October, 1993

Dear Colleague:

Attached is the Information Services Market Analysis Program's latest report on the *Utilities Sector.* It provides a current assessment of the events and issues driving this marketplace, and offers INPUT's forecast of the market size for information services for the period 1993-1998.

This report should be filed with INPUT's other *U.S. Information Services Market Analysis Program* reports, behind the tab marked *Utilities*. Your INPUT program binders, together with the delivery mode reports, provide a total assessment of the United States market for information services.

Market Analysis Program industry and cross-industry sector reports are prepared annually, and may be in one of two forms. The expanded reports, such as this *Utilities Sector Report*, contain a detailed industry analysis and supporting forecast data. It will typically be 40-50 pages in length. The forecast update will be a short report, providing a new forecast and summary data to support forecast assumptions. It will generally be 15-20 pages in length. Normally, for each industry and cross-industry market segment, full reports will be produced every other year, with summary reports prepared in the intervening years. The intent of this new format is to recognize the value of our clients' time, and provide concise statements of industry activity, supported by rigorous business, technical and competitive analysis, and a five-year industry forecast.

I am certain that you will find the *Utilities Sector* report to be both informative and useful, and welcome any comments that you have on this document, or any of INPUT's publications.

Sincerely,

Bob Goodwin

Robert L. Goodwin
Manager
Information Services Market Analysis Program

Enc.

VERTICAL MARKET ANALYSIS

UTILITIES
1993-1998

U.S. Information Services
Market Analysis Program

OCTOBER 1993

UTILITIES

INFORMATION SERVICES OPPORTUNITIES & TRENDS

1993-1998

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Information Services Market Analysis Program
(MAP)

Utilities

Information Services Opportunities & Trends 1993-1998

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Introduction

A
Purpose, Organization, and Methodology

This section identifies the purpose and scope of this report, notes how the document is organized, and explains INPUT's research methodology and the techniques used in the preparation of forecast data.

1. Purpose

The purpose of this forecast report is to identify key changes in the market for information services in the utilities industry and to provide the 1993 INPUT forecast for this market sector.

Sector Definition—The utilities sector, as defined by INPUT, includes:

- Electric utilities that can be investor-owned, cooperatives, municipally-owned, federally owned, or state power districts.
- Gas utilities that consist of pipelines (transmission) and distribution (local) companies, some municipal.
- Water/sewage/waste disposal utilities that can be publicly, municipally, or privately owned.

2. 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, activities, and competitive factors in the utilities sector that can impact the current and future use of information services.

- Chapter III, *Information Systems*, notes how the utilities sector organizes and uses information technology, and identifies both key technologies and the major trends in the use of information systems. Key applications and the use of outside products and services are also considered.

- Chapter IV, *Information Services Market Forecast*, presents an analysis of the expenditures for information services, by delivery mode and submode, for the U.S. utilities market.

- Chapter V, *Vendor Competition*, discusses key industry issues and considers the competitive positioning of major vendors. It also identifies significant vendors by size and application area and offers profiles of a selection of leading vendors.

- Chapter VI, *Conclusions and Recommendations*, offers suggestions and recommendations for participants in the utilities market.

- Appendix A, the *Forecast Data Base*, presents a detailed forecast for the utilities vertical market, by information services, delivery mode, and submode.

- Appendix B, *Forecast Reconciliation*, provides a reconciliation to the previous forecast.

3. Methodology

Much of the data on which this report is based was gathered during the first half of 1993 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 utilities industry and the IS vendors serving the industry. INPUT maintains ongoing relationships with, and a data base of, all users and vendors interviewed. Interviewees for the research portion of this report were selected from this data base 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 data bases, 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 information by delivery mode or industry. Also, vendors often use different categories of industries and industry segments, or view their services as falling into different delivery modes from those used by INPUT. Thus, INPUT must estimate revenues for these categories on a best-effort basis. For this reason, the delivery mode

and individual segment forecasts should be viewed as indicators of general patterns and trends rather than specific, detailed estimates for individual years.

Rounding—The values used in many of the exhibits contained in this report have been rounded for ease of reference. User expenditures for all information services categories are detailed, to the nearest $1 million, in Appendix A, the *Forecast Data Base.*

B
General Business Trends

As noted in the Economic Assumptions section of the Department of Commerce's 1993 U.S. Industrial Outlook, U.S. economic growth in 1992 was somewhat less than what was forecast in the prior year. The very slow recovery seen at the end of 1991 continued into 1992, with unemployment remaining at undesirably high levels—a condition fueled primarily by corporate restructuring and defense industry cutbacks. Even though retail sales were encouragingly high during the 1992 Christmas season, business expenditures continued to remain low due to both an ongoing desire to reduce costs and improve profits, and uncertainty as to the precise nature of any economic (primarily tax) reforms that would be proposed by the new Clinton Administration.

In 1992, the major burden for implementing economic policy fell on the Federal Reserve, a strategy that caused the Fed to steadily reduce the federal funds rate from 8% in June of 1990 to 3% in September of 1992, forcing a general reduction in all interest rates to the lowest levels in years.

The outlook for 1993 is cautiously optimistic, with many of the uncertainties tied to the new adminsitration's attempts to reduce the budget deficit while, at the same time, stimulating a still sluggish economy. At this time, messages remain mixed, with proposed corporate taxes favoring small businesses and those who make capital investments, and penalizing larger corporations, especially services firms, through a 2% increase in the top corporate tax rate from 34% in 1992 to 36% in 1993. Personal income will be reduced by a proposed increase in income taxes averaging 3% for middle income families, and 5% for those in the highest income categories. All taxpayers, business and individual, will also experience higher energy costs due to proposed new energy taxes. Many critics of the administration's proposals fear the new taxes risk slowing the economy just when it has started to show some healthy growth. There is a general wait-and-see attitude to determine how successfully the proposals survive the conflicting agendas of the congressional process.

INPUT uses the Blue Chip Consensus (economic) report and various other sources (Federal Reserve, IMF) to identify anticipated economic growth trends and incorporate GDP assumptions in industry and delivery mode financial forecasts. Economic growth in 1992 had a very slight movement upwards, but the 3% growth in GDP anticipated for that year is now forecast for 1993. This modest 3% growth resulted from the pressures placed upon the defense industry, tax uncertainties, a weak commercial real estate market, high federal debt, slow growth in the labor force, cautious financial institution lending policies, and the growing economic interdependence of industrialized nations. Balancing these growth inhibitors are the health gains in corporate profits noted in 1992 and a pattern of increased consumer spending.

In summary, U.S. economic fundamentals strengthened in 1992, establishing a foundation for the modest but steady 3% growth predicted for 1993.

C
Related Reports

In addition to this market-specific report, the reader may also be interested in other, related INPUT reports that address other vertical markets, specific delivery mode markets, and the U.S. and worldwide markets for information services. Such reports would include the following INPUT publications:

- *U.S. Processing Services Market, 1992-1997*
- *U.S. Professional Services Market, 1992-1997*
- *U.S. Network Services Market, 1992-1997*
- *U.S. Applications Software/Turnkey Systems Market, 1992-1997*
- *U.S. Systems Integration and Outsourcing Markets, 1992-1997*
- *Worldwide Information Services Forecast, 1992-1997*

II

Trends, Events, and Issues

This chapter notes the trends, events, and issues that are affecting the utilities industry and driving the use of information services.

A
Trends and Events

Exhibit II-1 summarizes the major trends affecting the utility industry.

EXHIBIT II-1

Utilities

Key Utilities Trends

- Supply/demand uncertanties
- Re-regulation
- Increasing competition
- Cost containment

1. Supply and Demand Uncertainties

Current estimates continue to indicate an annual growth of about 2% in electric demand for the remainder of the 1990s. Will enough generation capacity be in place to meet this demand? It appears so. Net generating capacity is forecasted to grow by 58,625 megawatts by 2001 from the current 742,733 megawatts. Transmission capacity, critical in an era of anticipated wholesale wheeling, will experience a 10% increase over the current 192,000 mi. in the U.S. and Canada. Both figures seem appropriate to the forecasted demand, but many uncertainties remain on both sides of the supply/demand equation.

Gas demand, relatively flat in recent years, is expected to accelerate, particularly in the light of a pro gas administration in Washington. Gas continues to be the preferred fuel used to generate electricity. In fact, of the new generation resources planned by 2001, 66% will be gas turbines. Gas supply fluctuates with demand. Thus, increasing demand provides increased incentives to produce more gas.

2. Regulatory Environment

The federal government is attempting to create a competitive environment for electric utilities, much as it has for gas. In addition, 50 different state Public Utilities Commissions (PUCs) micro manage the rate structures and business decisions of utilities, leaving utilities caught in the middle.

a. Climate of Deregulation

Utilities have followed the deregulation path of the airline and telephone industries. Basically, the gas pipeline industry has been deregulated. Order 366, issued by the Federal Energy Regulatory Committee, (FERC) in 1992, separated gas sales services from transportation services, making pipelines common carriers. Further steps to deregulate electric utilities were part of the National Energy Policy Act (NEPA) of 1992 that was also aimed at reducing consumption and promoting alternate fuels.

At the distribution level, as in the telephone industry, deregulation, and hence competition, is more difficult to achieve. This is an area where a natural monopoly occurs, caused by the poor economics of having telephone and electric lines—or gas, water, or sewer pipes side by side. At the distribution level, it is more logical to look for "re-regulation" rather than deregulation, implying a tightening rather than a loosening of state government oversight.

The Clean Air Act Amendments of 1990 are beginning to "kick in" and by 1995 will affect 111 coal-fired plants (with an additional 700 by the year 2000). Utilities have also begun to buy and sell emission allowances through the Chicago Board of Trade, thereby putting a specific economic value on environmental costs. Environmental concerns vary by region and have weakened the traditional camaraderie among utilities by dividing them along lines of self-interest.

b. Consumerism and the Public Utilities Commissions (PUCs)

Although technically representing consumer and utility interests, most PUCs (many of which are elective) tend to side with consumers' short-term interests. Utilities try to maintain positive public relations to help assure a cooperative PUC and thus spend a great deal of executive time with the PUC.

c. Bureaucratic Implications

The regulatory fishbowl that utilities operate in engenders an unusually conservative philosophy. The prudence of utility decisions is always subject to question by politically influenced second-guessers. Rate cases are supported by immense paperwork, and the number of rate cases is increasing after a steady decline throughout the 1980s. The Nuclear Regulatory Commission's paper requirements have been overwhelming since the Three Mile Island accident in 1979, although licensing requirements have been relaxed recently. Still it is unlikely any utility will undertake new nuclear construction on its own in the next few years.

3. Increasing Competition

The monopolistic nature of utilities suggests the absence of competition. And utilities, with their conservative approach to business, can hardly be considered cutthroat. However, in recent years it has become increasingly apparent that the humdrum style of many utilities has given way to an era of intense competition. In fact, preparation for a competitive environment is the dominant element of most utilities strategies, including considerations of downsizing and culture change.

a. Gas versus Electric

Competition among different fuel sources is hardly new. The basic rivalry has always been between gas and electricity. This competition is normally limited to the industrial and heating/air conditioning markets. Unconstrained by the contradictory forces of marketing versus conservation that afflict many electric utilities, gas companies continue to be the more aggressive marketers.

b. Independent Power Producers (IPPs)/Cogenerators

Encouraged by federal regulators, independent power producers and cogenerators offer new dimensions of competition for utilities. Both of these entrants have a tendency to use gas as fuel for their generators. The result is a ratchet effect between electric and gas rates.

c. Resurrection of Marketing

After the oil crisis of 1973, marketing went out of fashion for electric utilities. Marketing departments shrank and after being renamed, refocused on conservation. The theme was: Let me help you not use my product. Contradictory as this seems, conservation continues to be preached by many electric utilities, beholden as they are to the PUCs.

Some 30 states have encouraged conservation by allowing utilities to treat related costs as though they were an investment in plant. The Edison Electric Institute estimates that through the 1990s, demand-side management will obviate the need for 24,800 megawatts of new electric power, the equivalent of 72 coal-fired plants. However, as larger utility customers have begun to discover that there are alternatives to local utilities, these utilities have reacted by reintroducing true marketing into their methods and organizations.

4. Cost Containment

To deal with a competitive world, utilities have fallen in line with much of corporate America in focusing on the cost side of the equation. For many years, utilities were regarded as "cost-plus" businesses. Indeed, that is basically the nature of the regulatory compact that traded monopoly status for the obligation to serve. But today, both the "cost-plus" and "obligation to serve" philosophies are under intense pressure. For instance, that as utilities rename themselves, the term service often drops out.

a. Culture Change

In the view of many utility executives, the threat and reality of increased competition has changed the industry from "cost-plus" to "sink-or-swim." Growing up in the industry, few utility employees ever learned the dog paddle, much less the Australian crawl. To address this, some executives now immerse their employees in focus groups and use other awareness enhancing techniques. The objective is to change the fundamental culture of these businesses so they can compete aggressively in a brave new utility world. The utility executives hope this will be achieved by dramatically changing the orientation and motivation of their employees.

b. Downsizing/Rightsizing/Capsizing

As utilities assume a lean and mean stance, they have taken a knife to the fat that gathered during less-contentious times. Most utilities have already been through at least one painful downsizing exercise. Few would argue that the industry was not ripe for downsizing. The term rightsizing has also been used to describe the process, suggesting the appropriateness of the staff reductions. Capsizing is a term sometimes muttered by members of the staff who have been re-sized out of their jobs.

B
Issues

Exhibit II-2 summarizes the major issues driving the utility industry.

EXHIBIT II-2

Utilities

Key Utilities Issues

- Competition
- Diversification/bankruptcy/mergers
- Environmental impact
- Fuel mix

1. Competition

As noted earlier, the major influence on most utilities' strategies is the increasingly competitive environment and the pressing need to reshape their organizations from the bottom up. It is difficult to overstate the importance of these concerns on utility thinking, and consequently, decision-making. Most utilities view competition with trepidation, if not outright fear. Utility people, including much of the executive tier, have little or no experience in competing. I/S solutions that can be clearly related to improving utility competitiveness will be well received.

2. Diversification/Bankruptcy/Mergers

a. Diversification

During the 1980s many utilities found themselves with excess cash generated by rates that had finally caught up with the regulatory lag of the 1970s. Constrained as they were to a rate of return determined by the PUC, utility managers attempted to expand their horizons by diversifying their businesses.

For some, this expansion consisted merely of dabbling in fields related to the core utility business. Others pursued related endeavors more vigorously. Some entered entirely different businesses, such as savings and loans and insurance. Few efforts at diversification prospered. With very few exceptions, utility managers have now decided to stay with what they know best.

b. Bankruptcy

The never-can-happen happened. A utility went bankrupt. Saddled with immense debt caused by cost overruns at the Seabrook Nuclear plant, Public Service of New Hampshire went belly up. Since then, the Columbia Gas System, Tucson Electric and El Paso Electric have been added to the list. Bankruptcy is now an issue within the utilities sector.

c. Mergers

Merger activity is a natural consequence of the increasingly competitive utilities environment. However, many regulatory approvals are required, and the process can be extremely time-consuming.

The $2.8 billion merger of San Diego Gas & Electric with Southern California Edison, which would create the nation's largest electric utility, was blocked by the California PUC. PacifiCorp, owner of Pacific Power & Light and Utah Power & Light, attempted to acquire Arizona Public Service but was denied. Iowa, Kansas, Ohio and Indiana are states where additional merger activity can be anticipated.

3. Environment

Environmental issues are having a significant impact on utilities for a variety of reasons, including the current political climate, and concerns over broad, long-term issues such as the greenhouse effect.

Buoyed by passage of the Clean Air Act, environmental activists are now focusing on higher hanging fruit, such as lawnmowers.

4. Fuels

a. Nuclear

The Three-Mile Island (TMI) accident triggered an intense focus on the safety of U.S. nuclear plants. The result was a massive increase in Nuclear Regulatory Commission regulations that impacted existing nuclear plants and caused the cancellation of all orders for new plants. No new nuclear plants have been ordered since 1979.

The result of these regulations has been to dramatically increase the cost of operating nuclear plants. Since TMI, staffing levels have risen from 150 employees per plant to over 1,000. As a result, in addition to the astronomical capital costs of bringing a nuclear plant on-line, the operations and maintenance expenses are higher than a comparable-capacity coal plant—a bitter disappointment for those who had bet on the promise of nuclear power. In responding to these realities, several nuclear utilities announced the premature retirement of their nuclear facilities.

b. Gas

The advantages of gas suggest that it is to be the preferred fuel for the 1990s. However, because gas heats 56% of U.S. homes, distribution profits can suffer dramatically in unusually warm winters, the case in much of the country in recent years. The natural gas industry contends that greater use of its fuel could reduce oil dependence and, in addition, help achieve a cleaner environment. The Clinton administration seems to agree.

c. Coal

The effects of the Clean Air Act are viewed by some as making it difficult—and in some regions impossible—to increase the electrical output of coal-fired power plants to meet increasing demand. However, mine prices continue to slide as the coal industry seems caught in a cycle of over-investment and overcapacity. One hundred and fifty four utilities use coal in large quantities. Of the one billion tons of coal produced each year, an estimated 80% is sold to utilities.

d. Alternate Energy Sources

In the 1980s interest peaked in alternate energy sources, such as geothermal, solar, and wind. NEPA, as well as the pressures from environmental interests within the new administration, may lead to a new resurgence of interest. As yet, geothermal energy is the only alternate form to achieve economic justification. In addition, recent technological advances in wind turbines and solar energy have been receiving renewed attention from utilities.

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III

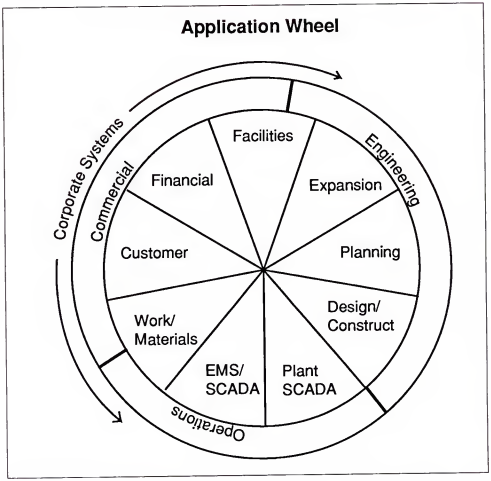
Information Systems

A
Overview

1. Evolution

As illustrated in Exhibit III-1, the utility application portfolio can be divided into three major segments: commercial, engineering, and operations.

EXHIBIT III-1



The three segments of utility information systems evolved from different beginnings:

- The commercial applications, largely accounting-related, were derived from early punch-card accounting machines used to do billing. Punch-card bills were the norm in the 1940s and 1950s, but have generally been displaced by statement bills today.

- Engineering applications were derived from analog computers used to model the network. With the advent of digital systems and particularly the popularity of the minicomputer in the 1970s, these engineering applications were replaced, but responsibility continued to be held by an engineering organization (there may be several in a large utility).

- The operations function lives in a real-time world perceived as totally distinct from commercial and engineering functions (although that concept is arguable). Computerized supervisory control and data acquisition (SCADA) systems, which are the basic component of today's energy management systems (EMSs), were developed in the 1960s when the supervisory control systems—operated by individual switches and push-buttons from consoles and wall boards—were first replaced by systems with digital, computer-based master stations.

2. Centralization

Given its accounting heritage and the state of technology at the time, it was natural for the commercial applications to be processed on a centralized basis using mainframe systems. The industry evolved with amazing consistency in this regard.

One major driver of this consistency was the development of CICS (Customer Information Control System) as the premier mainframe data base/data communication (DB/DC) enabler of the 1960s and 1970s. In developing CICS, IBM involved several utilities, and the resulting program product was rapidly adopted by 90% of the larger utilities in the U.S. It was a serendipitous surprise for IBM when CICS proved to be so successful outside of utilities.

Another factor influencing the centralization of information systems in utilities is that utilities are by definition geographically constrained—i.e., to their service territory. As a result, communications costs and other benefits associated with a more decentralized approach (that have a bearing on other, more national industries) are not a major consideration for utilities.

In the last few years there has been a clear shift away from utilities' centralized view of information systems, both physically and organizationally. Client/server is today's hottest technology in utilities—although the definitions vary greatly, when indeed they are offered. Thus, development responsibility for major systems is being assigned to end-user departments more and more, increasing their accountability.

3. Corporate Systems versus Engineering/Operations

In most utilities, the 1980s saw the development of a closer relationship between engineering computing and the information systems organization. This relationship was a logical outgrowth of information systems' reaching out to end users under the organizational and philosophical banner of the Information Center. But the lines of separation between operations and information systems, with some significant exceptions, generally continue.

The power plant has been similar to the operations side of utilities information systems from both an engineering and an operations standpoint. Most power plants are not built by the utilities themselves, but rather by contractors. Typically, there is tremendous pressure to get the plant into operation so that its costs can be put into the rate base and the utility can earn on them. In this environment, little emphasis is placed on the niceties of the information systems used within the plant.

Unlike other utility organizations, the superintendent or manager in a power plant is a czar. His job is to keep that plant in operation; each day out of production can cost millions of dollars. The manager is not inclined to be beholden to the information systems group for support. Most plant systems are not systems at all, but rather a series of unrelated subsystems or "islands of information," as some refer to them.

Since the advent of the 1990s, there has been a wholesale integration of utility information systems, not only of the commercial systems managed by information systems, but also of the engineering and operations applications that are now outside of the corporate systems' jurisdiction. The reason for this is that competitive utilities can ill afford not to capitalize on their information resources. The situation has been likened to a nervous system with two brains—it might work, but not very well. The analogy is particularly appropriate in light of increasing skittishness among utility executives as competitive pressures continue to increase.

B
Applications

1. Customer Information System (CIS)

The backbone system of the utility is the Customer Information System, "where it all began." As noted earlier, the first computer systems in utilities focused on accounting applications.

The customer-accounting job in a utility is a big one. These systems were extended from batch accounting to on-line customer inquiry and related subapplications. The modern CIS is the key information system of the utility and includes order processing, meter reading, billing, credit and collection, adjustments, cash, and customer information. Larger electric and gas utilities are highly complex but fairly similar in function. They tend to want solutions tailored to their unique situations. Smaller utilities such as water, cooperatives, and municipals are much simpler, making this segment more amenable to packaged solutions.

In the larger utilities, the most important characteristic of a CIS is its age. Many of these systems were developed in the early 1970s and are extremely difficult to maintain. The result has been a spurt of activity in rewriting these systems. The cost of rewrites has soared, with some estimated to be in excess of $100 million. Almost without exception, these newly initiated rewrites are for an S/370 architecture using DB2 as the DBMS. Cooperative processing is currently on the leading edge of these rewrites, with some viewing the mainframe as a giant server, in one popular industry definition of a client/server architecture.

The eyes of the industry turned to the development of a replacement CIS at a Canadian utility, that chose to decentralize its 14 million-customer CIS into nine regions, each supporting its service area on an IBM AS/400 using a packaged software solution. There are many issues attendant on this type of decentralization, including the efficiencies of billing (the factory processes), the handling of an increasingly mobile customer set, and the ability to "mass (consolidated) bill" enterprises with multiple locations. In 1992, it was concluded the minuses outweighed the pluses and the project was abandoned, but some view the project as merely before its time. Since then, other medium-sized utilities have begun efforts to apply RISC UNIX workstations to the customer system application, while others have downsized from mainframes to minis.

The CIS area includes meter reading. For well over twenty years, utilities have piloted automatic meter reading (AMR) over telephone lines, using RF readouts, even digitized pulsing of a power line. Few of these pilots have gone far in competing with the overall economics of the meter reader.

- It costs $6-$7 per year to read a meter. In the 1980s, the meter reader was armed with a hand-held computer that simplified the task and introduced new efficiencies. The market for hand-held devices was quickly saturated for larger utilities. Today, the new market for hand-held devices is in the cooperative and municipal utilities.

- Often, AMR must be augmented by additional functionality in order to prove economical. The major candidate for addition is load management, but two-way communication links could offer many interesting variations, not the least of which would be spot-pricing of energy at the residential level.

2. Marketing Support Systems

Many utilities view marketing support systems (MSS) as part of the customer support system. One fundamental difference is that a customer system usually follows customers only, whereas an MSS also follows prospects. This is not a subtle distinction to a marketer. Of course, an MSS uses extracts from the customer data base for market analysis. This need not be totally current data (as maintained by the CIS). Rather, it is a snapshot at a point in time, perhaps monthly, and it is frequently complemented by related demographic data from external sources. The data base is often relational to allow ease of access for unanticipated analyses.

Beyond the analysis aspects of an MSS, a variety of other tools are used. These include tracking and account-planning systems and mailing lists. Most important are forecasting tools that enable the marketing organization to evaluate various rates, because price is often the only way to differentiate products.

3. Financial Systems

Utility accounting practices have many quirks that distinguish them from other industries. These reflect the ramifications of regulation and its associated reporting requirements, as well as creative devices used to reflect the capital-intensive nature of the industry.

- An example of the former is the use of FERC codes for reporting purposes despite their inapplicability to actually running the business.

- An example of the latter is the Allowance for Funds Used During Construction (AFUDC), that somehow allows a utility to claim revenue for funds used to finance construction work in progress.

In addition, the bookkeeping requirements of utilities covered under the Public Utility Holding Company Act of 1935 are quite different from the requirements of companies not so fortunate. A major objective of many utilities is to introduce true-cost accounting techniques into financial systems to enable the utility to price its products for profit on a situation-by-situation basis. It is fair to say utility financial systems are highly complex and a critical part of utility operations.

4. Transmission and Distribution (T&D)-Work/Materials Management

Work management and complementary materials management systems are the cornerstones of utility operations in the field. Work management involves the inspection, surveying, maintenance, and construction of transmission and distribution facilities. The activities include those normally required for day-to-day control of construction, maintenance, and operations tasks—from receipt of a work request through design, scheduling, performance, reporting of completed work, and closing activities. Complementing work management is the materials management system, that tracks the inventory of stores (materials) to assure sufficient materials are available to the work crews, at the same time assuring that capital is not tied up unnecessarily in excess inventory.

It is not unusual for utilities to have multiple work management and/or materials management systems. This is due to the varying levels of detail required—e.g., the number of facilities in a distribution network (100,000s) versus those in a coal-fired plant (100s)—as well as to the different organizations involved (T&D versus plant).

5. Facilities Management

Facilities management normally refers to the management of distribution facilities—e.g., transformers, feeders, poles, pipes—although it may be applied at the transmission level as well. It is easily confused with the delivery mode INPUT refers to as systems operations. Facilities management, the application, has a spatial context in that the facilities are stationary at a certain point of geography. FM has a connectivity aspect in that the facilities are interconnected to form a network. FM has a variety of other attributes of an engineering and accounting nature.

The geographic aspect of these systems is evident in the myriad maps maintained (some of the time) by utilities, and many can be redundant and contradictory. Various departments have maps of the same territory and maintain them with information provided by different sources. As a result, maps seldom agree and no one knows which is correct. But the map is only a reflection of the underlying function—to manage these facilities. In this sense, facilities management systems are data base systems that provide for geographically based output (maps).

As a data base system, facilities management is often confused with applications that make use of facilities data. These may be commercial (e.g., taxes based on political boundaries), engineering (e.g., flow analysis), or someday even operational (an actual SCADA data base). But in a purist sense, the facilities management system only maintains the data and does not apply it.

Facilities management systems have different requirements with respect to accuracy. For example, a gas utility in a major city needs to know rather precisely where its pipe is before it starts tearing into the downtown asphalt. On the other hand, an electric utility can be off by a wide margin if it is looking for the transmission line on the south forty of the Jones' farm. The importance of accuracy is not simply esoteric, because conversion costs for facilities management systems have been known to increase exponentially with the level of accuracy required. Costs to convert from paper to computer records can represent half or more of the costs of a typical facilities management system.

6. Supervisory Control and Data Acquisition (SCADA)/Energy Management Systems (EMSs)

Some would argue that the most important utility systems in the 1990s are the SCADA/EMSs. This importance is predicated on the belief that, at a time of cost-consciousness, the ability to safely reduce margins in the transmission of electricity, gas, and water is the only way to meet demand. This reduction must be done in an era of deregulation that enables access to networks outside the control of the utility. In addition, it is argued, the wholesale brokering of energy, both electric and gas, vastly complicates the financial implications of utility day-to-day operations.

SCADA and the more advanced energy management systems are the backbone of utility operations. These systems monitor and control the utility network in real time. As such, these systems are responsible for the network's economical and reliable operation. These are sensor-based systems that feed into a control center, either directly or through a hierarchical control arrangement.

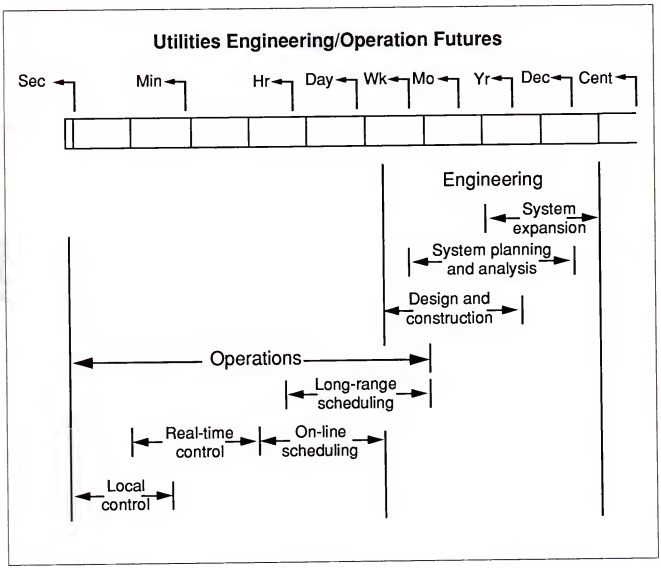
The introduction of open systems has had a profound effect on the SCADA/EMS market in recent years. Virtually all major suppliers in this turnkey market have espoused the benefits of distributed, workstation-based architectures; one supplier has already accomplished an operational system. The cost implication of this approach is to more than halve the price of prior systems.

SCADA is not limited to gas and electric. It is an important application in the water industry as well, although the consequences of an error in the network are not usually as extreme. These systems are typically microprocessor-based.

7. Engineering

Utilities have been described as both engineering marvels and engineering monuments. Whichever, it is a fact engineering is at the core of what a utility does. Many utility executives have engineering backgrounds. In utilities, engineering and planning are closely related disciplines. The essence of a utilities engineering mission is to plan a system to meet a future demand. "Future" here can indicate different time frames, as illustrated in Exhibit III-2.

EXHIBIT III-2



Systems expansion applications are focused on the system as it must be five and ten years from now and on the planning, design, and construction of required facilities. These include load forecasting, generation mix analysis, production costing, and environmental and facility land use analysis.

Systems-planning applications look to a one- to three-year horizon and the reliable and economic operation of the network in conjunction with interconnected systems. These include load flow, transient analysis, and assorted engineering exotics.

Systems planning leads to design and construction activities with the related applications, including CAD/CAE, structural design, piping HVAC, economic analysis, and of course, project management.

8. Power Plant Applications

The power plant is not really an application; it is a place. But because of its self-contained philosophy in most utilities, the plant is best viewed as an application unto itself, typically a very large application with many subsystems. As noted earlier, most plant systems were installed by the contractor (or more typically a subcontractor) and they lack integration.

For example, consider assigning a work crew to fix a leaky valve in a nuclear facility. One needs to know the history of repairs on the valve, who is available with the skills to do the job (plant maintenance system) and what materials they can use (materials system), how much radiation each has been exposed to (health physics system), how much radiation is in the area of the faulty valve (radiation monitoring system), and whom the access control system should admit. It's easy to discern the need for integration of these subsystems. A fully integrated system is referred to as a plant management system.

As might be expected, the driving application of the power plant is the work management system, sometimes called the plant maintenance system, a traditional transaction-based application, not all that different from its transmission and distribution (T&D) counterpart. The plant also runs a variety of engineering applications along similar lines to T&D. These applications are related to the economic use of fuel. Nuclear plants are exceptionally computer-intensive in this regard. The plant operations counterpart to an EMS is the plant monitoring and control system, a SCADA-type system used to manage all the basic operations of the plant in real time.

New plants can be expected to be small and gas-fired, with less complex systems requirements than older plants. Successful vendors will team with the construction firms to ensure the systems are installed as part of the base plant rather than requiring a retrofit.

C
Information Systems Issues

The key issues facing the information systems function in the utilities industry are listed in Exhibit III-3. Each is discussed in this section.

EXHIBIT III-3

Utilities

Utilities Industry Information Systems Issues

- Regulatory impact
- Downsizing/culture change
- User department development
- IS as an investment versus an expense
- Expanding application portfolio

1. Regulatory Impact on Operations

While clearly a major influence on the utility industry as a whole, changes in the regulatory climate are having a specific impact on many aspects of utility operations.

- The Clean Air Act Amendments (CAAA) of 1990 established two phases for the reduction of sulphur-dioxide—the first affecting 111 coal-fired plants by 1995, the second an additional 700 by the year 2000.
- Order 1992 issued by FERC in 1992 separated gas sales services from transportation services, making pipelines into common carriers.
- The National Energy Policy Act of 1992, one of the last acts of the Bush administration, was aimed at reducing consumption, promoting alternate fuels, and increasing competition.

The primary focus of federal regulation has been, and will continue to be, on the safeguarding of the environment and increasing competition. These areas have a direct impact on the operations side of the utility application portfolio, which must respond to environmental concerns as well as the need to monitor the use of plant and transmission facilities more closely. Energy Management Systems will require the ability to dispatch power on the basis of environmental considerations, as well as the traditional economic and reliability (security) objectives. Plants will require tighter

monitoring of operations, particularly emissions. At the same time, open access will require careful supervision to maintain security while techniques for charging all users of the grid, utility or not, will be required. Gas utilities will need to expand their SCADA capabilities to better manage the gas in their lines in an evolving application sometimes called Gas Management.

2. Downsizing/Culture Change

As utilities plan for the sink-or-swim world of competition, they are:

- Improving productivity through staff down-sizing
- Building customer relationships through marketing departments systems
- Attempting to change their cultures through employee motivation/ education

These actions present a variety of issues to the utility I/S organization, running the gamut from:

- Rapidly increasing interest in outsourcing
- Downsizing from mainframes to minis and minis to micros and, at times from mainframe directly to micro
- Development of marketing systems employing sophisticated decision support tools
- Expansion of office systems to support a leaner, flatter organization
- Redevelopment of financial systems to get a better handle on costs

All of this is directed at using technology to enhance effectiveness. Utility management has never been so amenable to new ideas that will help them become more efficient producers.

3. User Department Development

During the early 1980s, with the advent of the PC and the information center, progressive utility information systems organizations took a proactive stance in helping end users make use of computer technology. They even went so far as to refer to end users as "clients." (Seldom did the clients reciprocate by referring to information systems people as "consultants.")

At first the tasks performed by these end users were somewhat trivial and limited to individual, or at most departmental, productivity. However, as the technology advanced and the PC went on-line, more and more end users downloaded corporate data into their PCs to manipulate it there. This downloading was fine so long as it was not represented as "corporate data."

In recent years, a shift has occurred where user departments assumed overall responsibility for the development of systems directly impacting their mission. For example, today it is common for the Customer Service department to have responsibility and full accountability for the development of a new CIS. The I/S department's involvement in this type of development may range from merely providing development support at the data center to consulting on data base matters. But the ball is in the user department's court!

There are significant advantages to this approach in terms of accountability. There are negatives as well, in terms of the role of the CIO, I/S career paths, and the enforcement of standards. An example of the latter would be when the CASE tool employed by the CIS department is deliberately spurned by the I/S organization because "they're using it; so it can't be any good."

4. Information Systems as an Investment versus an Expense

With increased cost pressures on utilities, the information systems organization has come under more careful scrutiny. A philosophical debate over the role of information systems in the utility organization has developed. On the one hand, information systems can be viewed as an expense, a necessary evil, something out of the mainstream of what a utility is all about, and something to be trimmed and pruned to minimum cost. On the other hand, information systems can be viewed as investments, solutions to cut costs, and levers to increase productivity. While there is no unanimity on these alternatives within the industry, a recent INPUT survey of 18 non-I/S utility senior executives indicated a tight definition of "core business" that would not include I/S.

In the utility industry, information systems do not generally enjoy a high reporting status within the organizational structure, and thus there is a propensity to view them as an expense. Interestingly, gas utility information systems executives seem to report higher in the chain of command—often to the COO—than their electric utility counterparts.

5. An Expanding Application Portfolio

After years of chipping away at an extensive application backlog, few utilities have made appreciable progress in exploiting the power of modern information technology. In part, this is due to the rapid change in the technology, but is exacerbated by the complexity of utility information requirements.

The typical utility is installing one new and one old application at any point in time. If it normally takes three years to develop an application (and it does), the inference is utilities will continue to lose ground to the application backlog—unless better development techniques are used or they make more use of external resources. CASE tools, discussed below, have not made a significant impact. As a result, there are outstanding opportunities for professional services and systems integration in the utilities sector.

D
Impact of New Technologies

This section considers the impact of new information systems technologies on the utilities industry. The major technologies are summarized in Exhibit III-4.

EXHIBIT III-4

Utilities

Key IS Technologies

- Imaging/graphics
- UNIX/open systems
- RDBMS
- Data/voice integration
- Case tools
- Artificial intelligence

1. Imaging/Graphics

The massive amounts of utility paper records (particularly in a nuclear facility) require control and accessibility. Storage and retrieval programs have provided contextual search capabilities to abstracts that index the actual documents. The advent of affordable image technology offers an opportunity to control the documents directly. A critical requirement for utilities is the ability to handle engineering drawings, not just the standard 8.5" by 11" documents used in such general business sectors as insurance and banking.

Imaging technology has also been related to graphics in the facilities management application and has enabled a more evolutionary conversion approach. In this case, old maps are image-scanned. Gradually, as required by actual use, the raster images are vectorized and made manipulatable for engineering and other applications. This helps to spread conversion costs over a longer period and enables an earlier cost-benefit crossover.

Imaging is beginning to be exploited in the CIS area for managing customer correspondence files. Imaging also complements electronic data interchange (EDI) technology in enabling image documents (e.g., shipping lists) from vendors not implemented under EDI to be managed by the same system that manages the EDI records.

2. UNIX/Open Systems

The increasing popularity of UNIX and resultant open systems is seen by many in the engineering/operations community as an opportunity to avoid the pitfalls of proprietary solutions that have proven to be dead ends in the past. Newer systems feature a workstation-based distributed architecture with stunning price/performance and the potential for cross-vendor portability.

In the engineering/operations areas of utilities, it is no longer a question of whether UNIX will be implemented, but when. Typically, this is answered by "with the next change-out" (utility vernacular for "when we redo the application"). However, with the increasing focus on integrating applications, that answer may no longer suffice. Specifically, the rapid growth of facilities management systems, coupled with their swing position between commercial and engineering applications and the fact virtually all major Automated Mapping/Facilities Management (AM/FM) vendors are on UNIX, suggest AM/FM decisions may drive the platform for other applications that exploit the AM/FM data base.

On the commercial side, there is appreciable interest in UNIX, particularly for smaller utilities, but mainly as a vehicle to tap the price/performance of workstations. There appears to be nothing unique to the utilities sector here and the issue will be resolved based on how the mini/micro hardware head-to-head competition (as exemplified by IBM's AS/400 versus RS/6000 product differentiation issue) is resolved. In larger utilities, enthusiasm for UNIX on the commercial side is giving way to the client/server trend, but not fully abandoning proprietary interests in the operating system arena.

3. Relational Data Base Management Systems (RDBMSs)

During the mid-1980s, utilities began to dabble in relational data bases, particularly DB2. At first there was a reticence to use this approach on mainstream applications such as CIS. However, today there is no hesitation. The corporate information systems organization has embraced DB2 and few packaged commercial mainframe application solutions are likely to meet with success unless they are compatible with DB2.

Today, all commercial data base managers are proprietary. However, some, such as Oracle, have a multivendor strategy and, as a result, are becoming increasingly popular for both engineering and commercial applications. They have entered the operations world, but only as shadow data bases, because they cannot as yet meet the stringent real-time performance requirements.

4. Data/Voice Integration

Utilities show increased interest in employing advanced communications technologies to enhance their relationship with their customers. In their simplest form, voice systems can provide account information to customers. In a more sophisticated form, and capitalizing on Automatic Number Identification (ANI) technology, customer service reps can have a client screen displayed without asking for the customer's name or number.

In an even more sophisticated system involving the integration of several systems, an out-of-service customer can be identified (CIS), the outage related to a specific transformer (facilities management), a crew dispatched (work management), and the customer advised on how long repairs are anticipated to take (the customer can even be called back at intervals to provide an update on progress)—all done automatically.

In a related aspect of data/voice integration, it should be noted telecommunications and I/S seem to be merging organizationally within larger utilities, an important trend that will allow these utilities to better capitalize on both technologies.

5. CASE Tools

Utility interest in the use of CASE (computer-aided software engineering) technologies grew rapidly because of the large transaction-based systems that form such a critical part of the application portfolio. Selection of CASE tools offers the same pitfalls as any major architectural choice—language, operating systems, etc.—in that resulting systems will be locked into that CASE tool for future maintenance. In some situations, the lock extends to the support services provided by the owner of the tool. As a result, some utilities are selecting CASE tool vendors that are unlikely to exploit such a relationship.

Many I/S organizations have chosen to ignore this issue, being preoccupied with the question of whether or not the tools will really result in the promised productivity gains. There appears to be considerable uneasiness within the industry on this point, with some pointing to object-oriented programming as the next applications panacea.

6. Artificial Intelligence (AI)

Expert and knowledge-based systems have been developed for utility applications ranging from plant operations (alarm response advisor, fire protection review, machine vibration diagnostics) to rate analysis. In general, they are aimed at addressing skills shortages that have increased as a result of industrywide downsizing. Utility reactions to artificial intelligence have been mixed—some hold the view that AI is more a technique than a technology, and that economic justification is questionable.

E
Information Systems Organization and Budget

More often than not, the information systems organization reports within the financial function of the utility. Typically, the VP of information systems reports to the CFO or the VP of management services. It is not uncommon for this executive to have other responsibilities, ranging from purchasing to facilities.

Comparison of utility information systems budgets is a difficult task because of different inclusions and exclusions. For example, some budgets treat data entry as an information systems expense, whereas others charge this function directly to the user department. Similarly, some budgets include some or all of the costs of engineering or operations computing, where others do not. Data and/or voice communications may or may not be included. As a result, without considerable analysis it is difficult to compare budgets.

Information systems budgets have capital and expense elements. In general, capital outlays for utilities can be added to the rate base and the utility can earn a return. At the same time, large capital expenditures may require review by the PUC, where the utility must defend the prudence of its management decisions.

Utilities make great use of ratios in comparing various facets of their operations. Of particular relevance to the information systems community (subject to the caveats mentioned earlier) is the information systems budget as a percentage of revenue. A representative figure in the utility industry is 2.0%, with a range of 1.0% to 3.7%. Such numbers can be dangerous, however. Whole power plants, SCADA/EMS, remittance processing, bursting, and meter readers may or may not be included. As a result, comparisons may not be meaningful.

Utility information systems budgets can be expected to grow between 5% and 10% annually through 1996. Concurrently, staffing will continue to decline as some I/S personnel are moved to user departments and others are let go as a result of corporate downsizing. It can be reasonably concluded that a larger proportion of the growing information systems budget will be spent on outside services.

F
Information Systems Objectives

Exhibit III-5 lists the key objectives for the information systems function within the utilities industry.

EXHIBIT III-5

Utilities

Utilities Industry Information Systems Objectives

- Be the solution to, not the victim of, downsizing
- Gain attention/respect of top management
- Fulfill corporate role while controlling end users

The objective of most utility information systems executives is to get respect. This means they strive to convince senior management of the importance of information systems' role in the strategic interests of the utility. They seek inclusion in planning and strategy sessions so they will be recognized as contributors. Given the recent high turnover among utility I/S executives, some are primarily focused on survival rather than glory.

To gain this respect, information systems executives seek ways their systems can be more responsive to the changing culture of utilities. Examples of such systems include a tax model to assess the implications of various alternatives in a merger negotiation, an energy management system to support the brokering of power with neighboring utilities, and a gas SCADA system to track specific gas supplies by pipeline within the distribution system, all enabling the most economical choices to be made.

Information Services Market Forecast

This chapter discusses the markets for information services in the utilities industry. The information and market estimates presented draw upon data, trends, and issues noted in earlier chapters.

Section A, *Overview*, notes the overall size and growth rate of the utility industry's expenditures for information services.

Section B, *Delivery Mode Analysis*, segments these expenditures into INPUT's seven standard delivery modes. A detailed expenditure forecast, by submode, is contained in Appendix A.

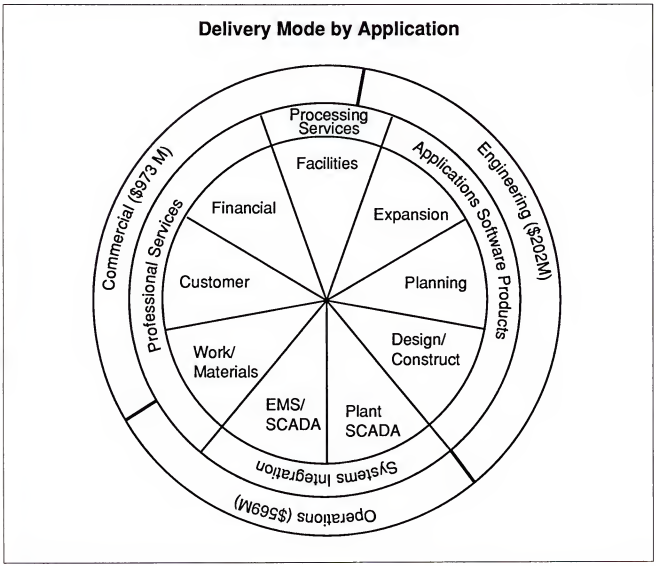
A
Overview

Technical, philosophical, and historical differences among the commercial, engineering, and operations organizations and applications within a utility result in varying approaches to information software and services. Most information systems organizations actively consider the applicability of outside solutions before deciding on in-house development, and downsizing has resulted in their willingness to settle for less than a perfect functional match with requirements. This is not only clearly true in areas such as resource management, but is becoming increasingly so for the previously sacrosanct customer systems.

On the engineering side, applications packages are commonly used, while the operations organizations favor a more customized, systems integration approach. While the latter claim an interest in off-the-shelf solutions, the reality is only the hardware (primarily workstation) side is becoming off-the-shelf. Software remains largely a custom activity.

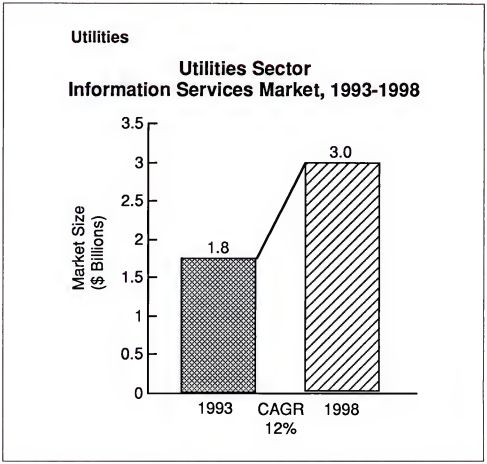
Exhibit IV-1 illustrates the primary delivery modes by application. It is not intended to suggest a rigid, inflexible view of these relationships, but rather offer a general perspective of the market and its segmentation into commercial, engineering, and operations activities.

EXHIBIT IV-1



As noted in Exhibit IV-2, INPUT projects information services expenditures in the utilities market will grow from almost $1.75 billion in 1993 to slightly more than $3.05 billion in 1998, at a compound annual growth rate of 12%, as noted in Exhibit IV-2.

EXHIBIT IV-2

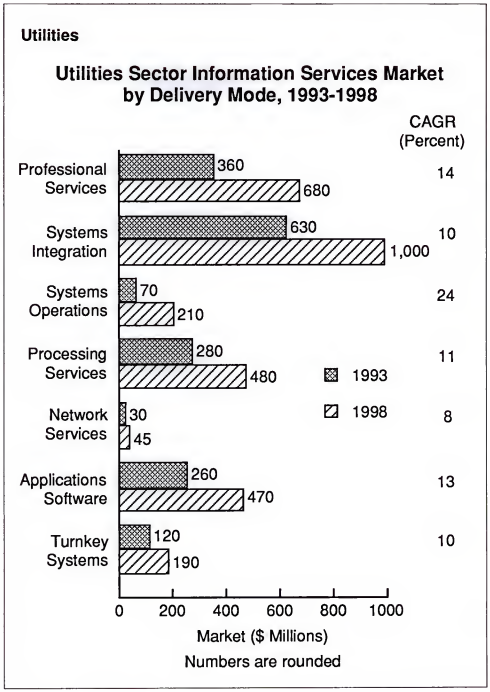


The 12% compound annual growth rate is consistent with and a continuation of the 12% rate projected by INPUT for the 1992-1997 period.

B
Delivery Mode Analysis

Forecasts by delivery mode for user expenditures in the utilities sector are shown in Exhibit IV-3. Analyses of the factors influencing user expenditures for each delivery mode are noted in the following paragraphs.

EXHIBIT IV-3



1. Professional Services

Two elements favor the use of professional services: On the systems side, the increasing complexity of modern technology makes it difficult for utilities to permanently retain staff with the necessary technical skills; on the applications side, the age (10-20 years) of these legacy systems—plus the many retirement incentive programs—have left utility staffs devoid of the application know-how needed to develop replacement systems.

Utilities have long understood the concept of peak shaving. Hence, the use of outside resources is normal business procedure. Outsourcing of systems operations, described below, will most often include significant software development/maintenance activities. As a result, growth of the professional services delivery mode will be accelerated by the complementary growth of systems operations, just as the use of application software generates needs for professional services resources.

Professional services growth, although constrained by a decreasing demand for unique high-function customer systems in favor of more packaged applications software solutions, will accelerate as outsourcing continues to take hold in utilities. Many vendors will attempt to parlay their outsourcing relationships into utility application credentials by remarketing developed code. However, utility applications software, not originally developed for a broad market, is usually only a "foot in the door" to selling professional services.

As a result of these forces, INPUT forecasts the 1993 expenditures for professional services in the utilities market sector to be almost $360 million, growing at a 14% CAGR to more than $680 million in 1998.

2. Systems Integration

The major operations-type applications in utilities are all systems integration opportunities. In addition, there is an increasing requirement to integrate operational systems with other corporate systems. This integration is intended to enhance the overall efficiency of day-to-day operations, and to align them with strategic goals such as power brokering. Power plants, particularly nuclear plants, are particularly attractive systems integration opportunities.

Another area of significant growth, in the systems integration delivery mode, although slower, is the increasing activity in SCADA/EMS and power plant control systems aimed at optimizing the use of existing facilities.

Given these driving forces, INPUT projects 1993 systems integration expenditures to be almost $630 million, growing at a 10% CAGR to slightly more than $1 billion in 1998.

3. Systems Operations

Interest in data center operations outsourcing has grown appreciably during 1992 and 1993 with the first major contracts established—Yankee Gas, Washington Water Power, and Northwest Natural Gas. With the precedent thus set, outsourcing of the central data center will receive increased consideration as cost pressures continue in the next few years.

A special consideration in utility outsourcing is that utility capital expenditures form a part of the rate base on which utilities earn a return. Consequently, a utility should maximize its rate base by assuring information systems operations (and therefore the associated capital costs) are part of the utility itself. On the other hand, these costs are rather small in relation to other capital expenditures, and the rate base has become less of a factor in the rate-making process.

Systems operations activity is accelerating, albeit from a relatively small base. Historically, as noted above, information systems investments—including the corporate data center—have added to the investment base and thus the measurement relative to rate-setting by the PUC. Changes in this orientation, already apparent in recent outsourcing decisions, make systems operations a true alternative in the utilities industry. Consistent with their conservative approach, however, major utilities can be expected to require trial marriages with outsourcing vendors before committing to long-term relationships.

INPUT forecasts 1993 utilities industry expenditures for systems operations at $70 million, growing at a compound annual growth rate of 24% (the largest for any utilities sector delivery mode) to almost $210 million in 1998. A portion of this rapid growth, however, is the result of starting from a relatively small base.

4. Processing Services

Small utilities, primarily REAs and municipals, frequently use processing services for day-to-day transaction processing. An important opportunity for vendors is the conversion of facilities records to computer form—a labor-intensive, one-time, but long-term, multiyear effort. Automated conversion tools are becoming both practical and economical, helping to justify the overall application in which conversion can represent more than half of the total costs.

The complexity of "nuclear codes" (nuclear plant-unique engineering programs) and the high-performance resources needed to run these massive number crunchers have led to a significant on-line, frequently interactive, market in this niche of 70 or so electric utilities with nuclear power plants.

Processing services growth has experienced upward pressure from facilities management conversion services, slightly offset by a declining volume of transaction processing services in the low-end market. The latter will also be impacted by the increasing penetration of turnkey system customer solutions.

INPUT projects utilities expenditures for processing services to be slightly more than $280 million in 1993, growing at a compound annual rate of 11% to almost $480 million in 1998.

5. Network Services

The major uses of network services in utilities are the traditional LEXIS/NEXIS-type services. Demographic data bases, available either on-line or as a package, offer utilities a complementary view of their customers and prospects and are a useful addition to a marketing support system.

Network services growth is influenced by a steady increase in the utilities' use of EDI, which allows on-line interchange between utilities and their many suppliers and is also used in Materials Management Systems as well as more advanced CISs. The logical extension of EDI is to tie utilities into their major industrial and commercial customers, as well.

Because most utilities are regional, however, their needs for network services do not match those of other industries. As a result, the market for network services is relatively modest in the utilities industry.

INPUT projects 1993 utilities industry expenditures for network services to be $32 million, growing to $46 million in 1998, at a compound annual rate of 8%.

6. Applications Software Products

The use of applications software products is growing rapidly in the utilities industry. Cross-industry applications—e.g., stockholder and human resources (not considered in this report)—are the most widely accepted. Another significant area is the entire spectrum of financial applications with an emphasis on the cost-accounting needed in the new competitive world of utilities. The use of utility-unique application code, often modified by the utility or the vendor to meet the specific requirements of the individual utility, is also growing rapidly. Customizing, particularly for larger utilities, is the rule, not the exception. Consequently, application software also has a drag-along affect on professional services.

The steady growth in applications software, driven by large utilities opting to use packages, and trading their tradition of internal development for cost and response considerations, will continue throughout the forecast

period, with 1993 expenditures of almost $260 million swelling to $470 million by 1998. The five-year compound annual growth rate will continue at 13%.

7. Turnkey Systems

Utility operations organizations frequently refer to their sensor-based control systems as turnkey systems. However, these often employ specialized hardware and are considered systems integration projects in this report. Small utilities (less than 50,000 customers) are the core turnkey market in the utilities market sector. Their application set is usually limited to customer information systems, with an emphasis on billing.

INPUT projects user expenditures for turnkey systems to be almost $120 million in 1993, growing to nearly $190 million by 1998 at a compound annual growth rate (CAGR) of 10%.

Conclusions and Recommendations

This chapter offers INPUT's conclusions and recommendations regarding information services opportunities in the utilities industry.

A
Overview

1. Excellent Business Opportunities

Competitiveness and cost-consciousness are now an integral part of the industry's thinking. This is an opportune time to use outside services to enhance utility efficiency. But utilities remain conservative and look for a proven track record and financial stability in their suppliers. New entrants require patience and deep pockets.

Given the aging of many systems, their lack of integration, and the rapid pace of technology, a substantial application backlog exists in most utilities. The cost constraints felt by many utilities as a result of recent downsizings—IS organizations included—creates even more pressure from that backlog.

IS organizations are under pressure to respond to the corporate need for efficiency. This pressure is IS's opportunity to improve its position in the corporate hierarchy and some organizations are capitalizing on it, seeking outside help where needed.

For these reasons, the outlook for utility services/solutions looks bright for the remainder of the 1990s.

2. Opportunities in Operations

The systems integration opportunity in utility operations applications is perhaps the most readily overlooked, requiring as it does highly specialized knowledge and expertise. But the advent of UNIX/workstation/distributed technology offers the prospect of replacing current dead-end systems with systems based on standard, upgradeable hardware/software that integrates well with other corporate systems.

3. Package Opportunities in Engineering

Application packages are the primary solution for engineering applications. Engineers seek functionality and data base approaches so that studies are repeatable and can be applied to changing parameters. Applications that work with the widely accepted CAD/CAM and Intergraph graphics systems have the greatest chance for acceptance. Here again, interfaces to corporate systems are important.

B
User Recommendations

Little has changed in recent years regarding areas of critical importance to users and information systems within the utilities industry.

1. Strategic Impact of IS

The IS community in many utilities needs to establish itself as a pro-active force with a legitimate mission to manage the data assets of the utility. This change requires a receptive ear at the top of the business, and the establishment of a Chief Information Officer (CIO) level of authority, if not title. Education of senior management in this regard is critical. Vendors and consultants with established credentials—not just in esoterics but in practical organization, management, marketing, and the utilities industry itself—can help.

2. Integration

Many larger utilities have major commercial systems installed. However, these systems are not integrated among themselves, much less with engineering or operations. There is a significant opportunity for systems integration to improve the application investments already made.

C
Vendor Recommendations

The utilities sector continues to increase its willingness to look to external sources for improved return on its information systems efforts and investments. Vendor recommendations are summarized in Exhibit VI-1.

EXHIBIT VI-1

Utilities

Vendor Recommendations

- Funding patience
- Integrated solutions
- Platform support
- Balanced marketing

1. Funding

Most utility applications are large, complex, and require a lengthy implementation cycle, with or without the use of outside services. Where outside vendors are used, sales cycles can also be prolonged. As a result, vendors must have financial resources to handle front-end cash flow requirements, even beyond the normal start-up/development costs.

2. Integration

Although the industry seeks integrated systems solutions, few vendors are able to develop all the required pieces. The successful vendor will form strategic alliances with other firms that have complementary, compatible offerings. Architectural compatibility is especially important.

3. Multiple-Platform Support

There is a temptation to attempt to be all things to all people, suggesting a vendor may wish to support a solution on a broad range of platforms. The successful vendor will seek to address markets where there is some platform commonality, thus avoiding inordinate development and support costs for multiple platforms. UNIX is one approach, but probably not a panacea. The key is to accurately assess marketing advantage versus development and support costs.

4. Balancing Marketing and Development

Critical to success in the utility market is the balancing of marketing with development. This balancing is particularly critical in the systems integration delivery mode. When one cannot fill the order, marketing is a waste of time. Development in the absence of demonstrable need is also rather questionable.

Forecast Data Base

A
Forecast Data Base

This appendix contains the forecast data base for the period 1993-1998.

Exhibit A-1 presents the detailed 1992 actual and 1993-1998 forecast for the utilities sector.

B
Forecast Reconciliation

Exhibit A-2 offers a reconciliation of the 1992 and 1993 forecasts for the utilities sector.

There were only minor differences between the 1992 projection for 1992 expenditures and the actual amounts noted in the 1993 report. The maximum variance was a 4% understatement of 1992 systems operations revenues, an amount that is relatively small ($2 million), given the small size ($57 million) of the base revenue.

Variances in the market projections for 1997 ran from 1% to 2% for three delivery modes, and reflect small improvements in the 1997 forecasts for processing services, professional services, and network services.

The only variation in the 1992-1997 compound annual growth rates (CAGR) is a 1% decrease in the growth rate for systems operations, created by the increase in the 1992 base.

Overall, the 1992 and 1997 market forecasts have remained relatively consistent—a logical result of the fact the 1992 Utilities Forecast Update was written in December 1992, and this full vertical report was completed in June 1993. The relatively stable nature of this market sector has resulted in two forecasts with consistent projections.

EXHIBIT A-1

Utilities Sector
User Expenditure Forecast by Delivery Mode, 1992-1998

Delivery Modes	1992 ($M)	Growth 92-93 (%)	1993 ($M)	1994 ($M)	1995 ($M)	1996 ($M)	1997 ($M)	1998 ($M)	CAGR 93-98 (%)
Sector Total	1,551	12	1,744	1,955	2,190	2,445	2,746	3,070	12
Professional Services	309	16	359	411	468	530	603	681	14
- IS Consulting	101	17	118	135	155	177	205	233	15
- Education & Training	70	16	81	92	104	119	134	153	14
- Software Development	138	16	160	184	209	234	264	295	13
- Application Management	0		0	0	0	0	0	0	0
Systems Integration	576	9	629	693	761	834	918	1004	10
- Equipment	195	8	210	230	250	270	293	317	9
- Software Products	50	14	57	66	76	87	100	113	15
- Applications Software	30	13	34	38	42	47	52	57	11
- Systems Software	20	15	23	28	34	40	48	56	19
- Professional Services	308	9	337	370	405	444	489	535	10
- Other	23	9	25	27	30	33	36	39	9
Systems Operations	57	23	70	86	108	134	167	208	24
- Platform Operations	30	13	34	42	51	61	73	88	21
- Applications Operations	14	36	19	22	28	35	44	55	24
- Desktop Services	7	29	9	11	14	17	22	28	25
- Network Management	6	33	8	11	15	21	28	37	36
Processing Services	251	12	281	312	347	386	430	475	11
- Transaction Processing	251	12	281	312	347	386	430	475	11
- Utility Processing	0		0	0	0	0	0	0	0
- Other Processing	0		0	0	0	0	0	0	0
Network Services	30	7	32	35	37	39	43	46	8
- Electronic Information Svc	27	7	29	31	33	35	38	41	7
- Network Applications	3	0	3	4	4	4	5	5	11
Applications Software	224	15	257	292	330	369	417	470	13
- Mainframe	50	10	55	59	63	67	73	79	8
- Minicomputer	69	12	77	86	95	102	114	126	10
- Workstation/PC	105	19	125	147	172	200	230	265	1
Turnkey Systems	104	12	116	126	139	153	168	186	10
- Equipment	47	9	51	54	58	62	67	72	7
- Software Products	39	13	44	49	55	61	67	76	12
-. Applications Software	34	12	38	43	48	54	59	67	12
- Systems Software	5	20	6	6	7	7	8	9	8

EXHIBIT A-2

Utilities Sector
1993 MAP Data Base Reconciliation

Delivery Modes	1992 Market				1997 Market				92-97 CAGR per data 92 Rpt (%)	92-97 CAGR per data 93 Rpt (%)
	1992 Report (Fcst) ($M)	1993 Report (Actual) ($M)	Variance from 1992 Report ($M)	Variance from 1992 Report (%)	1992 Report (Fcst) ($M)	1993 Report (Fcst) ($M)	Variance from 1992 Report ($M)	Variance from 1992 Report (%)		
Total	1,546	1,551	5	0	2,733	2,746	13	0	12	12
Professional Services	309	309	0	0	596	603	7	1	14	14
Systems Integration	570	576	6	1	918	918	0	0	10	10
Systems Operations	55	57	2	4	167	167	0	0	25	24
Processing Services	253	251	-2	-1	427	430	3	1	11	11
Network Services	30	30	0	0	42	43	1	2	7	7
Applications Software	225	224	-1	0	415	417	2	0	13	13
Turnkey Systems	104	104	0	0	168	168	0	0	10	10

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Vendor Competition

A
Introduction

This chapter presents a description of information services vendors serving the utilities sector. The chapter is divided into the following sections:

- Competitive Climate
- Competitive Positioning
- Leading Vendor Profiles

B
Competitive Climate

The competitive climate in utilities is influenced by changes in technology, shifts in application development focus, and the emergence of some market leaders in specific segments.

There has been a shift in information systems in the utilities market toward client/server architectures and UNIX platforms as appropriate for utilities applications. Vendors currently are presented with a significant opportunity to rewrite or reengineer many of the legacy systems still in place from the 1970s. Some vendors known primarily for their mainframe applications are shifting to software that functions in a multiplatform environment, unbundled from turnkey hardware packages.

There has also been a significant shift in the control and responsibility for information systems in the utilities sector. In many cases, user departments have assumed overall responsibility for the development of systems directly related to their functions.

C
Competitive Positioning

1. Market Fragmentation

Participating vendors in the utilities sector report the competitive climate is characterized by a crowded and fragmented market populated by a multiplicity of niche players. In the 1990s one market leader has emerged, Andersen Consulting.

2. System Integration

There has been a move toward the integration of utility information systems, not only in corporate applications, but in engineering and operations systems as well, presenting a significant opportunity for systems vendors in the 1990s to play a major role in this integration.

3. Strategic Information Systems

In an increasingly competitive environment, many utilities view information systems as offering strategic advantages, especially toward maintaining their competitive positions with their customer bases. As competition increases, the Customer Information System has become an important tool in enhancing relationships with the customer, a role also filled by marketing systems where they are implemented.

This merger of telecommunications, control, and customer information systems needed for strategic information systems has also indicated an organizational merger of the telecommunications and the information systems groups within the organization.

4. System Migration

The increasing popularity of UNIX has led to a significant opportunity in moving old engineering/operations applications to a newer open systems model. The growth of facilities management systems, combined with their crucial position (between commercial and engineering applications), indicates that AM/FM applications decisions will often dictate the adoption of the UNIX platform.

5. Expansion of Information System Applications

Few utilities have made appreciable progress to this point in addressing the application backlog. This situation has been exacerbated by increasing regulation and also by the trend toward downsizing. Utilities' internal IS staff continue to lose ground to their application backlog. As a result, there are considerable opportunities for professional services, applications development, and systems integration in this sector.

6. Interest in Consortia

As an alternative to in-house development and outsourcing, utilities are considering joint development projects among themselves and/or with vendors. A notable example of a consortium effort is the Theseus project for a new customer system.

D
Participating Vendors

1. Applications Software Vendors

There has been a concerted shift toward the integration of utility information systems, not only in corporate applications, but in engineering and operations systems as well. This poses a significant opportunity for systems application software vendors in the 1990s, as most information systems in the utilities sector have been a series of unrelated subsystems. A description of leading applications vendors by market segment follows:

Customer Information Systems-Andersen Consulting is the clear leader because of its reference installations at several major utilities. Price Waterhouse is making an effort to position itself in this market with the product "System 2000." IBM has an offering, UCDS, as well. At the low end of this market segment Mentor Systems, DSI, and Occom are the major players.

Transmission, Distribution, and Work/Materials Management-Leading vendors offering application software for transmission and distribution and work and materials management are noted in Exhibit V-1.

EXHIBIT V-1

Utilities

Leading Vendors of Transmission, Distribution and Work/Materials Management Application Software

- American Software
- Andersen Consulting
- EDS
- Price Waterhouse
- STAGG Systems
- Stoner Associates (Severn-Trent Gas/Water, U.K. parent)
- Synercom

Energy Management/SCADA—leading vendors of EMS/SCADA systems—are noted in Exhibit V-2.

EXHIBIT V-2

Utilities

Leading Vendors of EMV/SCAL Applications Software

- ASEA-Brown Boveri
- ESCA
- Geo Vision
- Harris Corporation
- Intergraph
- Severn Trent
- Siemens
- Synercom

Facilities Management—Leading vendors of facilities management software—are noted in Exhibit V-3.

EXHIBIT V-3

Utilities

Leading Vendors of Facilities Management Applications Software

- ESRI
- ENGHOUSE
- Geo Vision
- Intergraph
- Synercom

2. Professional Services

The vendors in the professional services market are extremely diverse and include Big 6 firms, subsidiaries of industrial firms, computer hardware firms, and vendors devoted to professional services. The leading vendors of professional services are noted in Exhibit V-4.

EXHIBIT V-4

Utilities

Leading Professional Services Vendors

- Andersen Consulting
- ASEA Brown-Boveri
- Digital Equipment Corporation
- Electronic Data Systems
- IBM
- Price Waterhouse

3. Leading Systems Integrators

Systems integration services offered to the utilities sector are characterized by increased competition and high margins of return. The system integration market is growing fast. Key factors for vendors are knowledge of the key business issues for specific industry subsegments and experience in implementing solutions in the industry. Leading SI vendors are noted in Exhibit V-5.

EXHIBIT V-5

Utilities

Leading SI Vendors

- Andersen Consulting
- DEC
- Siemens
- EDS
- IBM
- Price Waterhouse

4. Leading System Operations Vendors

This segment is marked by a clear increase in market leadership by EDS, confirming its position as market leader. GENIX, a smaller vendor, is active in this market as well. Leading system operations vendors are listed in Exhibit V-6.

EXHIBIT V-6

Utilities

Leading System Operations Vendors

- Computer Sciences Corporation
- Electronic Data Systems
- Genix Corporation
- ISSC

5. Up-and-Coming Vendors in the Utilities Sector

Up-and-coming companies have positioned themselves to deliver multi-platform open systems to the utilities market. They have taken an early position in developing products for the UNIX operating system. New sales growth and powerful alliance positioning have made each of these companies a growing competitor in the utilities sector. A sampling of "up-and-coming" vendors to the utilities market are noted in Exhibit V-7.

EXHIBIT V-7

Utilities

"Up-and-Coming" Vendors

- M3I
- Stagg Systems
- Siemens

E
Vendor Profiles

1. Andersen Consulting

69 West Washington Street
Chicago, IL 60602
Phone: (312) 580-0069
Fax: (312) 507-2584
Total Personnel: 22,730
Total 1992 Revenue: $2.7 billion

Company Description

Andersen Consulting is an international management consulting organization whose mission is to help its clients change their organizational structure to become more competitive. Andersen works with clients from every industry to integrate their technology, processes, strategies, and organization. Andersen Consulting offers its products through the following service lines:

- Business Process Management
- Systems Integration
- Strategic Services
- Change Management

Strategy

Utilities are one of six vertical industry markets addressed by Andersen. Revenue in 1992 from the utilities sector was approximately $260 million worldwide. Approximately 10% of Andersen's personnel are involved in utilities projects at any time.

Andersen competes across the entire utility application and services spectrum with particular emphasis on professional services and system integration activities. System integration projects typically involve customer systems, financial systems, maintenance, or facilities management.

Products and Services

Professional services projects to the utilities sector include customer systems, financial systems, maintenance, and facilities management.

Andersen offers a proprietary CASE technology called FOUNDATION which is composed of METHOD/1, PLAN/1, DESIGN/1, and INSTALL/1. CUSTOMER/1 is a specific implementation designed for utility customer systems. Also under FOUNDATION are TPS (Total Plant System)/Prism and WORK/1, a work management system.

Key Issues

- Andersen Consulting focuses on the selection and training of its personnel. Andersen professionals are leveraged by centrally located pockets of expertise. Extensive networking capabilities are used to apply the appropriate personnel to specific customer needs.

- Andersen believes by the end of 1993, 70-75% of its work will involve client/server technology.

2. IBM North America

560 White Plains Road
Tarrytown, NY 10591
Phone: (914) 333-3030
Total revenue: $26.5 billion
Total Employees: 95,400

Company Description

In addition to being the leading hardware vendor in the utilities sector, IBM is now well-positioned to offer professional services and systems operations services.

Strategy

Before its most recent reorganization, IBM had a strong vertical market focus on the utilities market. Since then much of the focus has been fragmented into separate groups. It is believed that ISSC will rally the other utilities elements within IBM and will turn their efforts into a strong market presence.

Products and Services

In professional services, IBM developed a service called UCDS (Utility Customer Design Service), an amalgamation of professional services and a base customer system design. With UCDS, IBM pursues professional services opportunities involving customer service systems.

The IBM subsidiary, Integrated Systems Solutions Corp., (ISSC) provides data center and systems integration outsourcing and related services. IBM was successful at landing its first major data center outsourcing contract in the utilities industry at Northwest National Gas.

Key Issues

- ISSC has renewed its commitment to its industry-focused approach to services and is developing a strong utilities industry focus.
- IBM had very strong growth in the utilities sector through 1991, though that growth slowed on the professional services side in 1992. However, IBM's growth is expected to continue, led by ISSC, and position it as a challenger for market leadership in the next five years.

3. Intergraph

One Madison Industrial Park
Huntsville AL 35894
Phone: (205) 730-2000
Fax: (205) 730-8300
Employees: 10,300
1992 Revenue: $1.2 billion

Company Description

One of the largest computer-aided-design (CAD) companies, Intergraph (originally incorporated in 1969 as MS Computing, Inc.) designs, manufactures, markets, and supports interactive computer graphics systems, expert systems, CAD/CAM applications software and systems, and geographic information systems (GIS).

Strategy

In 1992, Intergraph restructured its sales and support organizations across industry lines. Utilities is one of nine selected industries.

Intergraph has a leading position in GIS, and has used it to develop unique solutions for the utilities sector.

Products and Services

Intergraph is the leading supplier of CAD/CAM tools to the utilities sector. In addition, Intergraph offers a solid utility AM/FM application package. The company is experiencing financial difficulties as it makes the transition from a turnkey-system approach to an open system client/server implementation.

Intergraph has offered an AM/FM solution that uses the UNIX operating system and is complemented by Intergraph's base software package, FRAMME (Facilities Rule-based Application Model Management Environment). Intergraph also supplies training and support services.

Key Issues

- Intergraph leverages an active consultant participant program, providing free training to qualifying AM/FM consultants.
- Intergraph delivers on a key component of the AM/FM application, integrating the graphic and data base sides of AM/FM.
- Intergraph has chosen an aggressive alliance policy to expand its related applications.

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- **Software and Services Vendors**
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  - Procurement Plans (PAR)
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  - Awards (FAIT)
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CUSTOM PROJECTS

For Vendors—analyze:

- **Market strategies**
- **Product/service opportunities**
- **Customer satisfaction levels**
- **Competitive position**
- **Acquisition targets**

For Buyers—evaluate:

- **Specific vendors**
- **Outsourcing options**
- **Market opportunities**
- **Systems plans**
- **Peer position**

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