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PRODUCTION QC SCHEDULE

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Program Year: 1989

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Author: A. GRAHAM **EE#** 301

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Market Analysis
Program (MAP)

Industry Sector Markets 1989-1994

Telecommunications Sector

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Industry Sector Markets, 1989-1994
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I

Introduction

Nearly all industry, U.S. and foreign, is in the process of change—from an industrial, commodity-based economy to an information, service-based economy. Few industries have felt the change as forcefully as the telecommunications industry has.

Within the framework of the changing economy, the telecommunications industry can be characterized as highly competitive and volatile, with excellent growth and market potential.

While deregulation has caused a degree of turmoil for both users and providers, numerous opportunities have begun to emerge and many more are expected.

To date, deregulation has brought new services such as resale, digital termination, and value-added networks. Of greater significance is the fact that a base is being established for telecommunications organizations to become key service providers in the 'information age'.

There is currently keen interest in services such as mobile cellular, radio, videotext, fiber, audio, and image. Numerous service opportunities are expected to open over the next several years as the economy relies increasingly on information.

A

Market Structure

The market for services to the telecommunications industry centers around two distinct groups of customers. The first are the few, large, national and regional service providers. These are represented by the seven regional operating companies and the major national carriers. The major organizations are identified in Exhibit I-1.

EXHIBIT I-1

Major Telecommunications Service Providers

Organization	Type
AT&T	IXC
Ameritech	RBOC
Bell Atlantic	RBOC
Bell South	RBOC
Contel	IND
GTE	IND
MCI	IND
Nynex	RBOC
Pacific Telesis	RBOC
Southwest Bell	RBOC
United Telecom	IND
U.S. West	RBOC

The second group are the numerous local and independent providers whose services are frequently limited. Local providers may be able to provide only basic services, and independent providers frequently focus on a specific product or service.

In total, there are an estimated 2,000 providers of telecommunications services that have requirements for information services. Of these, the organizations identified in Exhibit I-2 represent an estimated 90% of the revenues generated by the industry.

1. Key Industry Components

Within the telecommunications industry, there are essentially three components—wireline, satellite, and radio.

- Wireline services include services delivered over traditional copper (or fiber) cables. Until approximately 25 years ago, cable was generally the only type of delivery method available.

EXHIBIT I-2

Telecommunications Industry Leaders

- AT&T
- MCI
- Sprint
- GTE*
- United Telecommunications*

* Includes total revenues for all LECs

- Satellite services are delivered through the use of earth stations that transmit to a satellite, which in turn broadcasts the data back to earth stations tuned to be able to receive selected signals.

- Until the advent of the cellular telephone, radio communications were not in high demand. Mobile radio communications were used, but there were numerous problems with quality and method of transmission. The quality was frequently poor and there was no privacy to the transmission. In addition, the transmission was confined to very narrow geographic areas.

Of equal or perhaps greater importance was that combining delivery modes and transmission methods was difficult and costly, precluding the integration of services. With the shift to digital-based services and improvements in technology, more high-quality services have become available.

2. IS Applications by Component

There are numerous applications for each of the components. For each, there are the traditional requirements for customer order and billing, accounts receivable and payable, information, etc. In addition, there are applications that are unique to each of the components.

- For wireline services, there are requirements for design and switching software, protocol conversion, network control, etc.

- For radio-based services, there are requirements for software to control calls and software to switch calls from one ‘cell’ to another.

B

Definitions

This analysis and forecast focuses on the needs of AT&T, the Bell Operating Companies (BOCs), independent local exchange carriers (LECs), long distance interexchange carriers (IXCs), long distance resellers, and cellular telephone operators.

Excluded from the analysis are value-added networks, the broadcasting and cable television industries, fiber optic and satellite networks, and international record carriers.

The analysis focuses on industry-specific products and services used by the included entities, rather than similar offerings used to manage large corporate networks.

The following provides a summary definition of a number of frequently used terms:

BOC (Bell Operating Company)—The regulated entity of the Regional Bell Operating Companies

FTS 2000—A contract let by the federal government to provide government-wide telecommunications services

Gateway—A method used by BOCs to provide access to unregulated services. The gateway provides a point of demarcation between regulated (basic) services and unregulated or value-added services.

ISDN—Integrated Services Digital Networks

IXC (Inter Exchange Carrier)—Service providers such as AT&T, MCI, and Sprint, that provide basic services between LATAs.

LATA (Local Area Transport Authority)—Defined geographic area within which a BOC is authorized to provide service

LEC (Local Exchange Carrier)—Regulated service provider to a local geographic area. May be a BOC or an independent service provider.

MFJ (Modified Final Judgment)—Court ruling providing the basis for operating authority of regulated telecommunications service providers

RBOC (Regional Bell Operating Company)—Term used to describe regional providers of regulated and unregulated telecommunications services that were formerly part of AT&T

RHC (Regional Holding Company)—Term used to describe regional providers of regulated and unregulated telecommunications services that were formerly part of AT&T. Also referred to as RBOC.

II

Issues, Trends, and Events

A

Issues

There are numerous issues facing both users and providers of telecommunications services. Users are concerned with the availability of services in the future, and the cost of present and future services. They have mounting concerns about the process of control and management of increasingly complex networks.

Providers are concerned about present and future user needs and requirements. They are also concerned with a variety of issues in the current and future regulatory environment.

Within the context of these two broad categories of issues, there are some issues that are of paramount or increasing importance in the industry. These are summarized in Exhibit II-1.

EXHIBIT II-1

Key Industry Issues

- Regulatory constraints
- Gateways
- LATA boundaries
- Service pricing
- Trade and competition

- *Regulatory Constraints*—The Modified Final Judgment continues to be the single most significant consideration for major telecommunication service providers.

  Although many questions concerning the Judgment have been resolved, and it does not have an appreciable impact on numerous providers (primarily smaller LECs), considerations concerning the Judgment pervade nearly all business plans.

  Gateways—During 1988, RBOCs were given permission to provide 'gateway' services. Although the ruling that provided this permission was reasonably explicit, a number of providers have had difficulty understanding exactly what is permitted and not permitted. The issue of allowable services is expected to exist for some time.

- *LATA Boundaries*—With the granting of permission to provide 'gateways', questions regarding 'inter-area' services are becoming more urgent. A number of BOCs have indicated that some traditional services will not be cost-effective if the service cannot be provided directly to a wide geographic (multiple LATA) area. This issue is expected to become increasingly important over the next several years.

- *Service Pricing*—The pricing of services has been an issue since the inception of deregulation, and is expected to remain an issue for some time.

  Until the recent change from revenue ceilings to price ceilings, service providers had little incentive to provide cost-effective service. Improvements in cost-effectiveness frequently did not result in the long-term investments necessary to continue high-quality service, since the profits could not be retained for reinvestment.

- *Trade and Competition*—An issue of growing concern to many providers of telecommunications services is the degree of competition from foreign providers, and the corresponding inability of U.S. providers to penetrate foreign markets.

  Since deregulation, providers of services have noted an increasing share of their markets going to foreign companies. While the RBOCs and major independent companies (Sprint, MCI, etc.) continue to satisfy the majority of their needs with U.S. companies, end users are increasingly looking upon foreign companies as services providers, reducing the market size for U.S. companies.

  As more of the U.S. market is consumed by foreign providers and business becomes increasingly global, many U.S. service providers are looking to foreign markets as sources of opportunity.

However, foreign markets are more tightly controlled, and market penetration has been difficult. The degree of difficulty is expected to remain and, in areas such as Europe, could increase.

In Europe, the economic community changes could result in informal, Europe-wide barriers for some time, as the countries and companies seek to protect an expanded market from foreign competition. If it develops, the protectionism would probably be in the form of selecting European vendors over others, rather than overt exclusion.

Vendors that will be successful in the 'new' Europe will be those that have a strong, established business base or relationships before the change in 1992.

B

Trends

Deregulation is bringing about numerous changes in the industry. Though the process of deregulation has resulted in considerable confusion among providers and users, key trends are beginning to emerge. The result of these trends over the next five to ten years will be in products and services that are increasingly information-rich. In addition, there will be increased focus on customer service. Key trends shown in Exhibit II-2 include the following:

EXHIBIT II-2

Key Industry Trends

- BOC freedom
- ISDN services
- Information services
- Mobile communications
- Network management
- Cable services

- *BOC freedom*—Over the next several years, the RBOCs will increase their tests of the limits of the Modified Final Judgement (MFJ). Near the end of the five-year horizon, the BOCs will be nearly free to compete in an open market. The BOCs will be able to provide services across LATA boundaries and will compete directly for the provision of information services.

- *ISDN Services*—Within the next five years, the term ISDN will nearly disappear from the public lexicon. Providers will begin to define 'service sets' that require ISDN as a technical base, but will market the sets of service, not ISDN.

  Services actually brought to the public will be market-driven. Users will have an opportunity to define specific services necessary to meet their needs, and to pay for them on a service-by-service basis. In addition, users will be able to receive mixes of services to meet their needs, at costs commensurate with the services received.

- *Information Services*—With the freeing of the BOCs, there will be an increasing number of information service products available. Initially, through gateways and alliances with information service providers, the BOCs will become direct competitors in the information services business over the next five years. However, the five-year time frame will be only the beginning. A significant number of services will not be available until the five- to ten-year time frame.

- *Mobile Communications*—Mobile communications will become increasingly important. From the current emphasis on mobile telephones, mobile service will expand to include mobile data services in a number of industries.

- *Network Management*—With the growth of value-added services, and particularly the emergence of virtual private networks, the BOCs will begin to be key providers of network management services.

  The BOCs will become increasingly responsive to customers' needs to have information about the operation and cost-effectiveness of their network, and will begin to provide considerably enhanced information about network design and operation.

- *Cable Services*—Over the next five years, the number of services that are delivered through cable systems will increase. Included in the cable services will be more services available to the home and office.

C

Events

Many important events took place in 1989. There were many changes in acquisitions and alliances, and many of the RBOCs began to identify services that could be provided as a result of the gateway decision. Four of these events are significant indicators of trends in the industry. They are summarized in Exhibit II-3.

EXHIBIT II-3

Key Events

- Gateway decision
- FTS 2000
- International investment
- Tariffs 12 and F

- *Gateway Decision*—The decision to allow the RBOCs to provide the gateway for information services is a key indicator of the trend toward permitting the RBOCs to provide a wider range of services.

  Though this decision currently prohibits the provision of the information service, it is a major change toward greater competitiveness. Over the next five years, the decision will be tested to determine the extent of its limits, and greater liberalization can be expected.

- FTS 2000—While the FTS 2000 contract is specifically related to the federal sector, there are aspects of the contract that have significance in the private sector.

  The contract specifies that future federal networks must be digital. The specification makes it necessary for providers to continue their development of all-digital networks. The continued development will ensure that digital (ISDN) services will be available sooner than they might otherwise have been.

  In order to fulfill the requirements of the contract, providers will need to increase their production capability. The increased production will result in lower unit prices and therefore the potential for lower prices for services available in the private sector.

- *International Investment*—During the year, there was considerable attention paid to the refusal to permit Nynex to participate in the building of the PTAT cable. Concurrently, Pacific Telesis was granted permission to participate in the building of a Pacific fiber cable system.

  While there were a number of factors that led to the decision to grant one request and deny the other, the decisions indicate that investments and service relationships are highly dependent on the form of the investment or relationship. Granting of permission to Pacific Telesis

indicates that RBOCs may be able to participate in a wide variety of ventures through acceptably structured relationships.

- *Tariffs 12 and F*—The filing of two tariffs during the year are key indicators of the trend of service costs. Both Tariff 12 and Tariff F are intended to provide a means for the RBOCs to charge lower prices to favored customers.

  While the tariffs (Tariff 12 for the private sector and Tariff F for the federal sector) relate only to contract pricing for large projects, they indicate that there is considerable room for reductions in tariffs. Historically, when lower prices are provided to the government or to some large customers, the lower prices will eventually filter down to private sector services.

Overall, INPUT believes that these events are clear indicators of cautious, but steady movement to greater competitiveness, increased sets of services, and the potential for lower prices.

III

Markets

A

Market Overview

The telecommunications sector is comprised of numerous providers, ranging in size from extremely small to the world's largest corporations.

The small companies include the smallest independent telephone companies (LECs) providing service to local communities throughout the country. The largest (RBOCs, IXCs, and independents) are providers of a wide range of products and services to customers throughout the world.

Either as a result of, or in spite of deregulation, the telecommunications industry has continued to grow. However, growth has not been as great as the providers would have liked.

Investments in productivity improvements and new products and services have been substantial over the past several years, and investment return could be several years away. The growth of basic (telephone) service, which contributes the greatest percent of industry revenues, has been generally static for at least the last two years, as shown in Exhibits III-1 and III-2. During the same period, the demand for text (telex, telegram) services has declined by an estimated 11%.

EXHIBIT III-1

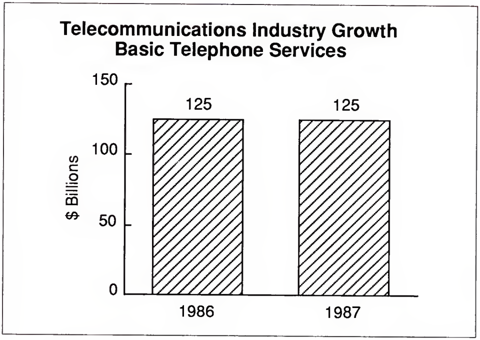
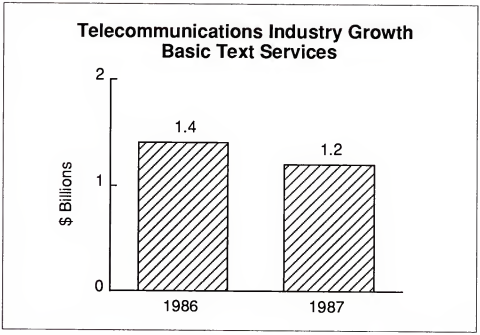


EXHIBIT III-2



The market is divided into three basic groups. The basic groupings include the RBOCs, the IXCs, and a number of independent providers.

- The RBOCs include regulated entities (BOCs) that provide basic transport services to predefined areas throughout the United States.

They also include a number of nonregulated subsidiaries that have emerged since deregulation. The nonregulated subsidiaries can provide a wide variety of services to customers throughout the world. The RBOCs are shown in Exhibit III-3.

EXHIBIT III-3

Regional Bell Operating Companies

- Ameritech
- Bell Atlantic
- Bell South
- Nynex
- Pacific Telesis
- Southwest Bell
- U.S. West

- Interexchange carriers (IXCs) provide service between the local service areas of the RBOCs. Major IXCs are shown in Exhibit III-4.

EXHIBIT III-4

Major Interexchange Carriers

AT&T
MCI
Sprint

- In addition to the two major categories, there are numerous independent service providers. Depending on the type of services provided, they may or may not be regulated. Key independent service providers are shown in Exhibit III-5.

EXHIBIT III-5

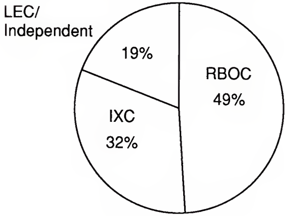
Key Independent Providers

Contel
GTE
United Telecom

Altogether, there are an estimated 2,000 providers of telecommunications services in the United States. However, the majority of the industry's revenues are realized by the top ten or twelve companies. Exhibit III-6 provides an estimate of the division of revenues.

EXHIBIT III-6

Industry Revenue Breakdown



B

Environmental Factors

There are numerous environmental factors which affect the telecommunications industry. Although there are a number of inhibiters, the driving forces tend to predominate. The inhibiters affect timeframes and costs, rather than the ability to develop and deliver new, cost-effective services.

1. Driving Forces

Driving forces in the telecommunications industry are closely aligned to the needs of user organizations, and include the following:

EXHIBIT III-7

Driving Forces

- Higher bandwidth
- Flexible services
- Service integration
- Internetworking
- User information/control
- Reduced costs

- *Higher Bandwidth*—Users are increasingly in need of higher bandwidth. As users work to integrate their business services, they are in need of greater capacity to process expanding volumes of work.

- *Flexible Services*—There is an increasing need for the ability to select services and combinations of services that will meet a user's specific needs. Since the majority of basic services have been met, users need the ability to tailor enhanced services that will address specific business requirements.

- *Service Integration*—There is increasing need to be able to integrate services across functions and geographic areas. Users frequently have little interest in services that are only available in a local area. They need services that are available at multiple plant locations or offices in a variety of geographic locations.

- *Inter-Networking*—Users recognize that there is frequently no single source of supply for all services. Since services (EDI, E-mail, etc.) must frequently be obtained from different vendors, they need to be able to transfer data between vendors.

- *User Information/Control*—Users are increasingly in need of the ability to control their own processing environment. Information is necessary to ensure control. A general lack of information and control is a key reason for lack of acceptance of high speed virtual public data networks.

- *Reduced Costs*—Reduction in costs continues to be a major concern, even with the significant reduction in usage costs that have taken place over the past several years. Users generally perceive a shifting of costs, rather than a true reduction in costs.

- *Standards*—Standards remain a key issue. Users need to be certain that once an investment is made in hardware or software, extensive rework will not be necessary to accommodate new or revised standards. Many users have opted to delay new services until standards are better defined.

2. Inhibiting Factors

While the driving forces predominate, there are several inhibiting factors that are causing the industry to experience less growth than could otherwise be expected.

EXHIBIT III-8

Inhibiting Factors

- Regulations
- Variety of services
- Vendor stability

- *Regulations*—The regulatory environment continues to have a stilting effect on the industry. While uncertainty remains regarding permissible services, providers will continue to be hesitant about making major investments in areas of opportunity.

- *Variety of Services*—There is an extensive array of services available from numerous vendors. The wide variety of similar services has caused users to delay choosing between them. Users frequently have insufficient time to conduct extensive analyses of service alternatives.

- *Vendor Stability*—Closely aligned with the availability of a wide variety of services, there is frequently concern about the stability of a vendor. There is often reluctance to invest in the services of a new vendor that may not be able to make long-term commitments.

C

Telecommunications Sector Expenditures

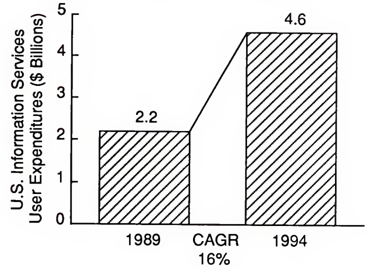
Revenues for the telecommunications sector are strong, and are expected to remain so for at least the next several years.

1. User Expenditures

As indicated in Exhibit III-9, the telecommunications sector is growing at a rate (16%) slightly greater than the information services industry as a whole (15%). Revenues for the telecommunications sector are expected to grow from an estimated $2.2 billion in 1989 to more than $4.6 billion by 1994.

EXHIBIT III-9

Telecommunications Sector Forecast, 1989-1994

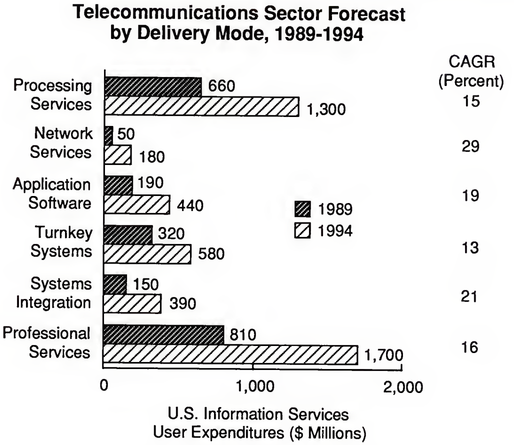


- While the rate of growth for the sector may not appear to be exceptionally large, it is important to note that revenues for the industry as a whole have been generally flat.

- Although revenues have been generally flat, continued growth in expenditures indicates that providers are making investments in areas such as productivity improvement and new services. The increased expenditures are necessary to meet growing user demands and to ensure maximum productivity in an increasingly competitive environment.

Analysis of the market by delivery mode (Exhibit III-10) indicates that while processing services represent a significant portion of the sector, professional services are strong and growing.

EXHIBIT III-10



- The growth in professional services results from the continuing need for both consulting and software development services to meet a growing number of conflicting needs and to provide increasingly flexible and integrated services.

2. By Industry Segment

As a means of identifying key areas of opportunity for services, INPUT analyzed the industry by vendor size. For each delivery mode, vendors were classified as small, medium or large.

Results of the analysis for the telecommunications segment indicated that providers generally fall into one of two categories, small or large. Unlike other industry segments, there were only a minimal number of medium-sized providers. The division between the large and small providers were as follows:

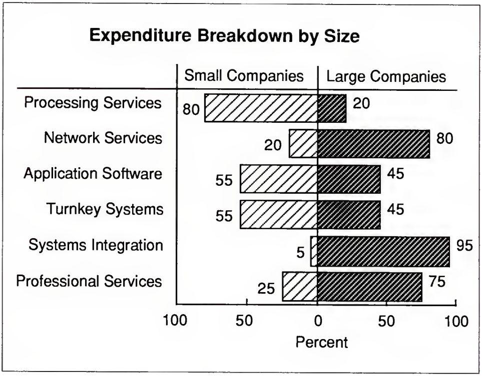
- *Large*—The large category included companies such as AT&T, MCI, the RBOCs, and Sprint.

- *Small*—The small category was comprised of the majority of the Local Exchange Carriers (LECs).

It should be noted that the operating units of GTE and United Telecom that provide local exchange services were considered individually. They were therefore considered part of the 'small' category.

As indicated in Exhibit III-11, the large providers account for the majority of expenditures for network services, systems integration and professional services. Much of the expenditure results from investment in new products and services.

EXHIBIT III-11



- The small providers account for the majority of expenditures for processing services, since greater economy can be achieved by having an outside firm perform processing.

- The need for applications software and turnkey systems is generally divided equally between the large and small providers. Both have a need to upgrade their software to meet growing user requirements, and for systems to meet an increasingly wide range of application needs.

D

Expenditures by Delivery Mode

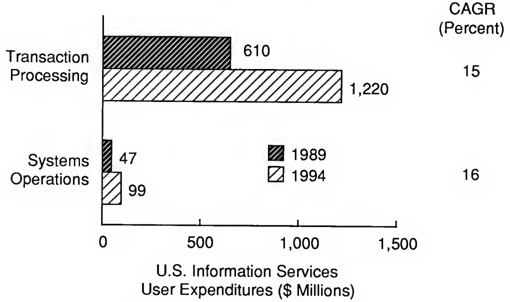
Analysis of revenues by delivery mode indicates that markets will generally remain strong. However, some softening has been noted in several areas.

1. Processing Services

The market for processing services is expected to remain stable, growing from $660 million in 1989 to an estimated $1.3 billion by 1994 (Exhibit III-12), an annual growth rate of 15%.

EXHIBIT III-12

Processing Services Forecast by Submode, 1989-1994



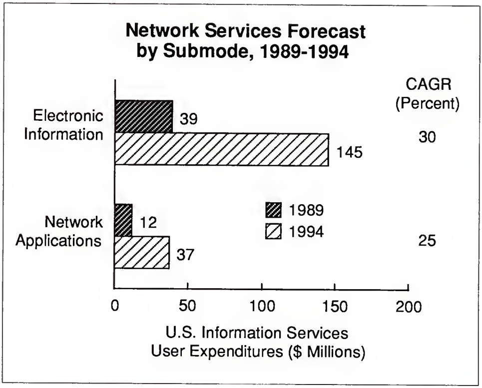
- Transaction processing services will continue to represent the majority of processing services for some time. Growing at an estimated 15% per year, services are increasingly provided through transactions, in response to the continuing need for current information.

- Systems operations represents a small portion of the processing services mode. Growth at an estimated 16% reflects the trend for firms to consider that independent contractors should assume responsibility for all processing services.

2. Network Services

The market for network/electronic information services is expected to show continued strong growth, from $51 million in 1989 to an estimated $180 million in by 1994 (Exhibit III-13).

EXHIBIT III-13



- Due to continued loosening of industry regulations, the demand for electronic information services will continue to grow at an estimated 30%, as providers identify a broader range of services that are allowable.

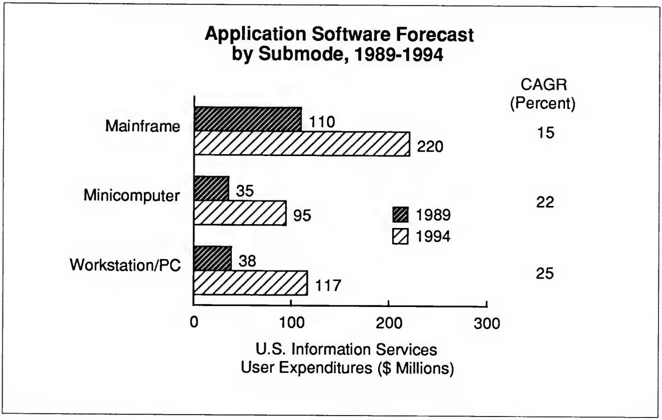
- Although the network applications segment is the smaller portion of network services, it is expected to show strong growth as an increasing number of allowable services are identified. The market for network applications is expected to grow at an estimated 25% for at least the next several years.

- Note that in prior forecasts, this submode was projected to grow at an estimated 40%. The higher rate was predicted on the belief that regulatory relief would permit a faster growth rate. While relief has been progressing, it has not been as rapid as originally believed. The projected growth rate has therefore been reduced.

3. Application Software

The market for application software will remain strong, growing from $186 million in 1989 to an estimated $438 million by 1994 (Exhibit III-14).

EXHIBIT III-14



In the 1988 forecast, INPUT projected a growth rate of approximately 30% for the application software delivery mode. In this year's forecast, the rate of growth has been reduced to 19%.

The previous projection was due to two assumptions. The first was that there would be more rapid granting of regulatory relief. This has been slower than expected. While relief will continue and modifications will be made, the rate will be slower than originally projected.

The second was that there would be more rapid incorporation of workstations into provider organizations. Acceptance of workstations and a commensurate increase in the need for application software has not materialized as rapidly as anticipated.

After taking into account the changes in rates of growth, the demand for application software is expected to remain strong.

- The demand for mainframe software is expected to remain strong, as the need for more flexible, integrated software increases.
- Flexible software is needed to meet the needs of users who want to define their own sets of services and who want increased detail and analysis of service costs.
- The demand for minicomputer software is expected to grow as providers acquire add-on processing capability for services such as voice messaging, etc. Vendors have frequently been reluctant to incorporate software for add-on services into their primary systems.
- The demand for workstation/PC software will also grow as vendors look for means to achieve greater productivity and perform increased analysis of their operations. Workstations/PCs are also increasingly used for software development.

4. Turnkey Systems

The market for turnkey systems (Exhibit III-10) is expected to grow in the telecommunications sector at a rate somewhat faster than in the industry as a whole. The growth results from the need for an increasing number of application-driven services such as voice messaging, EDI, etc. that are operated as standalone systems.

5. Systems Integration

Systems integration services currently represent approximately 7% of the sector (Exhibit III-10). The percent is expected to grow to 8% by 1994, due to a growth rate of 21% over the next five years.

6. Professional Services

Professional services represent the greatest portion of the telecommunications sector. This is not expected to change. There is a continuing need for both consulting and software development services to meet changing needs in a competitive market.

IV

Competitive Developments

A

Introduction

Since the beginning of deregulation, numerous firms or departments of large firms have targeted the telecommunications industry as a significant market. Many of the larger firms have established industry-specific groups to develop business with key industry leaders such as AT&T and the RBOCs.

To some, the industry has not developed as rapidly as originally anticipated. Encumbering regulation, rapidly changing technology, and poorly defined services have precluded the rapid deployment of many new or planned services. In addition, many users have been preoccupied with trying to consolidate or make better use of existing services and facilities.

An additional problem has had an impact on the movement of carriers into the provision of new services. As a result of deregulation, most of the carriers (BOCs) have had to spend considerable time, effort and money to re-do their billing and customer service systems.

Software available at the time of deregulation did not adequately provide for customer-oriented business, nor did it meet the needs of intercompany billing required for LATA and IXC-oriented processing. This has caused a drain on resources and has diluted management's ability to focus on new products and services.

An additional inhibiter to growth has been the background of many executives. Products of an established, highly regulated industry, many executives have not adapted well or quickly to an unregulated, competitive market.

While considerable work has been completed, much remains to be done in order to meet the needs of the future. The following section provides a summary of the services provided by vendors to the telecommunications sector.

B

Leading IS Vendors

A key characteristic of the telecommunications sector is that there are numerous providers offering a wide range of services. With more than 1,900 telecommunication service providers (LECs, IXCs, etc.) located throughout the country, and need for a wide variety of products and services, there are numerous local and regional providers to the telecommunications sector.

However, of the many providers, several derive significant revenue from services provided to the industry. Exhibit IV-1 summarizes leading vendors of services to the telecommunications sector.

EXHIBIT IV-1

Leading Information Service Providers Telecommunications Sector, 1988

Company	Revenue ($ Millions)
General Electric Info. Services	14
American Management Systems	30
Cincinnati Bell Information Systems	30 *
Computer Horizons	50 *
Electronic Data Systems	136

*INPUT estimate

- It is important to note that the major providers noted represent a comparatively small portion of the expenditures in the sector.

- It is equally important to note that the revenue derived from the sector by some organizations, such as CBIS and EDS, represents a comparatively small portion of the company's noncaptive revenues. For CBIS and EDS, the estimated percent of total revenue is 16% and 8%, respectively.

C

Mergers and Acquisitions

A key result of deregulation has been the need for the RBOCs to establish themselves in new lines of business. To be able to progress quickly, many of the organizations have pursued a strategy of acquisition.

A review of recent merger/acquisition activities provides an indication of the direction that a number of the RBOCs are taking. From the activities identified in Exhibit IV-2, several trends can be noted.

- Though specific orientation for each acquirer can be noted, they are not necessarily consistent. An RBOC (or independent) may acquire more than one company of the same type. They may also divest themselves of similar types of companies. (Lack of performance could be a leading reason for the sale.)
- The most popular industries of the target companies appear to be paging and cellular telephone. This is not surprising, since they are rapidly growing industries and are generally outside the constraints of the MFJ.
- With improving profit positions, there has been considerable attention to the buyback of shares by the organizations. This provides substantial resources for future expansion or new acquisitions.

D

Vendor Profiles

This section profiles vendors providing processing and network services, professional services, software, turnkey systems, and systems integration services to the telecommunications industry. It focuses on major market participants and innovative firms, with particular attention paid to recent developments.

Additional information about these and other companies can be obtained from INPUT's *Vendor Analysis Program.*

1. Analysts International Corporation (AiC)

Analysts International was formed in 1966 to provide professional services to a wide variety of industries. An estimated 20% of the company is owned by Computer Task Group. The company's 1988 worldwide revenues were estimated to be $70 million.

Of AiC's total revenue, approximately 13% was derived from the telecommunications sector. Of the total derived from this sector, nearly all resulted from the development of application software products (professional services). The majority of this was for mainframe computers.

EXHIBIT IV-2

Merger/Acquisition Activities

Acquirer Company/ Acquired Company	Announce Date	Comments
Bell Atlantic/Data 3 Computer	7/06/88	Computer sales
Bell Atlantic (Sorbus)/ (Computer Maint. Co.)	8/11/88	Computer maintenance
Bell Atlantic/Dyncorp	11/16/88	
Bell Atlantic/Multicom	12/02/88	Paging
BellSouth Corp./ Mobil Comm. Corp.	1/25/88	Paging/answering service
BellSouth Corp./ United Telecom Cellular	7/14/88	Mobil cellular
BellSouth Corp./ Management Sciences	7/22/88	Computer software
BellSouth Corp./ Voicecall Comm.	8/29/88	Paging
Cargill Inc./GTE Corp.	12/08/88	Investment position
Centel/United Telespectrum	3/14/88	Cellular phone
Compucom Systems/ Compushops (Bell Atlantic)	2/01/88	Computer retailing
Contel/Realcom Comm	2/11/88	Communications co.
Contel/Southland Mobilcom	3/4/88	Cellular telephone
Contel/United Telecom	7/15/88	Various properties
Contel/Eaton Corp.	7/24/88	Information system
Eastern Microwave/ U.S. Sprint (Microwave Int.)	3/30/88	Microwave services

EXHIBIT IV-2 (Cont.)

Merger/Acquisition Activities

Acquirer Company/ Acquired Company	Announce Date	Comments
GTE Corp./Choice Computer	4/25/88	Software distributor
GTE Corp./GTE Corp.	8/04/88	Share buyback
GTE Corp./EMC Express	10/11/88	Healthcare
GTE Corp./IHC Services	10/11/88	Healthcare
IBM/Pacific Telesis	3/21/88	Network equipment
MCI Communications/ MCI Communications	3/30/88	Share buyback
MCI Communications/ MCI Communications	10/28/88	Share buyback
MCI Communications/ Int. Telecharge	1/12/89	Long distance services
Pacific Telesis/Pacific Telesis	3/16/88	Share buyback
Pacific Telesis/ ABI Amer. Bus. Phones	8/09/88	Telephone co.
Pacific Telesis/Pacific Telesis	12/08/88	Share buyback
Southwestern Bell/ Southwestern Bell	3/31/89	Share buyback
Southwestern Bell/ Omni Communications	3/31/89	Paging company
Southwestern Bell/ Crisco Communications	6/29/88	Carrier/paging
United Telecom/U.S. Sprint	7/18/88	Long dist. comm.
U.S. Sprint/ Private Transatlantic Cable	2/29/89	Long dist. comm.
Versys Corp./Contel (Bus. Sys.)	12/29/88	Business systems

The company considers the telecommunications industry to be a key target industry, but has focused increased attention on the electronics and manufacturing sectors over the past two years.

Between 1987 and 1988, revenues from the electronic sector increased from 17% to 30% of total revenue. During the same period, revenue from the telecommunication sector declined, from 18% to an estimated 11%.

2. American Management Systems

Founded in 1970, AMS provides professional services, application software and processing and micrographic services to a variety of industries. Since 1982, AMS has focused on telecommunications as a key industry for the company's services.

AMS's 1988 worldwide revenues are estimated to be in excess of $213 million. Of this, services to the telecommunications sector represent approximately $30 million (14%). Over the past several years, service to the telecommunications sector has represented one of the fastest-growing areas of the company's business.

For the years 1986, 1987, and 1988, the company's revenues from the telecommunications sector increased by 42%, 57%, and 340% respectively over the previous year. In 1985, the company's revenue increased only 5% over the previous year.

The company's revenues are derived primarily from professional services. A key service has been the development of customer billing, message processing, service order management and carrier access billing. The services are provided to local companies, interexchange carriers, international carriers, electronic mail providers, and cellular telephone companies.

3. Cincinnati Bell Information Systems

In 1983, CBIS was formed as an independent, unregulated subsidiary of Cincinnati Bell, a company founded in 1962. CBIS provides software products and professional and processing services to telephone companies, large corporations, and the government. CBIS has also been active in providing products and services to foreign PTTs.

Key software products are related to customer billing, order entry, message processing, cable records, customer service, construction management, and cellular account management. Products and services for the telecommunications sector are provided through CBIS's Telecommunications Information Systems business unit.

In 1988, CBIS derived an estimated $30 million from the noncaptive, domestic telecommunications industry. This represented approximately 16% of the company's revenues.

CBIS considers the telecommunications industry (both domestic and international) to be a strong niche for the company. However, it is placing increased emphasis on diversifying into nontelecommunications-industry-related activities.

As an indication of interest in nonindustry activities, CBIS has recently begun work in image processing, a process that permits financial institutions to provide images of transaction documents as an alternative to returning original documents.

Of increasing importance to CBIS's business is a focus on selling solutions, which includes increased activities in the area of systems integration. With strength in both products and professional services, CBIS is expected to continue its growth as a diversified service provider.

4. Computer Horizons Corporation

Formed in 1969, Computer Horizons is a custom software development services company providing systems analysis, design, and programming services to large companies, primarily in industrial/manufacturing, communications, and financial services industries.

Much of the company's business involves the development of major mainframe applications, with particular emphasis on data base technologies.

Of Computer Horizons' total 1988 revenue of $79 million, the majority (90%) is derived from professional services. Approximately 10% is derived from systems integration.

Prior to 1988, the majority of Computer Horizons' revenue was derived from the industrial/manufacturing and financial services sectors. In 1988, the company reports that the majority of its revenues were derived from the telecommunications industry. The sector revenues resulted from continued work in the design and development of telephone company billing systems.

5. Computer Task Group

Founded in 1966, Computer Task Group (CTG) is one of the largest providers of computer-related professional services. In 1988, CTG's worldwide revenue was estimated to be in excess of $218 million. Of the total, $209 million was earned in the U.S.

Of the total U.S. revenue, approximately 85% was derived from professional services. The remaining 15% was derived from systems integration. Of the professional services revenue, 85% was derived from software development.

While only an estimated 5% ($12 million) of the company's revenues were derived from the telecommunications sector, CTG has strong relationships with fifteen divisions of interstate companies, with 11 regional and state telephone companies, 7 units of large independent companies, and at least one large international company.

The company's strategy is to be a full service provider. CTG provides applications support for systems related to customer services, network services, operator services, and marketing services.

As a leading professional services company, CTG believes that the telecommunications industry provides significant opportunities, but will most likely not devote significant additional resources to marketing to the industry.

6. Electronic Data Systems Corporation

Founded in 1962, Electronic Data Systems Corporation (EDS) is a leading provider of computer and communications services to a wide variety of industries.

In 1988, EDS reported worldwide revenues of nearly $5 billion. Of the total, an estimated $1.7 billion was derived from the U.S. Of the total revenue, the largest portion, an estimated 58%, is derived from processing services. An additional 20% is derived from systems integration projects.

EDS derives substantial revenues from nearly every industry sector. The two largest are the state/local and federal government sectors, representing an estimated 35% of their total revenue. Revenues from the telecommunications sector represents an estimated 8% of the total revenues. Of the sector total, revenue from processing services is estimated to be $99 million. Revenue from systems integration is estimated to be $41 million.

7. General Electric Information Services Company

Formed in 1979, General Electric Information Services Company (GEISCO) is a consolidation of General Electric's MARK III worldwide services.

One of the largest information services networks, GEISCO's 1988 worldwide revenues were estimated to be in excess of $400 million. Of the total revenues, GEISCO's U.S. revenues were estimated to be approximately $200 million.

The telecommunications sector is important to GEISCO, but currently contributes only an estimated 7% to corporate revenues. Approximately $10 million is derived from processing services, and $4 million is from network services.

One of GEISCO's key services to the telecommunications industry is its Mechanized Assignment and Record Keeping (MARK) service, part of its computing services.

The service interfaces through IBM PCs at telephone company locations to assist in service order processing, trouble analysis and repair, line testing, inventory and cable management, and numerous other areas related to ongoing operations management.

8. Mentor Graphics Corporation

Approximately eight years old, Mentor Graphics provides circuit design software to domestic and international telecommunications organizations. Mentor develops the software, packages it with Hewlett-Packard systems, and sells the total package as a turnkey system.

Customers include major U.S. and international telecommunications companies having a wide range of applications, such as Alcatel, AT&T, British Telecom, Compression Labs, ITT, and NTT.

Mentor's revenues for 1988 were reported to be approximately $25 million, representing a 35% growth rate over previous years. The company projects continued growth at an estimated 25% per year for the next several years.

Reduction in the growth rate is attributable to a general consolidation taking place in the industry, particularly in Europe, which represents 50% of Mentor's revenues.

Mentor's future product strategies are centered around improving its product base, to provide more cost-effective processing. A new product, due for release next year, will provide the capability for concurrent processing, significantly reducing product development time.

Mentor views the telecommunications market as an open and growing market. Mentor believes that it has a strong competitive position that will continue to grow.

In addition to the firms noted above, there are numerous firms that provide a variety of services related to their expertise.

While some receive significant revenues form the telecommunications sector, many receive only limited revenues, providing valuable services in niche areas. Frequently, they provide their services only in narrow geographic areas.

9. AGS Computers, Inc.

AGS provides custom software development, professional services, and applications software for the telecommunications, banking/finance, and computer manufacturing industries. The company derives an estimated 25% of its revenues from the telecommunications industry, primarily from AT&T.

10. Anderson-Bell Company

Formed in 1980, Anderson-Bell provides software for statistical analysis. Its key product is ABstat, a statistical analysis package that runs on IBM and IBM-compatible PCs.

11. Appex-Lynach Systems Corporation

Appex-Lynach custom develops software on DEC equipment for most business and engineering aspects of telecommunications companies. Its cellular roaming technology is reported to be in use by Bell Atlantic and by NYNEX.

12. Boole & Babbage Incorporated

Boole and Babbage is a leading provider of software for optimizing the use of computing resources. System optimization is increasingly important for systems supporting customer service activities.

13. Commercial Software Inc.

Commercial Software provides several software packages for cost allocation, telecommunications equipment management, on-line inquiries and credit card authorization, trouble reporting, network management, and network optimization and design, primarily for DEC VAX processors.

14. Computer Generation

Formed in 1968, Computer Generation is a software developer and consulting company specializing in measured telephone services. The company's key product, TCLS, is used by telephone companies to capture time and usage charges for transmission to hotels for customer billing.

15. Comshare, Inc.

Comshare provides processing systems and services to assist telcos in controlling administrative activities such as telephone number assignment and voice traffic load balancing. The company continues to increase its focus on decision support systems, providing services to domestic and international companies including AT&T, Pacific Telesis, British Telecom, and Telecom Canada.

16. DataProducts

An affiliate of Sugar Land Telephone (Texas), DataProducts markets carrier access billing systems for IBM System 36 and 38 computers. The company is an IBM value-added reseller, and provides a variety of professional services.

17. Datronic Systems, Inc.

Formed in 1973, Datronic is a developer of data base software and a provider of programming services. Services are provided to all industry sectors.

18. DMW Commercial Systems

Formed in 1979, DMW Commercial Systems is a provider of industry-specific and nonindustry-specific software. The company manufacturers telephone and voice equipment, and provides processing services for network analysis to determine optimum network structure.

19. Dyatron Corporation

Formed in 1964, Dyatron is a developer of accounting software, primarily for the retail industry. It also provides custom consulting and programming services to multiple industries.

20. Emery DataGraphic

Emery provides professional services consulting and conversion to telcos and other utilities, to automate mapping and facilities management recordkeeping.

21. ExperTelligence Incorporated

A private company formed in 1980, ExperTelligence provides artificial intelligence software, a natural programming language, an expert system and a file transfer system. Products are provided to all industries.

22. Geographic Systems, Inc.

Graphic Systems provides marketing software for geographical analysis, and forecasting for planning wire centers and telephone exchange capacities. The company also performs professional services.

23. Graphic Software Systems

A private company formed in 1981, Graphic Software Systems produces and markets a number of software packages for graphics creation and presentation. Its products are provided directly to computer manufacturers and VARs.

24. H&A Computer Systems

A private company formed in 1978, H&A develops systems and applications software, including financial analysis, systems utilities and communications. The communications software links IBM mainframes, Series 1s, and PCs.

25. IBM

IBM works closely with several equipment manufacturers and telephone companies to develop software interfaces for Bellcore's Intelligent Network Architecture for international services.

26. Information Dimension Incorporated

Information Dimension is a unit of the Battelle Memorial Institute. It is a nonprofit developer of software for text storage, management, and retrieval. Timesharing, consulting and programming services are also provided.

27. M/A/R/C Incorporated

A private company formed in 1970, M/A/R/C provides word processing software across industry lines.

28. Manufacturing and Consulting Services

A private company formed in 1971, it is a subsidiary of MCS, Inc.. The company develops CAD/CAM software, primarily for mechanical and electrical engineers in the engineering and aerospace industry. Products are also sold to the telecommunications industry.

29. Mitchell and Gauthier Associates

A private company formed in 1975, Mitchell and Gauthier Associates develops engineering software with an emphasis on products that perform continuous simulation and engineering modeling. The company is also a distributor of scientific/engineering products.

30. Network Software Associates Incorporated

A private company formed in 1980, the company is a developer of communications software and hardware. Its primary product is used to permit a PC to act as a 3217 terminal. The company also provides a variety of products which allow PCs to act as RJE (Remote Job Entry) devices.

31. North Central Data Cooperative

North Central is a data processing cooperative servicing member telcos and other independents, as well as other rural utility companies. The cooperative sells turnkey systems and provides software maintenance and consulting services.

32. Performance Systems Incorporated

A private company formed in 1981, Performance Systems develops systems software for performance management of mainframes and minicomputers.

33. Rockwell International

Rockwell markets systems that provide enhanced 911 services. The systems route emergency calls to emergency service providers, and aid in caller identification and location.

34. SK Concepts

A private company formed in 1980, SK Concepts provides application and networking software for billing and management of radio communications centers.

35. Telos Consulting

A public company formed in 1969, Telos is a subsidiary of the Telos Corporation (Santa Monica, CA). The company develops scientific software for multiple industries, including telecommunications. The parent company provides custom programming services to all industries.

36. Urban Decision Systems Incorporated

A private company formed in 1974, the company provides demographic software for mailing and other purposes. Service is available through timesharing. Software is available for mainframes and PCs.

37. Wicat Systems Incorporated

A public company formed in 1977, Wicat provides software related to student training and educational courseware. Software tracks student progress through a series of lessons. Software is provided to all industries.

V

User Budget Considerations

Long viewed as a stepchild of data processing, telecommunications is now viewed increasingly as a strategic resource, receiving more attention from corporate offices.

Concurrently, end users of telecommunications services (both business and personal) are faced with a complex array of products and services.

With the rapid changes taking place in industry—the increased attention, and the increased products and services—telecommunications managers are placing greater emphasis on identifying products and services that will not only meet the short-term needs for reduced costs, but will provide a base for strategic expansion. As a result, they frequently take longer to make decisions, trying to ensure that investments made will meet both current and future needs.

The purpose of this chapter is to highlight a number of user considerations that do or will have an impact on user expenditures for telecommunications services.

A

Driving Forces

There are a number of driving forces behind user decisions to acquire telecommunications services. Key factors summarized in Exhibit V-1 include the following:

- *Integration*—Increasingly, organizations are working to develop integrated systems that will support corporate strategy and direction.
- *Connectivity*—In order to meet the needs of integrated systems, there is a growing need to provide connectivity between a wide range of computer and communications products and services. Connections are needed between vendor-provided networks as well as private networks.

EXHIBIT V-1

User Driving Forces

- Integration
- Connectivity
- Consolidation
- Decentralization
- Cost reduction

- *Consolidation*—Corporate consolidation is driving a need to consolidate disparate network services. Networks from different organizations are frequently used to support different applications with differing operating requirements. Frequently, standards and equipment are different, requiring significant cost and time to consolidate networks.

- *Decentralization*—As organizations consolidate, there is a trend toward moving decision-making to lower levels. This necessitates an ability to move data between dispersed organizational entities quickly and easily.

- *Cost Reduction*—With the need to provide more data to more locations in the same or less time, there is the need to reduce costs for services.

B

Major Issues

There are a number of issues associated with the forces causing users to change. The issues summarized in Exhibit V-2 include the following:

EXHIBIT V-2

Major User Issues

- Standards
- Service availability
- Service pricing
- Management effectiveness

- *Standards*—To meet the needs of integrated systems, equipment and service standards are necessary. While standards development has been progressing rapidly, users believe that many standards to support future services are not present. Users are reluctant to invest in equipment and services that will require change at a later date.

- *Service Availability*—Users are concerned that needed services are not readily available. They indicate that, while ISDN services have been discussed extensively, few services are available. They are looking for vendors to identify solutions that will address their problems.

- *Service Pricing*—Users are concerned about the direction in which prices (tariffs) will move. Although there is a general belief that prices will move downward over the long term, there is an equally strong belief that short-term costs will increase. In many cases, users will wait until services become more cost-effective, rather than change now.

  In addition to the costs of existing services, users are reluctant to implement services for which there are no agreed-upon prices. This is the case for many ISDN services.

- *Management Effectiveness*—A growing concern in many organizations is the effectiveness of telecommunications managers. Having progressed into management from highly technical positions, many telecommunications managers are not prepared to deal effectively with management issues such as strategic planning, organizational effectiveness, asset utilization, etc. Management effectiveness is becoming more important as telecommunications facilities and services are increasingly recognized as assets.

VI

Opportunities

There are numerous opportunities for services in the telecommunications sector. However, with an overabundance of options, users have only limited ability to absorb new services.

Considering the seeming overabundance of service options, and a general lack of confidence of many users in the ability of providers to successfully deliver quality services, INPUT identifies short-term opportunities that are geared to assisting providers strengthen their market and service positions. Key opportunities are summarized in Exhibit VI-1.

EXHIBIT VI-1

Key Opportunities

- Electronic data interchange (EDI)
- Enhanced billing systems
- Customer reporting services
- Traffic management/analysis
- Security systems
- ISDN service sets
- Network management
- Mobile data

A

Electronic Data Interchange

Whether through gateway services or through direct service provision, there is an increasing need for electronic data interchange (EDI) services.

Products and services that support the Telecommunications Industry Forum (TCIF) subset of the ANSI X12 EDI standard are becoming more necessary to users throughout the country.

While initiatives to date have been primarily concerned with larger national and multinational companies, the next several years should see greater interest at a local level, between medium-sized companies and their suppliers.

B

Enhanced Billing Systems

Since deregulation, there have been major efforts to upgrade or replace antiquated billing systems. With basic systems now in place, emphasis should shift to enhanced systems that will provide greater flexibility in meeting user requirements.

Users need billing information that helps them understand where and how they are incurring charges. With the advent of ISDN-related services, there will be greater need to tailor billing information so as to identify the customer's service costs by type of service and by service consumer.

In the future, successful providers will need to be able to tailor supporting statements to meet the requirements of individual users.

C

Customer Reporting Services

In addition to more flexible statements, users need analytical reporting that will provide information by type of service.

Users indicate that they would be willing to pay for add-on services that would provide analysis of use by type of service, etc. This could require additional changes to systems, but could result in added revenue streams for service providers.

D

Traffic Analysis/ Management

While many telcos and independent providers can—and do—assist with traffic analysis, the need for ongoing management and analysis processes is growing.

Commercial network analysis systems provide extensive information. However, users are frequently understaffed and are unable to conduct comprehensive analyses of traffic patterns. As a result, they will often overspend to ensure excess capacity, or underspend and suffer reduced quality.

There is a need for products which can provide comprehensive analysis of a user's internal and external network. This need will become greater as services and facilities become more integrated.

E

Security Systems

With the growing number of security breaches, there is a growing need for systems that will monitor network access and protect against unauthorized access.

Systems that can detect unauthorized access and trace it to the source will become necessary as organizations rely more heavily on integrated networks.

F

ISDN Service Sets

The movement to ISDN affords numerous opportunities for software developers, professional services, and service firms.

However, it is time to drop the term ISDN from the marketing lexicon, and begin to focus on sets of services that are needed by industry and by users.

Analysis should be done to identify the types of digital-based services needed by industries such as financial services, manufacturing, etc. The needs of these industries frequently differ. Packages of services are necessary, that will address specific problems or improve productivity.

Along with the identification of the services, there needs to be software that will permit users to mix and match services to meet specific needs.

Digital-based services are expected to show growth in the next several years. However, success in implementing services will be greatly dependent on the success of telcos and independent providers in understanding and developing responses to users' needs and requirements.

G

Network Management

The management of networks is becoming more complex. As networks grow in size and services become more integrated, there will be a growing need for products and services that can monitor network performance and provide management data.

In addition to the hardware- and software-related products and services, there is a growing need for training and education. Organizations frequently devote only limited time to training, and telecommunications staff are not able to successfully use available tools.

H

Mobile Data

The mobile telephone industry has demonstrated the success of cellular technology. While problems do remain, there will continue to be a requirement for mobile data services.

Mobile data services will be in demand for field personnel and for industries such as transportation, as will positioning and messaging systems based on cellular technology.

In addition, cellular technology could be an attractive option for extremely rural parts of the country. Cellular voice and data could meet the majority of the needs of rural communities.

VII

Conclusions and Recommendations

A Conclusions

There are numerous conclusions that could be drawn from analysis of the industry. However, three predominate—these key conclusions are summarized in Exhibit VII-1.

EXHIBIT VII-1

Key Conclusions

- Regulatory concerns continue
- Quality increasingly important
- Solutions needed

- *Regulatory concerns continue*—Preoccupation with regulations and the degree of latitude permitted for new service offerings continues to be preeminent in the industry.

  For telecommunications services providers, these concerns will continue to be major factors in any business decision and will inhibit the growth of new, creative services.

  For providers to the telecommunications sector, preoccupation with regulations means that greater care must be taken in developing new products and services. In addition, more time will be needed to market new services, since regulatory impact will have to be assessed.

- *Quality increasingly important*—To the end user, quality is of increasing importance. With basic needs generally satisfied, and with an increasing number of competitive services, only services that meet quality requirements will be successful.

- *Solutions needed*—There is a need for services that permit users to integrate their business operations. Users need solutions that will integrate voice and data, internal and external networks, etc.

  For both telecommunication service providers and providers to the telecommunications sector, this requirement means that a deeper understanding of the business concerns of an organization is necessary.

  Telecommunication service providers must also be able to mix and match a broad range of services into tailored offerings that address specific requirements.

B

Recommendations

INPUT makes the following recommendations for both providers of telecommunication services and for providers to the telecommunications sector. Key recommendations are summarized in Exhibit VII-2.

EXHIBIT VII-2

Key Recommendations

- Increase quality
- Be realistic
- Increase customer sensitivity
- Develop creative products

- *Increase quality*—In products and services provided to the telecommunications sector and providers of services to end users, product quality needs to be improved.

- *Be realistic*—More emphasis should be placed on the ability to deliver on commitments made. Users generally recognize that ISDN services are limited. Likewise, they recognize that providing high-capacity, ISDN-based, integrated services for one large company does not address their needs. However, users do have a keen interest in specific services that will address their needs.

For providers to the telecommunications sector, establishing relationships that will result in evolution of a product will be preferred to promises of a single comprehensive system that is proposed to meet all needs.

- *Increase customer sensitivity*—Both telecommunications service providers and providers to the telecommunications sector need to become more attuned to the needs of the end user.

  The needs and requirements of the end user should be thoroughly understood. As part of the analysis of needs and requirements, opportunities should be sought that may be outside the mainstream of existing products and services. Responses to the needs should be addressed.

- *Create new products*—With many basic needs generally met, emphasis should be placed on creating the 'next generation' of products. This is particularly true in value-added services such as voice messaging and electronic mail.

TE-A

Appendix: Market Data Base, 1989-1994

Telecommunications Sector User Expenditure Forecast By Delivery Mode, 1989-1994 ($ Millions)

Sector by Delivery Mode	1988	Growth 88-89 (%)	1989	1990	1991	1992	1993	1994	CAGR 89-94 (%)
Total Telecommunications Sector	1830	18	2168	2517	2925	3402	3964	4610	16
Processing Services	560	17	656	755	869	1000	1151	1324	15
- Transaction Processing Services	525	16	609	700	805	926	1065	1225	15
- Systems Operations	35	35	47	55	64	74	86	99	16
Network/Electronic Information Services	40	28	51	66	85	109	141	181	29
- Electronic Information Services	30	30	39	51	66	86	111	145	30
- Network Applications	10	20	12	15	19	23	29	37	25
Application Software Products	155	20	186	220	260	309	368	438	19
- Mainframe	95	18	112	129	148	170	196	225	15
- Minicomputer	30	17	35	43	52	64	78	95	22
- Workstation/PC	30	28	38	48	60	75	94	117	25
Turnkey Systems	270	17	316	357	403	456	515	582	13
Systems Integration	125	20	150	181	219	265	325	385	21
Professional Services	680	19	809	939	1089	1263	1465	1700	16

About INPUT

INPUT provides planning information, analysis, and recommendations to managers and executives in the information processing industries. Through market research, technology forecasting, and competitive analysis, INPUT supports client management in making informed decisions.

Continuous-information advisory services, proprietary research/consulting, merger/acquisition assistance, and multiclient studies are provided to users and vendors of information systems and services (software, processing services, turnkey systems, systems integration, professional services, communications, systems/software maintenance and support).

Many of INPUT's professional staff members have more than 20 years' experience in their areas of specialization. Most have held senior management positions in operations, marketing, or planning. This expertise enables INPUT to supply practical solutions to complex business problems.

Formed as a privately held corporation in 1974, INPUT has become a leading international research and consulting firm. Clients include more than 100 of the world's largest and most technically advanced companies.

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