $1,130,000,000
FYE: 12/31/94

a. Company Background

- SAP AG was founded in 1972 in Walldorf (Germany) by four former IBM engineers.

- In 1985, SAP International was formed in Biel (Switzerland) to support the marketing and sales activities of SAP AG's international subsidiaries. SAP International's operations were consolidated into SAP AG's headquarters in Walldorf in April 1992.

- SAP AG currently has over 3,800 employees and more than 3,200 customers in 36 countries.

b. Strategy

SAP's challenges are to expand its international coverage and customer base; exploit opportunities in eastern Europe; and at the same time to extend market coverage to small and medium-sized organizations in North America and Western Europe.

To address the needs of large and midsize corporations that require integrated applications systems using an open systems, client/server strategy, SAP introduced the R/3 System, with first deliveries to North American customers in September 1992.

Like the R/2 System, the R/3 System provides a range of on-line, real-time, integrated business applications. Also like R/2, R/3 customers can address specific applications needs while laying the foundation for a single, enterprise-wide strategy.

The delivery of R/3 to North America was ahead of SAP's announced schedule and well ahead of major competitors such as System Software Associates and ASK. In 1994 and early 1995, R/.3 continued to be well received.

c. Products and Services

The R/3 System is an integrated set of ten business applications modules that manage a range of strategic business applications for data-intensive corporations with numerous locations and operations.

- The core of the R/3 System is the Basis System, which contains development tools for the system and provides interface capabilities that allow users to access database information in any module from anywhere in the company.
- R/3 System modules include:
  - RF: Financial Accounting
  - FA: Fixed Assets
  - RK: Cost Accounting
  - RK-P: Project Planning and Control
  - RV: Sales-RM-PPS: Production Planning and Control
  - RM-MAT: Material Management

- RM-QSS: Quality Assurance
- RM-INST: Plant Maintenance
- RP: Personnel Management

- Modules are available and priced separately. Pricing on the Basis System starts at $100,000, depending on configuration.

d. Key Issues

- SAP America has strategic alliances and relationships with professional services firms and systems integrators that augment its sales and support efforts in the U.S. SAP Alliance partners include Andersen Consulting, CAP Gemini America, Computer Task Group, Coopers & Lybrand, Deloitte Touche, Ernst & Young, KPMG, Price Waterhouse and SHL Systemhouse.

- Despite its relatively recent introduction, the R/3 System accounted for more than 80% of the company's 1993 North American revenues.