INPUT

RESEARCH REPORT

US Telecommunications Sector IT Software & Services Market 1997 - 2002

United States Telecommunications Sector IT Software & Services Market: 1997 - 2002

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Abstract

The Telecommunications industry has been characterized by a monopolistic management culture for almost its entire 100 years history through to the breakup of AT&T in the early 1980s.

Now the impact of liberalization (e.g. the Telecommunications Act of 1996), rapidly developing technology, especially the Internet, and the burgeoning data communications requirements of enterprises are challenging the traditional industry model.

The Telecommunications industry is deploying IT based solutions focussed on transitioning to a 'data, Internet, mobile, voice' model from a 'voice' only model, building and retaining the customer base in markedly competitive markets and meeting added-value service needs with Enterprise Network Management and Intelligent Network services.

This report assesses the impact of these changes on the IT market within the U.S. Telecommunications sector, particularly on the current and future use of IT Software & Services.

The report provides an analysis of total IT budgets. It provides forecasts for IT Software & Services expenditure through to the year 2002 and provides comparisons with other industry sectors.

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Market Forecast Program

United States Telecommunications Sector IT Software & Services Market : 1997 - 2002

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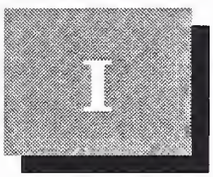

Introduction

This report is produced as part of INPUT's U.S. *Market Forecast Program* for the IT Software & Services industry.

This report is one of a series produced by INPUT to examine the relative importance and position of key industry sectors for the U.S. IT Software & Services business.

Companion reports in other INPUT Programs cover these industry sectors for Europe and from a worldwide perspective.

This chapter identifies the purpose and scope of this report, describes how the document is organized, and explains INPUT's research methodology.

A Purpose of the Report

The purpose of this report is to provide an industry perspective on the Telecommunications sector in the U.S. for IT Software & Services vendors.

The report provides a quantitative analysis of the significance of the sector in relationship to the whole market and to other industry sectors for overall IT related expenditure especially expenditure on IT Software & Services.

The Telecommunications Sector addressed in this report, as defined by INPUT, is divided into two major segments:

- The first is predominantly comprised of common carriers (telephone and circuit providers).

- The second is comprised of broadcast service providers, such as general media and cable TV service providers.

The categories are derived from the Standard Industry Classification (SIC) code for Communications (SIC code 48), see Appendix C.

This report, whilst providing quantitative information about the overall IT expenditure, and detailed analyses of IT Software & Services expenditure, of the Telecommunications sector, focuses on the particular challenges being faced by the common carriers in the United States.

B
Scope of the Report

This report specifically focuses on the Telecommunications sector, as defined above, in the U.S., from the perspective of the IT Software & Services industry.

The analysis of this sector provided in this report, covers total IT expenditure in general and IT Software & Services user expenditure in particular.

These areas are described in the sub-sections below.

1. Total IT Expenditure

Respective sections in the report analyze and forecast the total IT budget, including both internal and external IT-related spending. This comprises:

- Equipment sales — expenditure on computer and data communications hardware products.

- Software products — all expenditure on systems software products and applications software product licenses including support services where these are included within the basic license fee.

- Information services — all expenditure on professional services, systems integration, outsourcing, processing services, network services, turnkey systems, systems software product support services and applications software product support services, and equipment services which comprises equipment maintenance and environmental services.

- Communications — all expenditure on IT-related data communications services.
- Facilities — IT budget expenditure on overheads such as space, heating, lighting, furniture, vehicles etc.
- Staff — direct in-house staff costs including any temporary contract labor.

2. IT Software & Services Categories

The complete list of categories included within INPUT's definitions is as follows:

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

3. Industry Sectors

INPUT defines the following industry sectors according to the most recent revision of the Standard Industrial Classification (SIC) code system:

- Discrete manufacturing.
- Process manufacturing.
- Transportation services.
- Telecommunications.

- Utilities.
- Retail trade.
- Wholesale trade.
- Banking and finance.
- Insurance.
- Health services.
- Education.
- Business services.
- Federal Government.
- State and Local Government.
- Miscellaneous industries.

The definition of these sectors by SIC code can be found in Appendix C, Terms and Definitions.

Additionally INPUT recognizes a separate set of Process or Cross-Industry sectors since they have general applicability across all industries.

These sectors involve multi-industry applications such as human resource systems and accounting systems.

These process-oriented sectors comprise:

- Accounting/Finance.
- Human resources.
- Education and training.
- Office systems.
- Engineering and scientific.
- Planning and analysis.

- Sales and marketing.

Further descriptions of these sectors are provided in the Terms and Definitions section included in this report as Appendix C.

C
Methodology

The data upon which this report is based was gathered as part of INPUT's ongoing market analysis program for the IT Software & Services business.

Trends, market sizes, and growth rates are based upon INPUT research, interview programs with users and buyers within the industry and the vendors serving these industries.

In addition extensive use was made of INPUT's corporate library. The resources in this library include on-line periodicals databases, subscriptions to a broad range of computer and general business periodicals, continually updated files on over 3000 IT Software & Services vendors, and U.S. Government statistics.

It must be noted that in the case of *financial data* some vendors are unwilling to provide detailed revenue data by product/services group or industry.

Also, vendors often use different categories of industries and industry segments, or view their services as falling into different product/service groups than those used by INPUT.

In these cases INPUT estimates revenues for these categories on a best-effort basis.

The values used in many of the exhibits contained in this report have been rounded for ease of reference.

D
Report Structure

The remainder of this report is structured in the following way:

Chapter II, *Executive Summary*, provides an overview of the principal analyses and conclusions developed in the main body of the report.

Chapter III, *Telecommunications Sector IT Environment*, discusses changes, market issues and activities in the U.S. Telecommunications sector that can affect the current and future use of IT Software & Services.

Chapter IV, *Telecommunications Sector IT Market*, contains an analysis of total IT budgets and IT Software & Services expenditures in particular, within the U.S. Telecommunications sector. It provides forecasts for expenditure in these segments through to the year 2002 and provides comparisons to other industry sectors.

Chapter V, *Electronic Business Directions* is a discussion of the major driving forces causing organizations to redefine processes and reengineer their structures.

Appendix A provides a set of summary tables that form a supporting database for the market forecasts contained in this report.

Appendix B provides a reconciliation between the market assessments and forecasts shown in this report in comparison with those previously published by INPUT in 1996.

Appendix C provides a definition of the terms used in the analysis of the IT Software & Services market.

E
Related INPUT Research Programs and Reports

The following reports contain detailed analysis of each market sector, offering commentary and recommendations for vendors.

1. U.S. Reports

Desktop Services Opportunities for the U.S. - 1997

Evaluation of Business Continuity Services in the U.S.

IT Customer Services Market Analysis, U.S. 1997-2002

Evaluation of Digital Money Products in U.S. Banking

Impact of Digital Money on Banking, 1997

Evaluation of Federal Program Budgets, 1998

Federal Financial Management Systems Market 1996

Federal Imaging Market 1996-2001

Federal Information Systems and Services Market 1996-2001

Federal Information Systems and Services Market 1997-2002

Federal Telecommunications Market 1996-2001

Impact of Procurement Reform on Federal Government

Outlook for the Federal Professional Services Market 1996-2001

Evaluation of SAP Service Providers in the U.S., 1997

Evaluation of Firewall Solutions, U.S., 1997

Evaluation of Intranet Development Opportunities - U.S.

Outsourcing Vendor Performance Analysis - U.S.

Year 2000 Services Opportunities

2. European Reports

a. Europe Wide Reports

Desktop Services Opportunities - Europe

Evaluation of Business Continuity Services in Europe

Professional Services Market Forecast, Europe, 1997-2002

SAP Services – European User Perspectives

Evaluation of Internet Firewall Solutions, Europe

Evaluation of Intranet Development Opportunities - Europe

Customer Care and Billing Solutions within Telecommunications Providers in Europe, 1996-2000

Operational Services Market Forecast, Europe 1997-2002

Outsourcing Vendor Performance Analysis - Europe

b. French Reports

Evaluation des Opportunites de Services Micros et LANs France, 1997

Evaluation of Business Continuity Services in France

Evaluation of SAP Services Providers in France

Evaluation of Internet Firewall Solutions, France

Opportunites de Services autour d'Intranet, 1996-2001

Les Services D'Exploitation de Centres D'Appels, France

Outsourcing Vendor Performance Analysis - France

c. German Reports

Evaluation of Business Continuity Services in Germany

Outsourcing Vendor Performance Analysis - Germany

d. United Kingdom Reports

Desktop Services Opportunities – U.K.

Evaluation of Business Continuity Services in the U.K.

Future of Network Management Support in the U.K.

Evaluation of SAP Service Providers – U.K.

Evaluation of Intranet Development Opportunities – U.K.

Outsourcing Vendor Performance Analysis for the U.K.

3. Worldwide Profiles

Worldwide Market Profile, 1997-2002

Regional Market Profiles, 1997 - 2002

North America
Latin America
Asia Pacific
Western Europe
Central & Eastern Europe
Middle East / Africa

Country Market Profiles, 1997 - 2002

United States
Canada
Mexico

Australia
China
India
Japan
South Korea
Taiwan
Hong Kong
New Zealand
Singapore

Israel
South Africa

Argentina
Brazil
Venezuela

France
Germany
Italy
United Kingdom

Russia

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II

Executive Summary

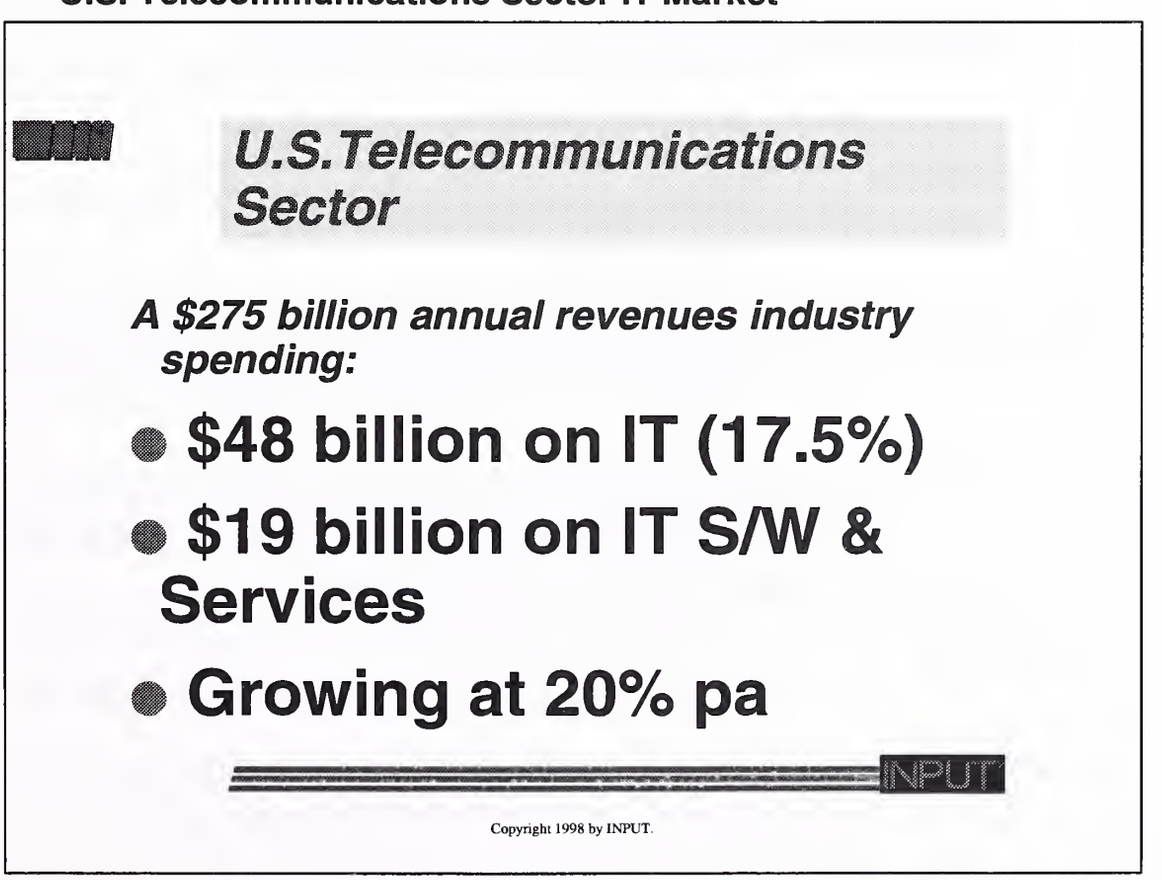
A

Telecommunications Industry 'Next Generation' Challenge

The U.S. Telecommunications sector represents a huge opportunity for the IT Software & Services industry, see Exhibit II-1.

Exhibit II-1

U.S. Telecommunications Sector IT Market



Source: INPUT

Although not the largest individual sector recognized by INPUT, the telecommunications sector has the highest ratio of IT expenditure to annual revenues (17.5%) and the highest forecast growth rate for the next five years of any U.S. industry sector.

The only industry sectors that are greater in absolute size than the Telecommunications sector are Discrete Manufacturing, Banking & Finance, Process Manufacturing and State & Local Government.

The Telecommunications industry has been characterized by a monopolistic management culture for almost its entire 100 years history.

Now the impact of liberalization, rapidly developing technology, particularly the Internet, and the data-centric communications demands of enterprises that are rapidly outpacing voice communications requirements, are challenging the traditional industry model.

In response to these forces the Telecommunications industry is deploying IT based solutions to build 'next generation' Telecommunications firms. Consequently (reference Exhibit II-2) the industry is focussed on:

- Transitioning to 'data, Internet, mobile, voice' services from 'voice' optimized services.
- Building and retaining the customer base with advanced customer care programs.
- Meeting organizational solution needs with enterprise Network Management services and individuals' needs with Intelligent Network services.

These transitions characterize the seismic changes affecting the industry as 'Next Generation' Telecommunications services operators emerge to challenge for future market share.

Exhibit II-2

IT Enabled Transition

Source: INPUT

In order to effect these changes Telecommunications firms are investing heavily in Information Technology and the supporting services that are increasingly vital to its application.

'Next Generation' firms have a strong imperative to nurture their customers in what are becoming fierce market conditions.

'Next Generation' firms have a focus on the provision to customers, whether enterprises or individuals, of a broad range of services beyond just transmission capacity.

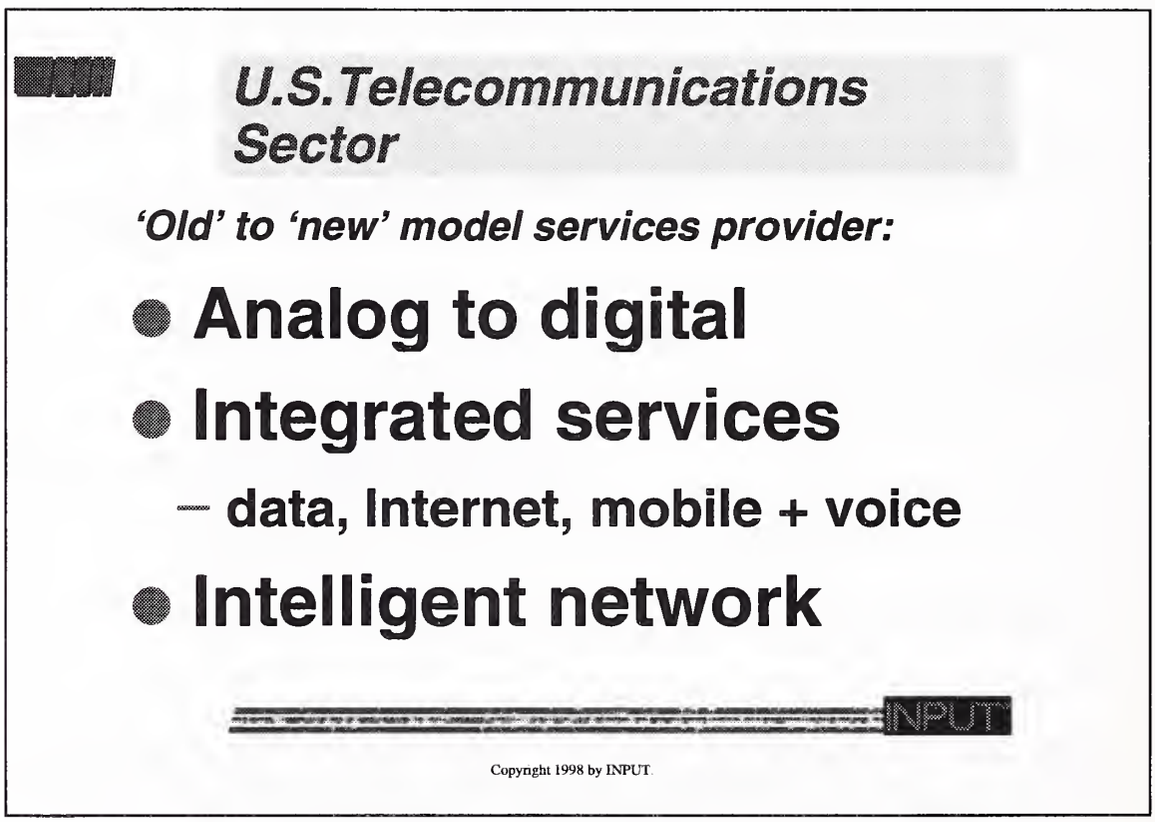
The remainder of this executive summary summarizes the main points concerning these issues that are covered in this report.

B
IT Enabled Transition

A number of key characteristics differentiate the new 'next generation' players from the 'old' model firms, see Exhibit II-3.

Exhibit II-3

Data, Internet and Mobile Services



Source: INPUT

Two key forces have irrevocably changed the traditional government regulated monopolistic model for the Telecommunications industry:

- Liberalizing trends in government and social thinking.
- Technological development largely spawned by digital (IT) technology.

The dramatic changes taking place in the telecommunications sector date back to the break up of AT&T in the early 1980s. More recently the Telecommunications Act of 1996 sought to reduce the barriers between various types of communications media.

The critical technology changes include:

- Conversion from an analog to a digital based network infrastructure with profound consequences for the sector
  - The digital based network unleashes the power of 'software' to enable many new capabilities and functions to be provided as well as to vastly increase the available bandwidth.
  - 'Software' thus represents the defining boundary between the 'old model' and 'new model' Telecommunications services provider.
- The provision of integrated services is also enabled by IT advances. In the past the industry was focussed on voice (POTS – plain old telephone service), now it is focussed on providing an integrated set of services comprising data communication, Internet services, mobile services as well as voice services.
- The provision of advanced added value features for customers, Network Management services for enterprises and Intelligent Network services for individuals:
  - Enterprise Network Management services are discussed separately in section D below.
  - Intelligent Networks (IN), sometimes also referred to as Advanced Intelligent Networks (AIN), focus on providing additional value functions like call waiting and call blocking to individuals.
  - Software components, ready to use, cross platform, object oriented libraries, provide the Telecommunications services providers with a solution for the provision of additional services.
  - IN developments are now switching from being technology led to market led. No longer a complex technology in search of a market but a key strategic weapon for gaining market leadership.

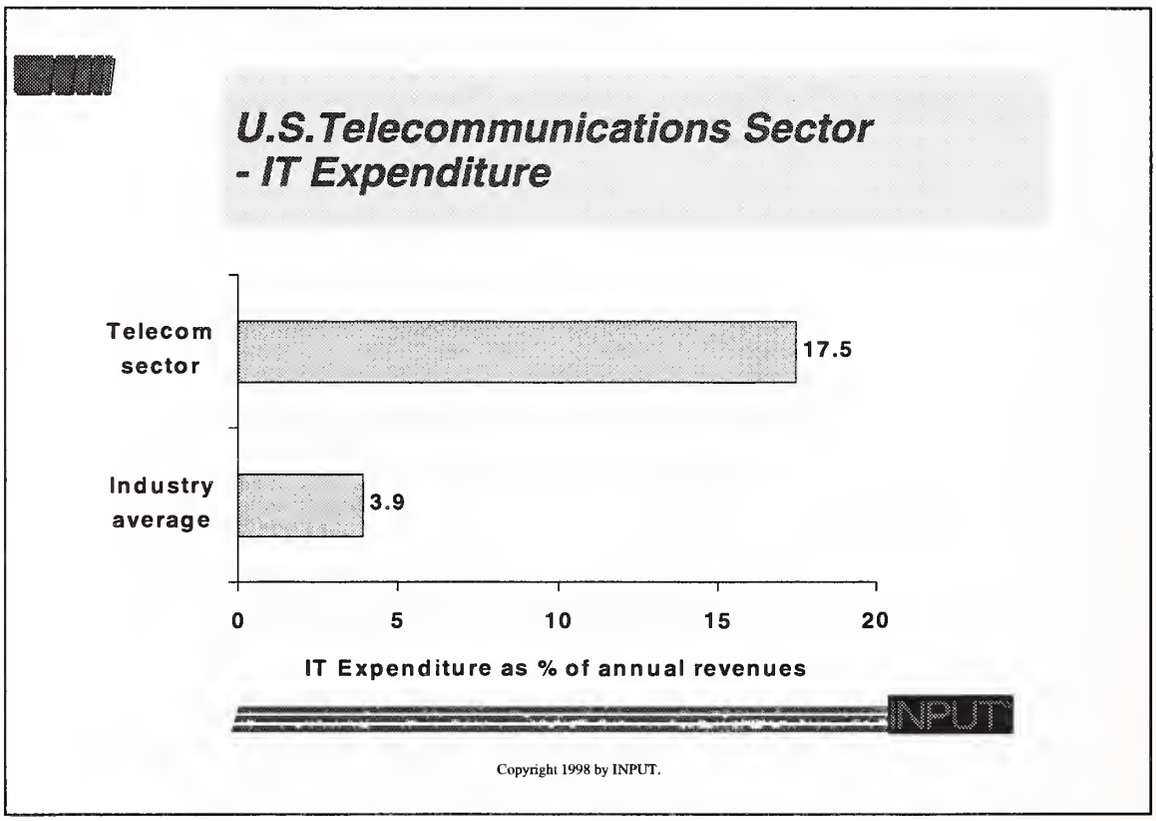
The Telecommunications industry is becoming more like the computer industry, characterized by rapid technological development and rapidly evolving service offerings.

As this process continues IT and associated services are becoming ever more vital to support the development of Telecommunications services operators.

In consequence the total IT expenditure for the Telecommunications sector represents one of the highest percentages for the proportion of industry revenues spent on IT, see Exhibit II-4.

Exhibit II-4

IT Expenditure as a Percentage of Revenue



Source: INPUT

The Telecommunications sector average percentage is well above the average for all other industries which range from just under 1.0% at the low end to 12.5% for the second ranked industry sector for this parameter, Banking & Finance.

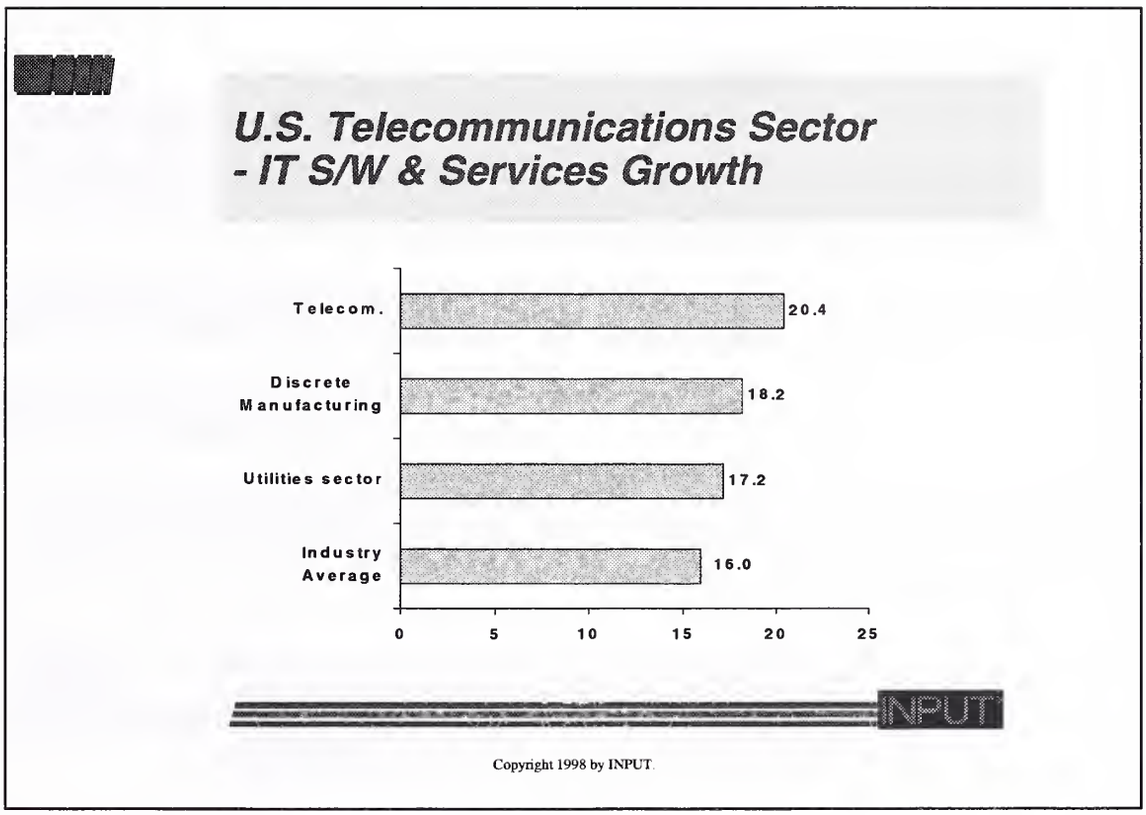
The absolute amount spent on IT by the Telecommunications sector ($19.3 billion in the U.S. in 1997) places the sector only as the fifth largest of the industry sectors identified by INPUT.

This is because the sector (total industry output estimated at $275 in the U.S. in 1997) makes it as yet the smallest sector in terms of total output, although a fast growing one.

Exhibit II-5 shows the expected growth of the IT Software & Services market for the Telecommunications sector in comparison with other leading sectors.

Exhibit II-5

IT Software & Services Expenditure Growth



Source: INPUT

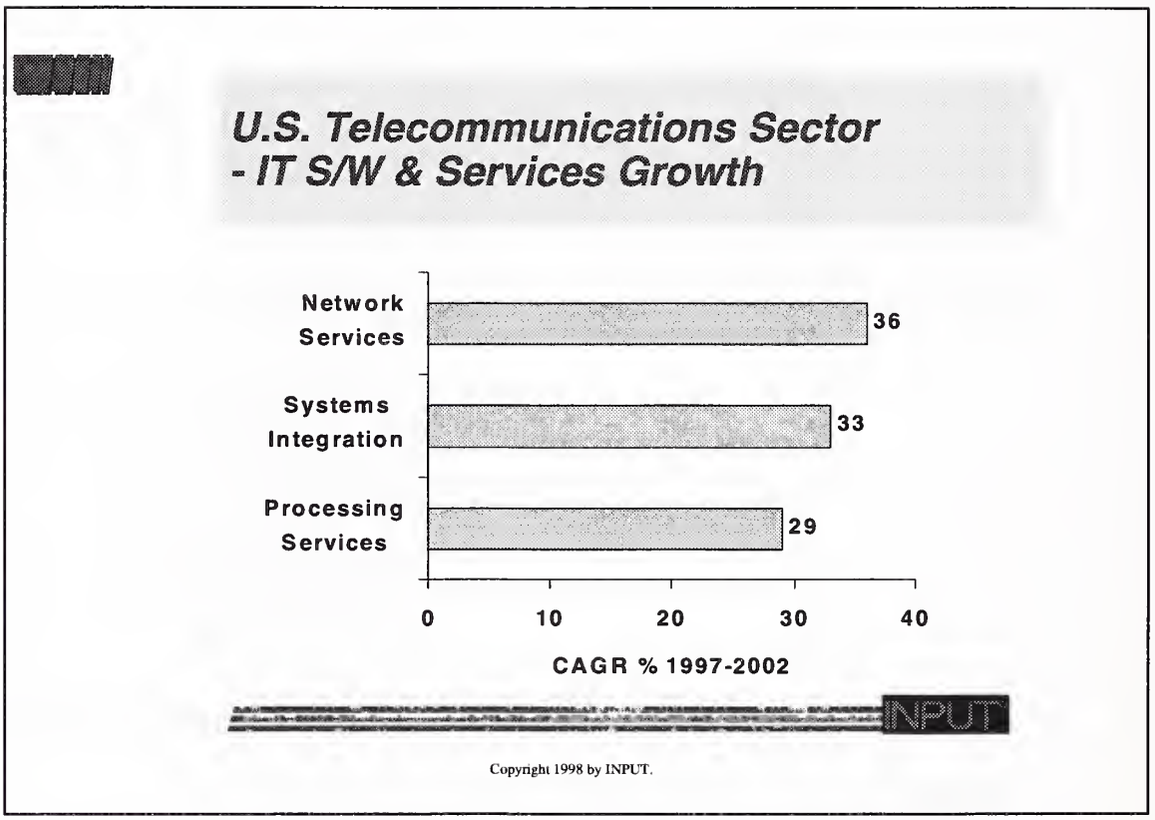
The Telecommunications industry is one of the fastest growing sectors overall and its IT Software & Services market growth is expected to be the highest for all industry sectors in the U.S. market.

Growth will be spurred by the need to support new services in increasingly competitive conditions, merger and acquisition activity, and restructuring as firms seek to adapt to new market conditions.

The appeal of the Telecommunications sector to IT vendors, particularly services vendors, continues to be based on a number of high-growth services areas as can be seen from Exhibit II-6.

Exhibit II-6

IT Software & Services High Growth Sectors



Source: INPUT

One of the major factors driving the high growth IT Software & Services sectors shown in this Exhibit is the huge investment being made in Customer Care & Billing Systems (CC & B) discussed in more detail in the next section.

Telecommunications organizations are in the process of either upgrading or re-developing their CC& B systems or building them from scratch where they only had in place a basic subscriber management system.

These system development efforts are a prime target for systems integration contracting and other associated services.

Processing Services will also be an important growth sector within the Telecommunications industry. It is expected to have an annual growth

rate slightly above that for Outsourcing services predicted to grow at about 27% per annum over the next five years.

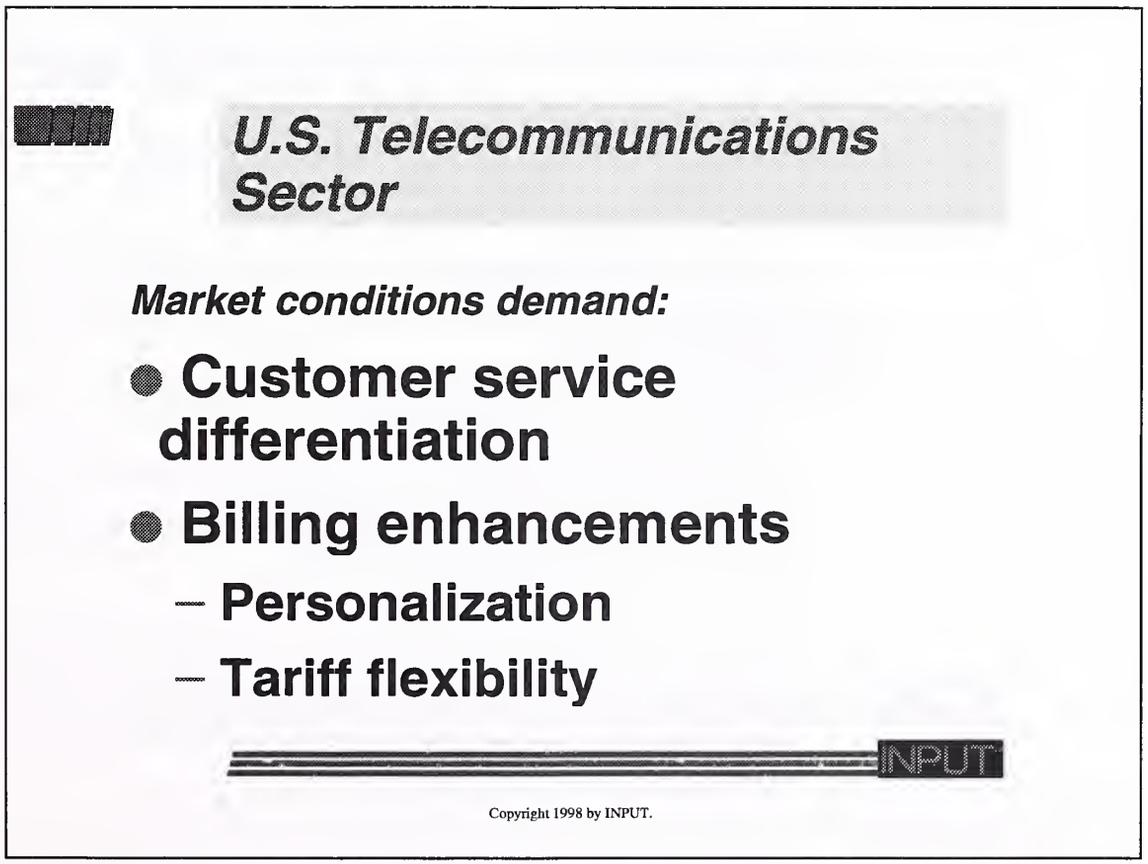
Processing Services growth will be driven by back-office processing requirements including CC & B systems, particularly cross charging systems between operators.

C
Customer Care Systems

The importance of Customer Care & Billing Systems was referred to earlier. They are in the vanguard of Telecommunications services providers IT investment efforts to keep pace with industry change and to develop and maintain competitive differentiation, see Exhibit II-7.

Exhibit II-7

IT Development in the Telecommunications Industry



Source: INPUT

In an era of increasing competition Telecommunications operators need to enhance the services they provide to existing customers and to minimize the churn they experience amongst the existing base.

They need to differentiate themselves as far as possible from their competitors by providing as excellent a customer service level as possible.

CC & B systems are a necessary condition for supporting these objectives.

Improving profitability is another major factor influencing Telecommunications services providers to invest in CC & B systems:

- Improve profitability through improved efficiency and the collection of electronic payments.
- Reduce fraud that can account for as much as three percent of an operator's total revenue.

The major functions addressed by CC & B systems are:

- Customer management and customer information database.
- Customer account management and billing.
- Links to other systems within the IT infrastructure, such as legacy systems and other finance systems.
- Marketing functions like telesales support and analysis of the database to support marketing analysis and promotional campaigns.
- Other services include supporting regulatory processes and training.

One of the most important benefits to a Telecommunications services operator of an advanced CC & B system is the capability of offering an apparently 'personal' level of service.

The call center system allows the support of 'customer-friendly' service levels because accurate information about the customer can be easily made available. Customer questions and problems can be resolved more readily and more quickly.

Another very important feature of a CC & B system to the systems operator is that of tariff flexibility.

In a competitive market there now exist a need to change pricing structures quickly and easily in order to counter competitive moves. Prompt implementation of pricing changes tied in with single bill consolidation and bundled billing are important facilities.

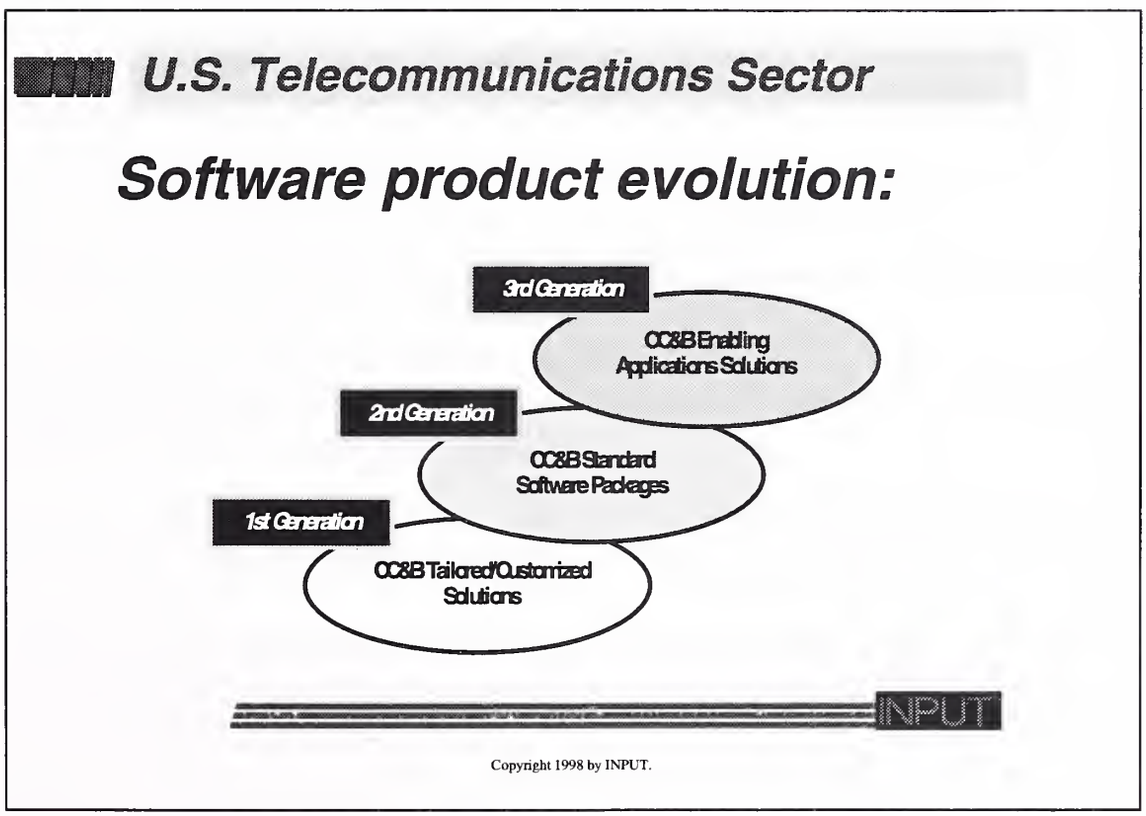
The CC & B system needs to offer the flexibility to change the basic tariff parameters (e.g. time of day, duration and distance) so that it not only makes tariff changes easy to implement, but also allows the flexibility to offer new services.

Given the importance and total size of the CC& B opportunity it is not surprising that it has become a prime target for software product applications solutions vendors.

Exhibit II-8 provides a graphical representation of the evolution of applications products in this area.

Exhibit II-8

Software Product Usage Evolution



Source: INPUT

As CC & B related systems are converging, more and more functionality is being imported into packaged Enterprise Applications Solutions products such as those from SAP and Baan.

By the 3rd generation of CC & B software products, true integrated Enterprise Applications Solution products would have emerged that provide a fully integrated range of CC & B capabilities.

These solutions must be able to integrate seamlessly with existing systems and customer databases in order to allow their users to derive maximum benefit form them.

D
Network Management

Network Management for enterprises has become a separate discipline as the supporting technology and methodologies have advanced.

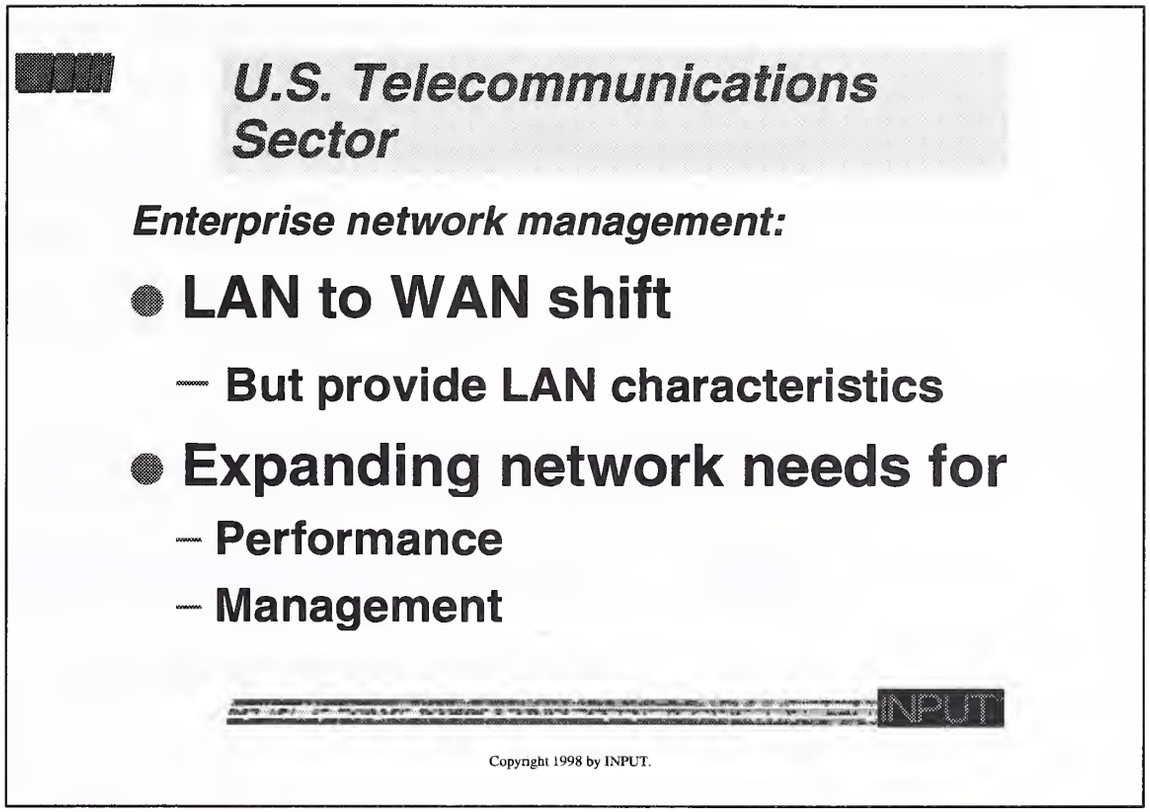
The key issue for both the Telecommunications services providers and for corporate users is the extent to which Network Management for enterprises can become a significant value-added service.

In the U.S. AT & T offers a substantial level of access to the network, including real-time.

Exhibit II-9 points to some of the main challenges being faced in the management of corporate networks that are creating the conditions for the development of this market.

Exhibit II-9

Network Management Challenge



Source: INPUT

In the recent past the majority of corporate data traffic (of the order of 80%) was accounted for by data traffic on LANs.

Now the position has reversed and the majority of traffic is shifting onto WANs as Internet use has exploded.

This has led to a need for enterprises to be able to manage their WANs in an analogous way to that in which they managed their LANs.

This means that enterprise users want to have the same characteristics, the same control over their network use, and the same cost levels that they experienced with LANs.

There is at the same time a rapidly expanding need, mostly unpredictable, for more bandwidth and connectivity.

This is complemented by a dramatic increase in the size and scope of the remote environment which is becoming ever more critical to the operational processes of the business.

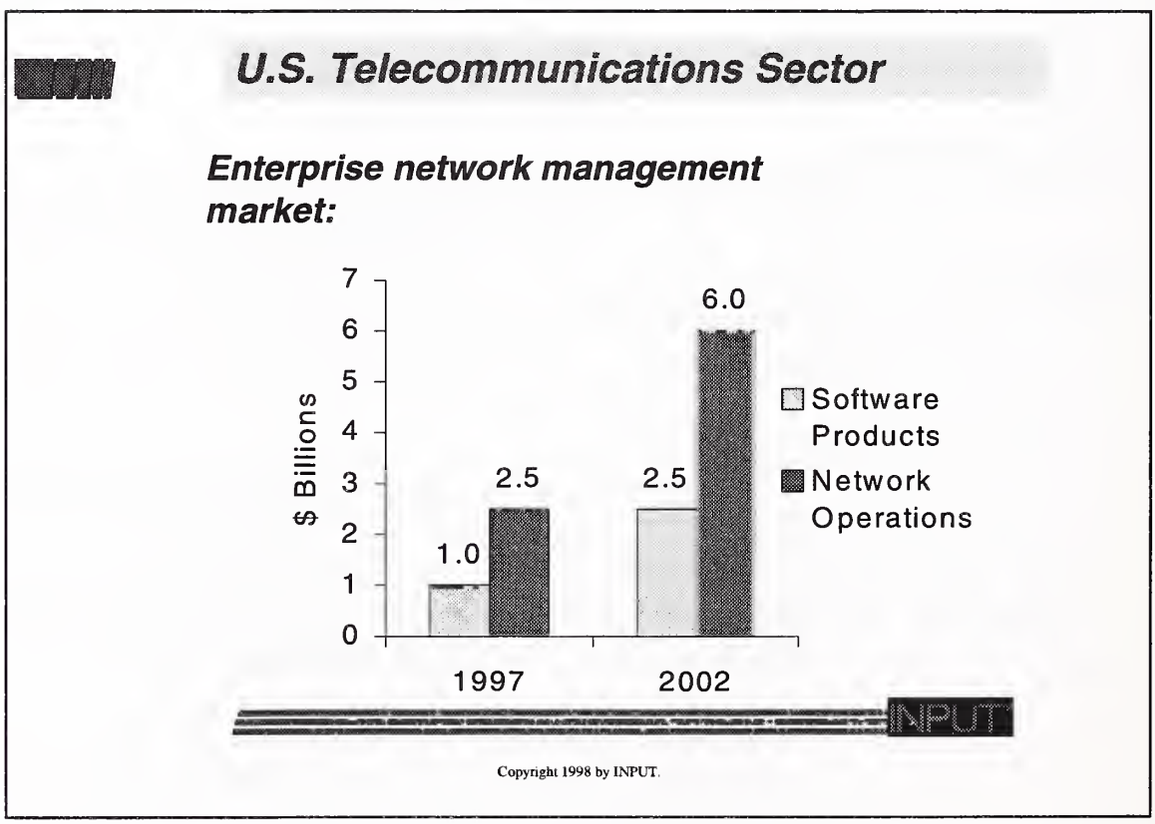
Enterprise users need to address the difficulty of developing networks that will maintain performance as application needs expand.

Further factors that are likely to support the development of this market are the need to specialize and concentrate key staff for network operations within an environment of rapid technology obsolescence.

Exhibit II-10 provides an estimate of the likely growth of this market in the U.S. over the next five years.

Exhibit II-10

Enterprise Network Management Market – U.S.



Source: INPUT

The enterprise network management market is both difficult to define and difficult to measure.

Definitional difficulties stem from the broad range of products and services that could be included within the overall sphere of enterprise network management, for example, professional services to design and plan for networks, equipment provisioning, configuration and certification and customer services and support.

INPUT has used a narrow definition here to focus on two key aspects of enterprise network management:

- The operation of network centers to include monitoring, fault detection and call center activity.

- Software product tools that support enterprise network management functions.

The market is difficult to measure because as yet few vendors separately identify this opportunity or generally count network related revenues in consistent categories.

Exhibit II-10 shows that the Network Operations sector is expected to grow at a compound average growth rate of 19% and the Software Products sector at 20% per annum over the next five years.

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III

Telecommunications Sector IT Environment

A
Telecommunications Sector Overview

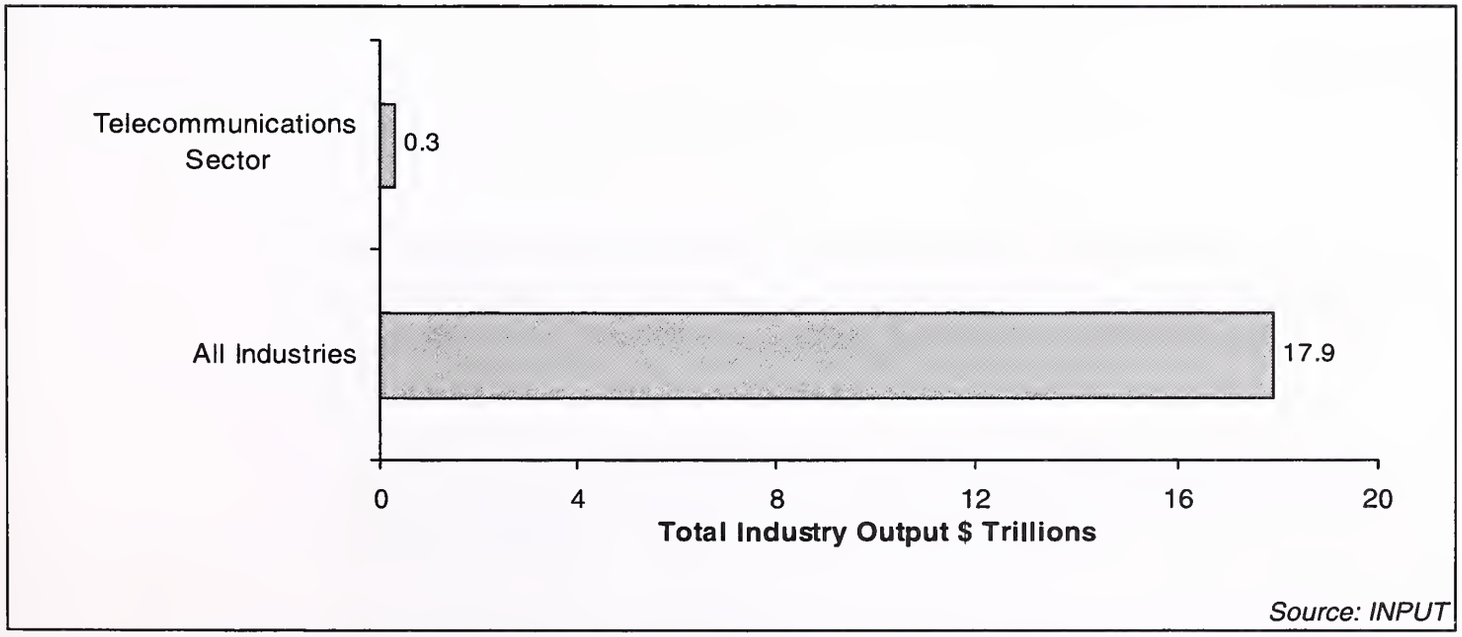
1. Macroeconomic Context

Globally the Telecommunications sector generates output estimated to total about $620 billion annually. The U.S. Telecommunications sector accounts for around 44% of this world total.

The Telecommunications sector accounts for just over 1.5% of the total economic output of the U.S. economy as indicated in Exhibit III-1.

Exhibit III-1

The Telecommunications Sector and Total U.S. Output - 1997



Source: INPUT

The U.S. Telecommunications sector is the smallest industry sector measured by output.

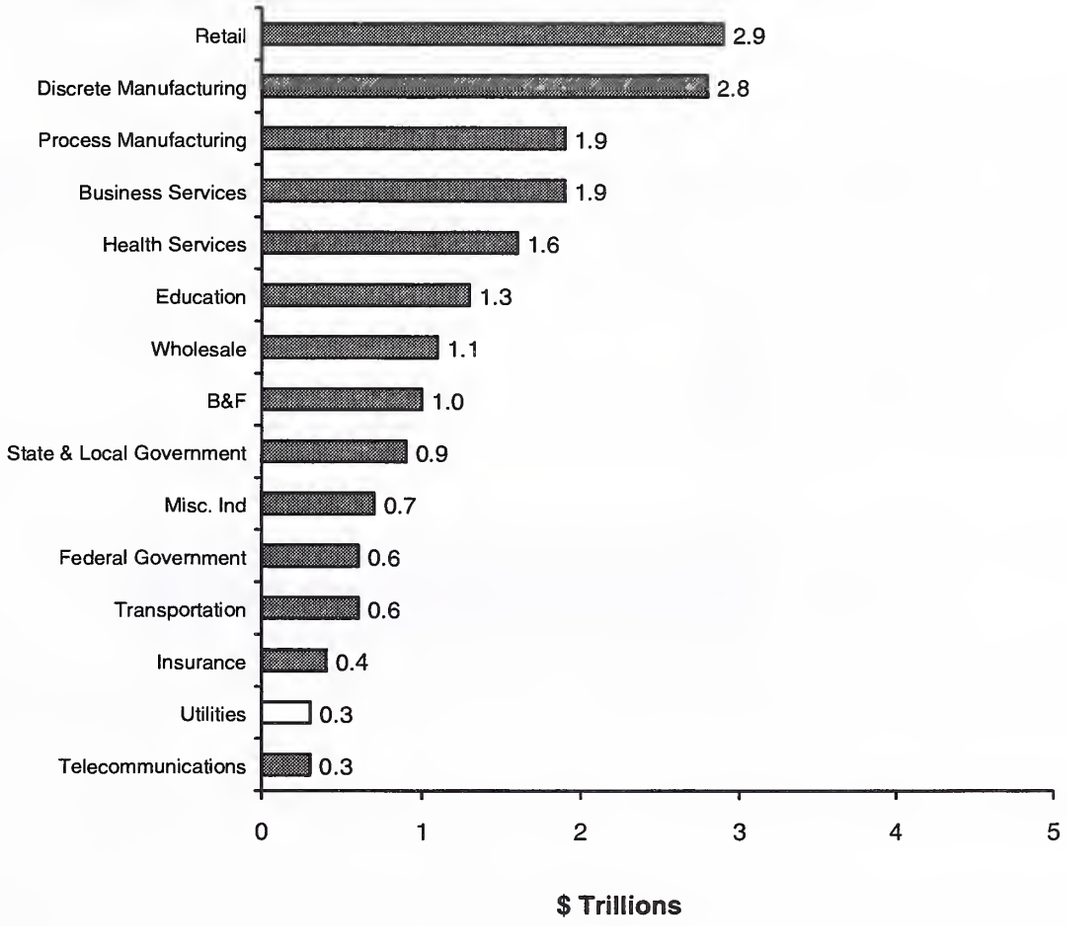
In overall economic terms it is growing very rapidly, some 10% per annum globally, in comparison with overall economic growth at about two to three percent.

The industry is defined using the industry classification set out by INPUT in detail in Appendix B for the purposes of this analysis.

A comparison of the relative size of the total output for each industry sector is shown in Exhibit III-2.

Exhibit III-2

Total Estimated Output by Industry Sector – U.S., 1997



Source: INPUT

The analysis above measures the total output of each industry sector without regard for the inputs and outputs between sectors. Consequently this analysis is done on a completely different basis from that used to calculate GDP.

Total industry output measures the total value of goods and services produced by each industry without eliminating intra-industry and inter-industry trading.

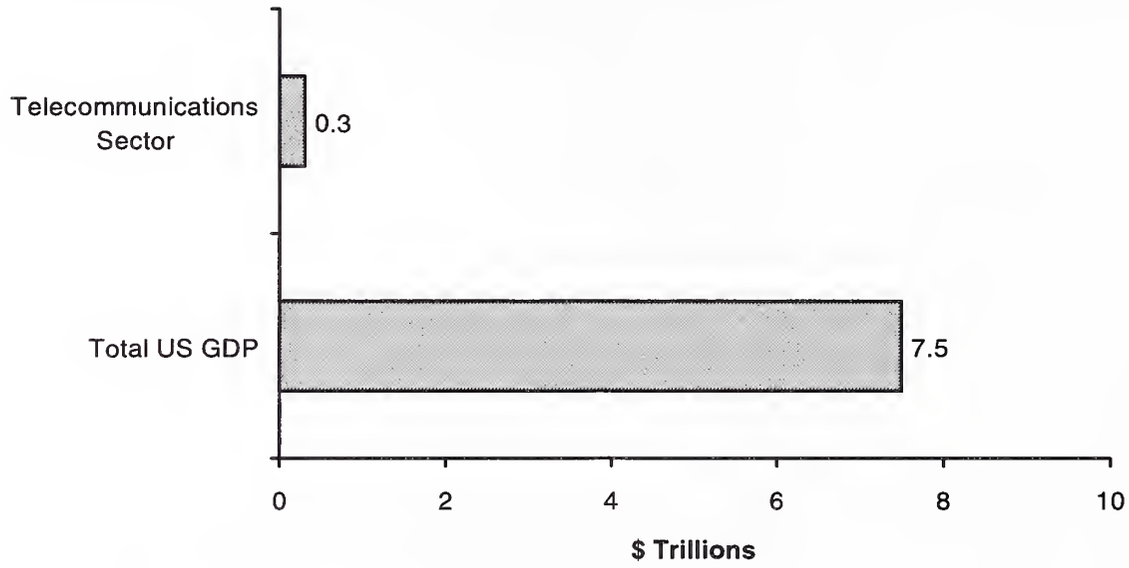
GDP estimates are specifically designed to remove these elements from the calculation.

The Telecommunications industry sector measured as a proportion of total U.S. GDP amounts to about 2.6%.

A comparison between the relative size of GDP and the measurement of total economic output used here is shown in Exhibit III-3.

Exhibit III-3

GDP and Telecommunications Sector Output – U.S., 1997



Source: INPUT

INPUT uses the total economic output approach in this report, as it is a more meaningful way to conduct a subsequent analysis of the total significance of IT expenditure to the sector.

The metric that is important to industry executives and managers in respect of total industry output is the proportion of IT expenditure to the organization's total revenues or expenses.

The overall proportion of IT expenditure for a sector related to its total output is the benchmark for IT expenditure at the individual firm level. This is discussed in the next chapter.

2. Key Challenges for the Telecommunications Sector

The revolution in the U.S. telecommunications industry is one of the major industrial transitions to the 21st century.

The background to this change is briefly summarized in sub-section B.1 below.

This revolution would not be possible, however, without the enabling force of software technology.

Software, and its supporting 'hard' technology development, became the defining boundary between the 'old' model of telecommunications utility and the 'new' model competitive communications facilities provider.

Commercial liberalization and the software revolution have created an intensely competitive environment for telecommunications providers characterized by:

- Accelerating technology change typified by the development of the Internet.
- Growing demands for ever more sophisticated services as user choice is expanded and enhanced.
- Competitive markets not only locally but also on an international scale.

Accelerating technology development has been the major factor behind a fundamental shift of industry focus:

- *From* the provision of voice facilities.
- *To* the provision of an integrated set of services comprising data communication, Internet services, mobile services as well as voice services.

The development of voice services over the Internet is possibly the most threatening technology enabled challenge for the traditional telecommunications services providers.

Naturally growing demand for more sophisticated or just lower cost services has complemented these enhanced capabilities.

Growing competition represents perhaps the major challenge for existing telecommunications firms.

In the U.S. companies like MCI, Sprint and more recently WorldCom have been responsible for making major inroads into the 'traditional' communications firm's markets.

This has presented the telecommunications organizations with an enormous marketing challenge.

The primary need in this new competitive environment is defense of the existing customer base. There is also significant rivalry to get access to customers at the local loop either by cable or wireless communication in order to be able to compete effectively.

The secondary need is the creation of marketing initiatives, and other strategems like joint ventures, designed to attack new markets, whether in their own natural territory or beyond.

The primary focus on customer retention is one of the major driving forces behind the rapid development in the industry of customer call centers supported by Customer Care & Billing systems.

This development has led to Customer Care and Billing systems becoming a major focal point of IT investment. This is discussed in sub-section C.1. below.

Another major development resulting from the need to provide corporate customers with greatly enhanced service capabilities is the provision of network management services (see section B.1.b.ii. below).

Telecommunications sector executives and managers thus face many challenges as they attempt to shift their organizations from the old 'voice' model to the new 'multi-service' business model.

Key management factors are the efficient allocation of resources, particularly the investment in communications bandwidth, and a focus on the creation of consortia and mergers or acquisitions.

For example GTE's acquisition of BBN, SBC's acquisition of Ameritech, and the still to be approved acquisition of MCI by WorldCom.

The industry eagerly awaits to see what moves will be made by AT&T's new czar, Michael Armstrong.

B
Background Trends and Economic Assumptions

1. Telecommunications Sector Trends

The traditional government regulated monopoly model that has applied to a number of industry sectors, including the Telecommunications sector, has come under challenge from two principal directions:

- Firstly liberalizing trends in government and social thinking.
- Secondly new technology development that complements, drives and supports liberalization.
- And these in turn have led to the commercial response of new entrants challenging traditional operators.

In the U.S. these trends were first manifested with the break up of AT&T in the early 1980s.

Now the Telecommunications Act of 1996 has ushered in a period of even more dramatic change.

The telecommunications sector is also undergoing a period of rapid change as a result of rapid technological development.

The technology trends that are contributing to this period of change include are principally the following:

- Broadband transmission.
- Advanced Intelligent Network (AIN).
- Multimedia services.
- Mobile wireless communications.
- Network management.
- Internet telephony.

Three areas are commented on below, Intelligent Networks, Network Management and Internet telephony.

a. Intelligent Network

The defining technology that separates the telecommunications sector of yesterday and that of today and tomorrow is software technology.

Software technology can, and is, being deployed by telecommunications services providers to bring to customers a raft of new services and capabilities. These new services are provided by what are typically called Intelligent Networks or Advanced Intelligent Networks.

Intelligent Network services include caller-ID, one number calling etc.

To do this, the network infrastructure, which conveys data from point to point, integrates more and more software technology.

Software components; ready to use, cross platform, object oriented libraries, provide the Telecommunications services providers with a solution for the provision of Intelligent Network services

Intelligent Networks can provide a wide array of customer services, for example:

- Extended Centrex services that provide a virtual private network for voice.
- Switch redirect services that allow all incoming calls to a group of pre-selected directory numbers to be rerouted to another location and/or directory number of the customer's choice.
- Remote changes and activation of call forwarding numbers.
- Call blocking for all or selected groups of telephone numbers.
- Virtual private network services to provide single billing for multiple locations and provide:
    - Connection of remote sites without dedicated lines.
    - Customer controlled reconfiguration.
    - Portable numbering plans within corporate sites.
- Do Not Disturb features that allow for the screening of unwanted calls with override features.

Whilst the application of software technology has been the key ingredient for the development of AIN services, due consideration should also be paid

to the impact of solid state electronic advances in an analogous fashion to that of the PC business.

It is the advances in processing capability and miniaturization that are continuing to spur software development and that are of particular significance for their application within the mobile telephone industry.

Given current technological trends it is quite likely that these AIN developments will continue to advance with more and more features being offered to customers.

The provision of these types of services offers Telecommunications services operators a significant opportunity for both market differentiation and increased profitability, factors becoming increasingly significant in a highly competitive environment.

Thus AIN developments are shifting from being technology led to market led. AIN is no longer a complex technology in search of a market but a key strategic weapon for telephone operators.

At the moment the three most important Intelligent Network services are freephone, premium rate services and VPNs (Virtual Private Networks).

b. Network Management

Corporate networks have become larger and more complex thus creating the need for more efficient, effective and economical ways of managing them.

Over the past few years concepts in network management have made significant advances in both technology and methodology, network management has become a discipline in its own right.

A key issue for both telecommunications operators and corporate users is the extent to which 'network management' can become a value-added service:

- Do corporate users want more direct control of the network facilities they use over and above those parts of their network infrastructure they own and control directly?

- To what extent are telecommunications services providers prepared to offer such services?

The technology for network management services is coalescing around common sets of standards, methodologies and user interfaces.

The umbrella term for these services is 'Enterprise Network Management' (ENM), which denotes any activity related to the management of networks.

ENM can be considered to cover network management services for networks owned and operated by customers as well as for network management services provided by telecommunications services providers.

The latter activity, although only at an early commercial stage, has chiefly derived from Bellcore's development of 'Customer Network Management Services' (CNMS) technology.

However, most of the standards and technologies being developed for network management are emanating from the computer and data communications industries.

The computer and telecommunications industries developed along very different lines. The language of the telecommunications industry is very different from the language of the computer industry.

Now, as the network management issue is primarily concerned with the management of data networks, rather than with analog or voice networks, it is the IT industry that has taken the lead in developing the technologies and methodologies that are used today to manage data networks.

The three main categories of IT vendor involved in this area are system platform vendors, software product developers and the data networking system suppliers.

As more types of digital network technology emerge, for example frame relay and ATM, the telecommunications services providers are increasingly turning to the rapidly expanding independent sources of network technology, largely spawned by the IT industry, rather than rely on their own home grown proprietary solutions.

The Internet is a further factor causing the telecommunications industry to re-define itself and transition to a data-oriented world.

The telecommunications industry cannot control the Internet, it can only learn to accept it, accommodate it, and utilize it to create new opportunities.

Network Management is one of those opportunities.

Currently there are five competing standards for network management:

- SNMP including RMON.
- DTMF.
- WBEM.
- JMAPI.
- CORBA.

SNMP is the 'legacy' protocol. It is the dominant and therefore in many ways the most useful standard in the network management arena.

SNMP is understood by everyone in the industry and is easy and cheap to implement.

Something in excess of 350 IT vendors support SNMP, well in excess of the number supporting the other protocols.

In contrast some 80 vendors only support DMTF, the second most supported protocol.

DTMF purports to address the weaknesses of SNMP by adding an API (Applications Programming Interface) and an architecture that purports to be protocol independent.

In this way DTMF can incorporate SNMP as well as other standards.

Although DTMF has broad-based support from the industry its use to date has been almost entirely confined to managing desktops and printers. This is because SNMP, the dominant network management protocol and the DTMF API are basically incompatible.

WBEM is a proposed standard that presents an architecture for unifying disparate protocols such as SNMP, DTMF and CORBA using http, the Internet Web protocol.

Microsoft is the principal driving force behind WBEM which is planned to be supported in the next version of Windows NT.

JMAPI is an API that purports to be able to eliminate porting because of its use of Java.

CORBA is an object oriented architecture that is not optimized for network management. CORBA's protocols are extremely difficult to map.

Most interest in Network Management is, not surprisingly, coming from ISPs (Internet Service Providers) and very large corporations, e.g. IBM, that operate huge networks, and from resellers that buy wholesale bandwidth and sell retail services.

AT&T offers a substantial level of access, including real-time, to the network, individually negotiated with the customer.

Exhibit III-4 encapsulates the fundamental forces that will drive the development of network management services in the future.

Exhibit III-4

Customer Network Management Services

- **Traffic has shifted onto WANs from LANs – Customers want LAN characteristics on WANs**
- **Expanding network performance needs**
- **Increasingly problematic technology management**

Source: INPUT

Even relatively recently the majority (80%) of U.S. corporate data traffic was on LANs, now the position has completely reversed and the majority of traffic is carried on WANs as Internet use has exploded.

This has created the need for customers to be able to manage their WANs in an analogous way to that in which LANs were managed and operated, customers want WANs and LANs to look logically the same.

Similarly there is a requirement for WANs to have the same cost characteristics as LANs.

There is an exploding, yet unpredictable, demand for bandwidth and connectivity. At the same time there is a dramatic increase in the size and scope of the remote environment all of which is critical to the operation of the business.

Customers are needing to address the difficulty of developing networks that will maintain performance as application needs grow.

Additional management problems are the shortfalls in key staff for network operation and the challenge of rapid technology obsolescence.

These forces not only make the network management area an attractive opportunity for the provision of network management services but also fuel the opportunity for the provision of full network outsourcing.

However, the market for enterprise network management software and services is difficult to define and difficult to measure.

It is difficult to define as there are many associated services which could be included within an all encompassing definition of the broad activity of managing enterprise networks.

For example:

- The inclusion of professional services to include network design, network planning etc.
- The provision of network equipment, configuration and the certification of networks.
- Customer services and support related to enterprise networks.

In this report INPUT has focussed the definition of Enterprise Network Management to comprise only:

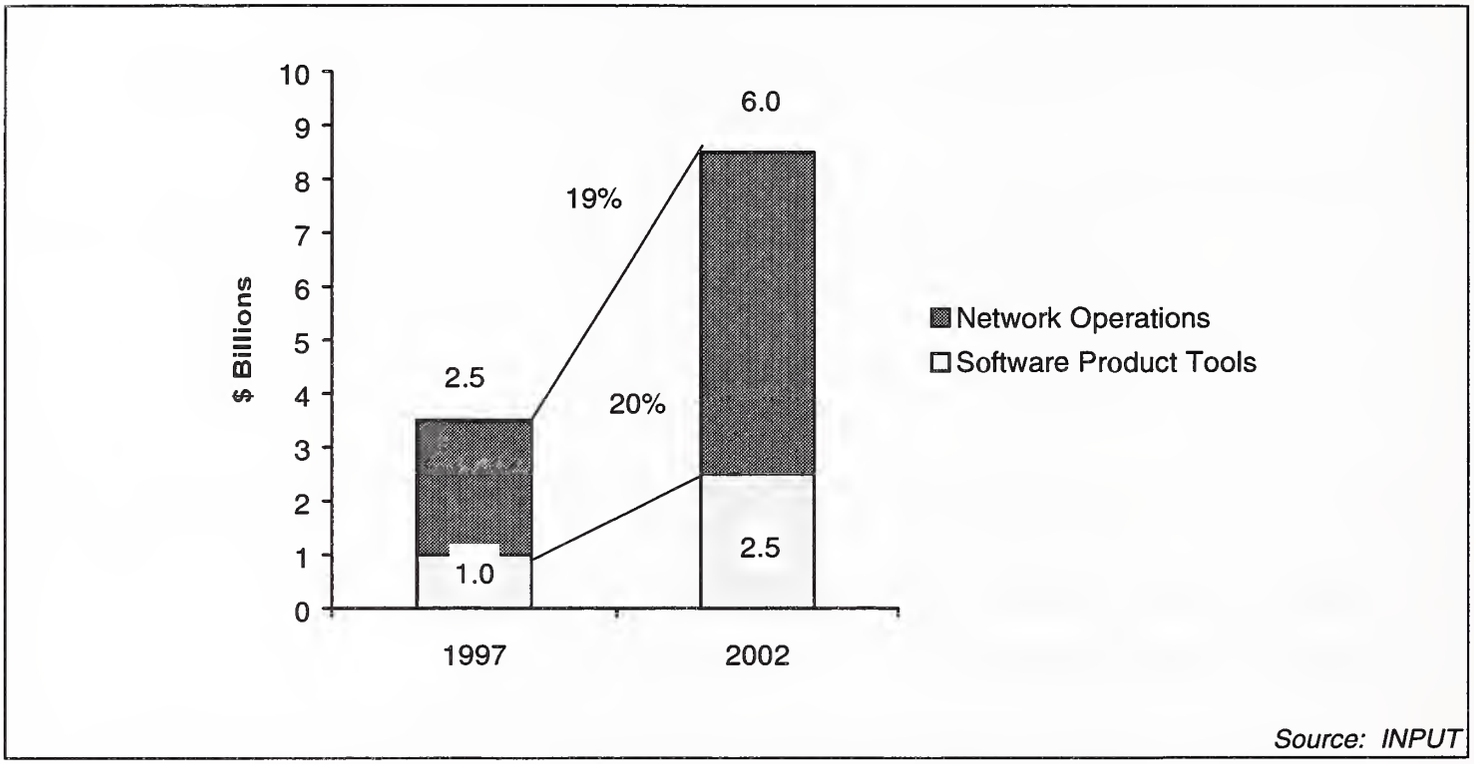
- The operation of network centers, which would include monitoring, fault detection and call center activity.
- The provision of software products tools that support Enterprise Network Management functions.

The Enterprise Network Management market is difficult to measure because vendors do not separate out network management revenues in consistent categories.

INPUT estimates that the U.S. market, as defined above, currently amounts to just over $3.5 billion as is indicated in Exhibit III-5.

Exhibit III-5

Enterprise Network Management Market Growth – U.S.



Source: INPUT

c. Internet Telephony

New entrants to the Internet telephony business are beginning to make this a serious issue for switched circuit based vendors.

Internet telephony is beginning to become a serious issue for two major reasons:

- Operators are investing directly in private networks to 'guarantee' access to the Internet backbone.
- Application of improved technology both in software and gateway servers.

Although most commentary on Internet telephony has concentrated on its use for voice, it is more likely to find greater opportunity in addressing the fax market.

The application of this technology is yet another example of the challenge to the 'old' network environment by new technology which ultimately may see the replacement of switched circuit networks optimized for voice transmission and their replacement by networks optimized to carry a variety of traffic dominated by data.

2. Overall Economic Assumptions

The forecast for the Telecommunications sector IT Software & Services market contained in this report are based on a fundamentally positive economic scenario.

However concerns exist about the Far Eastern economic crisis and its possible knock-on effects for the global economy as a whole.

It should, however, be recognized that a far worse financial impact, than that assumed here, could yet impact the global economy. This is a continuing risk until the Japanese authorities have demonstrated that they have taken sufficient action to stabilize their economy.

Some economic uncertainties exist even for the buoyant U.S. economy.

Of particular relevance are:

- The possibility of a stockmarket 'correction' that would affect business confidence generally and thus could inhibit IT investment decisions.
- The deteriorating economic stability of the Far Eastern nations, most importantly Japan.
- The issue of the supposed "new economic paradigm" in which the advanced economies are expected to enjoy years of continued economic growth and low inflation as a result of the erosion of the traditional 'business cycle'.

The "new economic paradigm" is based on the theory that technology development and global competition have created a uniquely benign environment for economic growth to continue unhindered by the ups and downs of the normal business cycle.

Technology, particularly IT, it is argued, has improved productivity to such an extent that traditional economics no longer fully applies.

An example of this is computer based JIT systems that eliminate most inventories, one of the key causal factors in the mechanics of the business cycle.

At an overall economic level these arguments are hard to sustain and it would be a high-risk strategy to base forecasts on this scenario.

One of the major counter arguments is the lack of firm evidence to support significant measured productivity improvements in service industries, the most highly developed users of IT systems.

This productivity paradox, huge investments in IT to achieve productivity improvement but little evidence to support it at an industry level or at a macro economic level, is possibly explained by neo-classical economics.

The argument centers on the observation that IT equipment has had the peculiarity of falling rapidly in price even as its functionality has increased, as a result IT has been applied to less and less valuable tasks.

In formulating the forecasts contained in this report INPUT has basically assumed that overall economic growth will continue in the U.S. over the forecast period according to currently predicted rates, without massive shocks imposed from other parts of the world, specifically the Far East.

Economic assumptions for the U.S. economy are summarized below.

Economic growth:
-Official growth target for 1997, 3.8% and 2% targeted for 1998.

Employment:
-50% of the U.S. population is presented within the working population.

Unemployment:
-5.4% level for 1996 declined to a slightly improved 5% in 1997 and is expected to increase slightly to 5.1% in 1998.

GDP Deflators are estimated at:

1996 – 2%
1997 – 2%
1998 – 2.2%.

C
Information Systems Environment

1. Information Systems Issues

The Telecommunications sector in total accounted for 7% of all IT related expenditures in the U.S. in 1997.

As an industry it ranked as the leader in terms of the proportion of total industry revenues (industry output) spent on IT related activities.

The Telecommunications industry averaged 17.5% of annual revenues spent on IT in 1997 in Europe compared to the average across all industry sectors of 3.9%.

Chapter IV below provides a detailed analysis of IT related expenditure, and specifically of IT Software & Services expenditure within the sector. Chapter IV also provides comparisons with other industry sectors.

As the Telecommunications industry becomes more like the computer industry, characterized by a rapid pace of technology development and new services introduction, IT services will become ever more important to support the individual firm compete and operate effectively.

As the Telecommunications industry becomes one of the fastest moving industries in the world, so will network operators and services providers require leading edge customer information systems.

These customer information systems will reflect the emphasis being placed on marketing issues in a newly competitive environment and will be required to maintain currency with the market, regulatory change and customer and competitive advances.

These systems are usually described as Customer Care & Billing systems (CC&B) and are discussed below.

The Y2K Millennium bug issue is also becoming a major issue for the Telecommunications industry along with many others, including applying IT to the management of global supply chains and document management.

2. Customer Care & Billing Systems

Customer Care & Billing systems are in the vanguard of telecommunications providers efforts to keep pace with industry changes and to retain competitive differentiation.

Telecommunications customers are expecting and demanding more and more from their suppliers.

Telecommunications services providers are in turn demanding new approaches to CC&B in order to seize the market opportunities that arise in their rapidly changing environment. CC&B is a broad term which can include everything from handling customer inquiries of all types to:

- Directory assistance.
- Workforce dispatch.
- Services order processing.
- Billing.

It is becoming one of the most important key differentiators for telecommunications operators, driving them to re-evaluate current processes, cost structures and IT infrastructures.

As such it is one of the most compelling forces for Electronic Business deployment in the Telecommunications sector.

In an era of increasing competition and the arrival of new and complex technologies, CC&B represents the opportunity for telecommunications providers to:

- Enhance service for existing customers to minimize churn.

  Be customer-friendly by resolving customer questions and problems as quickly as possible.

- Attract new customers with new and adapted services.

  Provide single bill consolidation and offer bundled billing which promptly implements pricing and rate changes.

  Offer itemized bills.

- Enhance the company's image.
- Differentiate services from those of competitors.
- Collect electronic payments.
- Improve profitability, including:

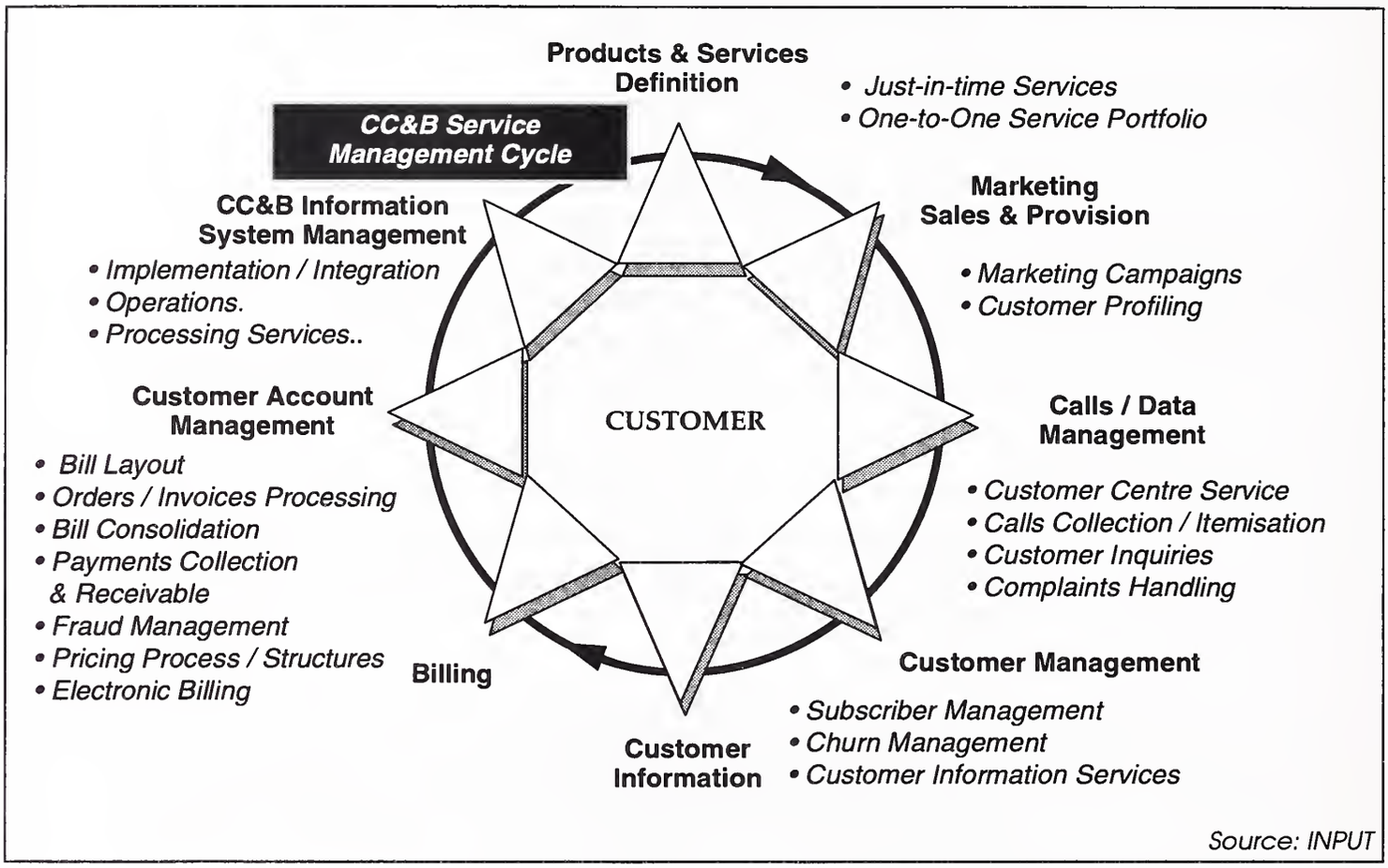
  Reduction of fraud which can account for as much as three percent of an operator's total revenue.

Exhibit III-6 shows the major functions addressed by CC&B systems:

- *Calls/Data Management* covers call collection and detailed call analysis.
- *Customer Management and Customer Information* includes customer care handling processes such as, registration, connection, disconnection, enquiries, customer satisfaction evaluation, bulletin boards and mailing.
- *Customer Account Management and Billing* includes subscriber bills and statements processing, charges calculation, taxes and discounts as well as credit checking, fraud management, and all payments processes concerning customers (cash, checks, bank transfers, electronic payments) and real time rating.
- *CC&B Information System Management* concerns the IT operations part of the solution. It is likely to include new implementation processes and interfaces handling other systems such as the network, legacy systems, and finance systems, systems operations etc. It will also cover the analysis of new technology usage opportunities such as electronic access, Internet implementation, datawarehousing and datamining facilities and workflow management.
- *Products & Services Definition and Marketing/Sales Provision* place emphasis on functions like telesales, sales tracking, market identification/segmentation, customer profiling, demand forecasting, usage analysis, new products and services design and marketing.
- *Other services* include regulatory processes, security, training, account hierarchies, current account balance, rating, control adjustments and receivable/journals/reports.

Exhibit III-6

Major Functions of CC&B Systems



Source: INPUT

In the past, in-house teams developed the forerunners of CC&B systems. They evolved over a long period of time and were optimized for predictable markets and for a monopolistic environment.

As a result many established telecommunications providers are struggling with old, inflexible and costly mainframe-based billing systems.

Some operators, for example find difficulty in changing basic parameters (e.g. time of day, duration and distance on a telephone call) constraining them from making changes in prices and even inhibiting the introduction of new services.

In contrast, today operators need to have responsive, open, scalable and cost effective systems that match the marketplace imperative to demonstrate their offers and their competitive advantages.

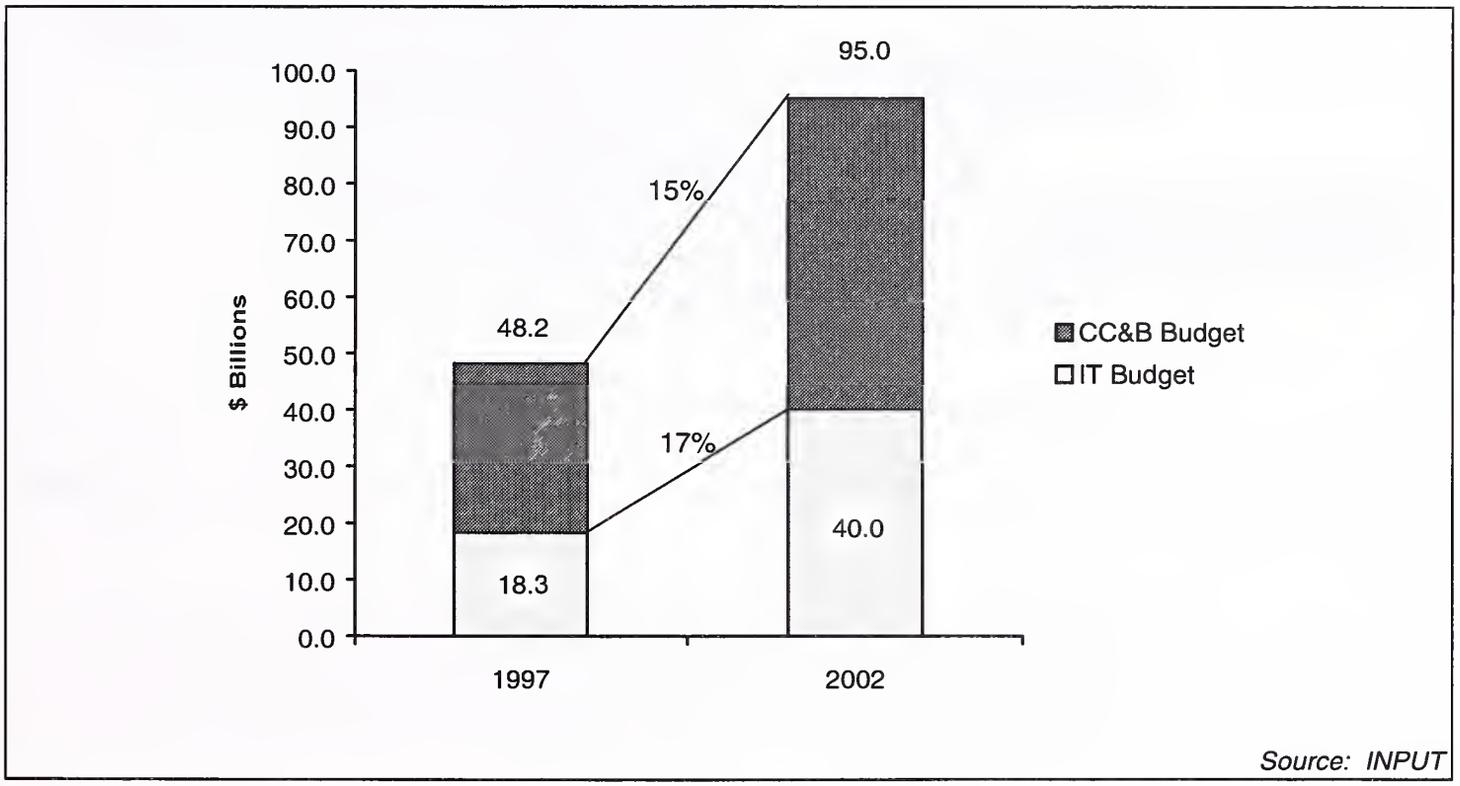
Not surprisingly the CC&B area has become a prime target for software applications product solutions and for the delivery of IT services associated with the implementation of these systems.

Exhibit III-7 shows that U.S. telecommunications operators will devote nearly 40% of their overall IT budget to CC&B solutions over the period 1997-2002.

The newer market entrants, including Internet service providers and wireless operators, are likely to increase their investment the most over the next four years.

Exhibit III-7

Development of CC&B Market – U.S.



Source: INPUT

Telecommunications operators recognize the need to deploy modular solutions made up from configurable software products.

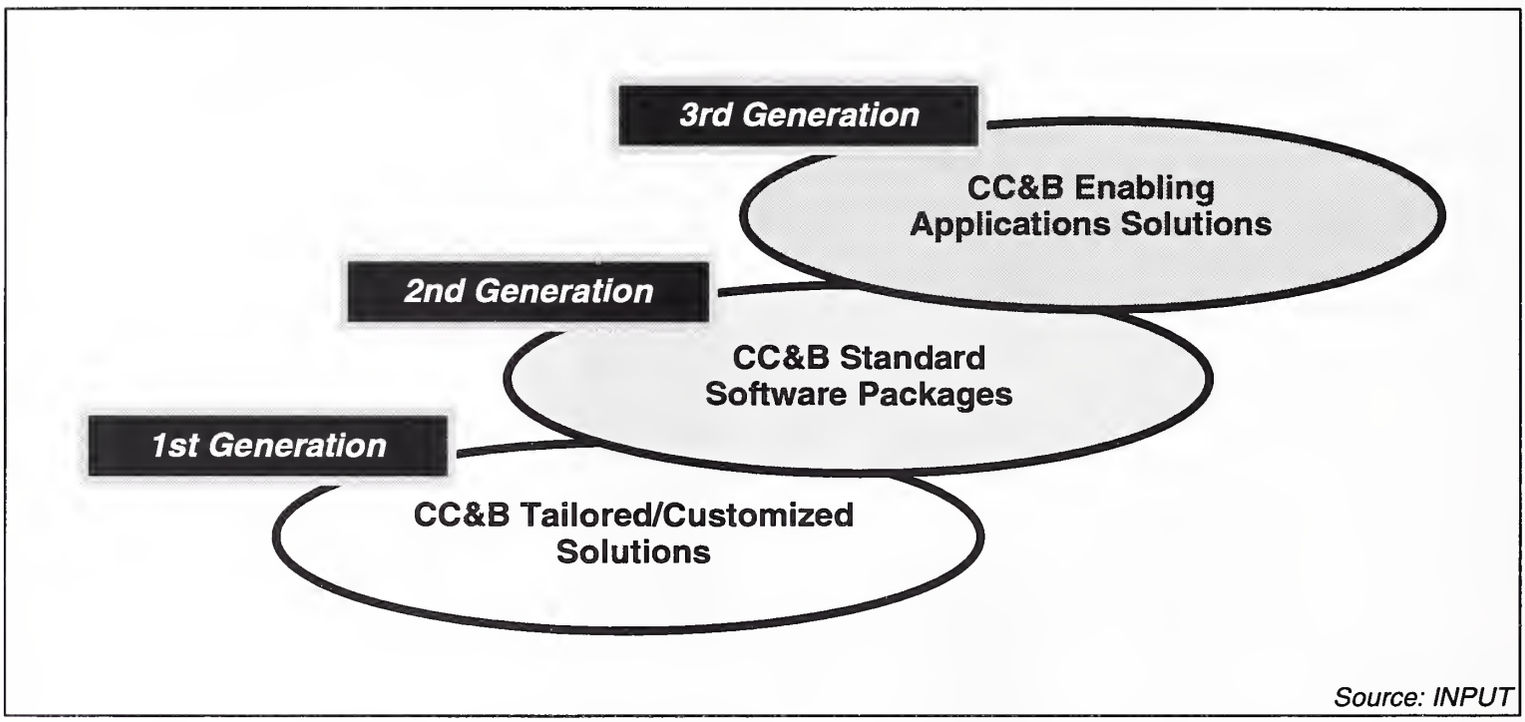
A modular solution is faster to implement as allowable project time is shrinking and a modular system also has the benefit of allowing the design to cope easily with variations such as new tariffs or services.

Another issue for IT managers is the difficulty of integrating many different application products successfully.

As CC&B systems are converging, a new enabling model, the use of packaged Enterprise Applications Solutions products such as SAP, could represent the 3rd generation of CC&B software products, see Exhibit III-8.

Exhibit III-8

Evolution of Telecommunications Services Providers' Software Products Usage 1997-2002



Source: INPUT

To address the telecommunications sector's increasingly short product and service introduction life cycles, IT Software & Services vendors are needing to provide robust and flexible CC&B systems that can handle:

- New tariff processing.
- Improved personalized billing.
- Timely revenue collection.

These solutions must be able to integrate seamlessly with existing systems and their customer databases in order to allow the organization to derive the maximum benefit from them.

Despite increasing emphasis on software products, professional services and systems integration services, telecommunications services providers seem to be more familiar with solutions provided by systems vendors.

The principal references for vendors operating in the CC&B market space were:

- Amdocs who are known for customer care applications.
- Andersen Consulting who are used for billing and consultancy services.
- AT&T for CC&B expertise.
- Cap Gemini America for professional services, systems integration, technical assistance and customer care solutions.
- CSC for consultancy services and systems integration.
- Compaq/Digital and H-P for customer care solutions as well as for their equipment provision.
- IBM for network services provision.
- The Sema Group for providing systems integration services in the area of billing and customer care.

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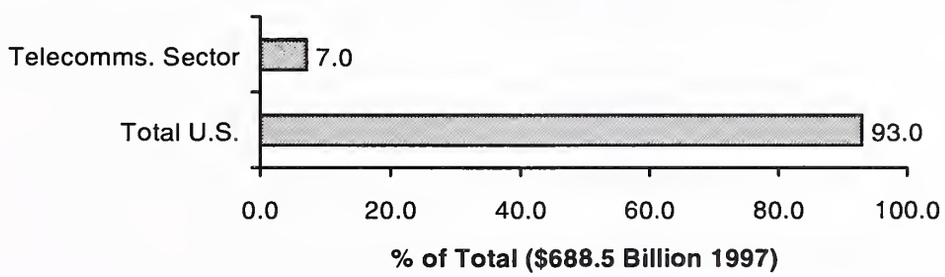
Telecommunications Sector IT Market

A
Total IT Budget for the Telecommunications Sector

The Telecommunications sector accounts for about 7% of all IT related expenditure in the U.S. market. Exhibit IV–1 shows the proportion of Telecommunications sector expenditure compared to the total amount spent by U.S. organizations on IT related items.

Exhibit IV-1

Telecommunications Sector IT Related Expenditure - U.S.



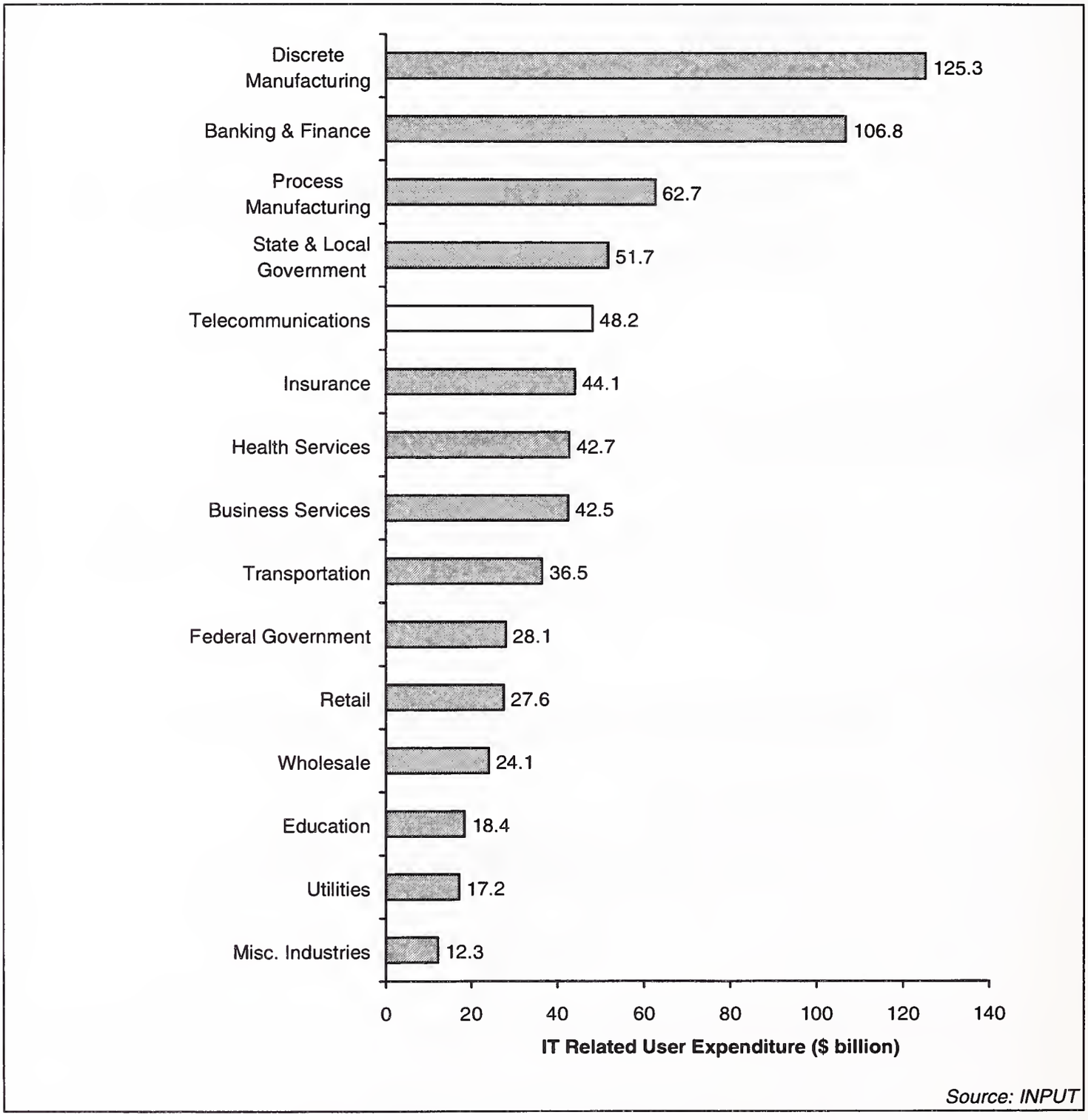
Source: INPUT

In comparison with other industry sectors the Telecommunications sector ranks the fifth largest individual industry sector overall as is shown in Exhibit IV-2.

A fuller comparison of the Telecommunications sector with other industry sectors is provided in Section C of this Chapter below.

Exhibit IV-2

Industry Sector Comparison – U.S., 1997



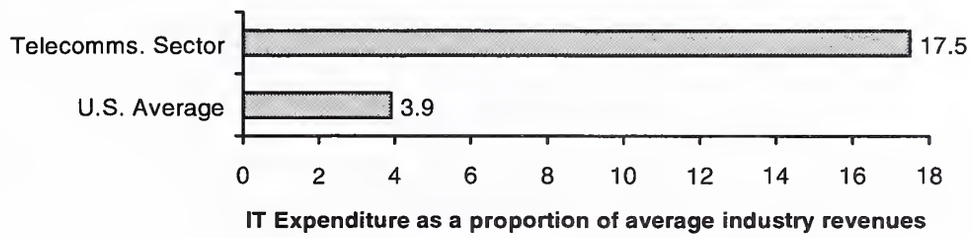
Source: INPUT

As a proportion of total industry output (the average for the individual organizations in the sector) the Telecommunications sector spent 17.5% of its revenues on IT in 1997.

Exhibit IV-3 shows the comparison of the Telecommunications sector with the average for all U.S. organizations and Exhibit IV-4 in comparison with other major industry sectors.

Exhibit IV-3

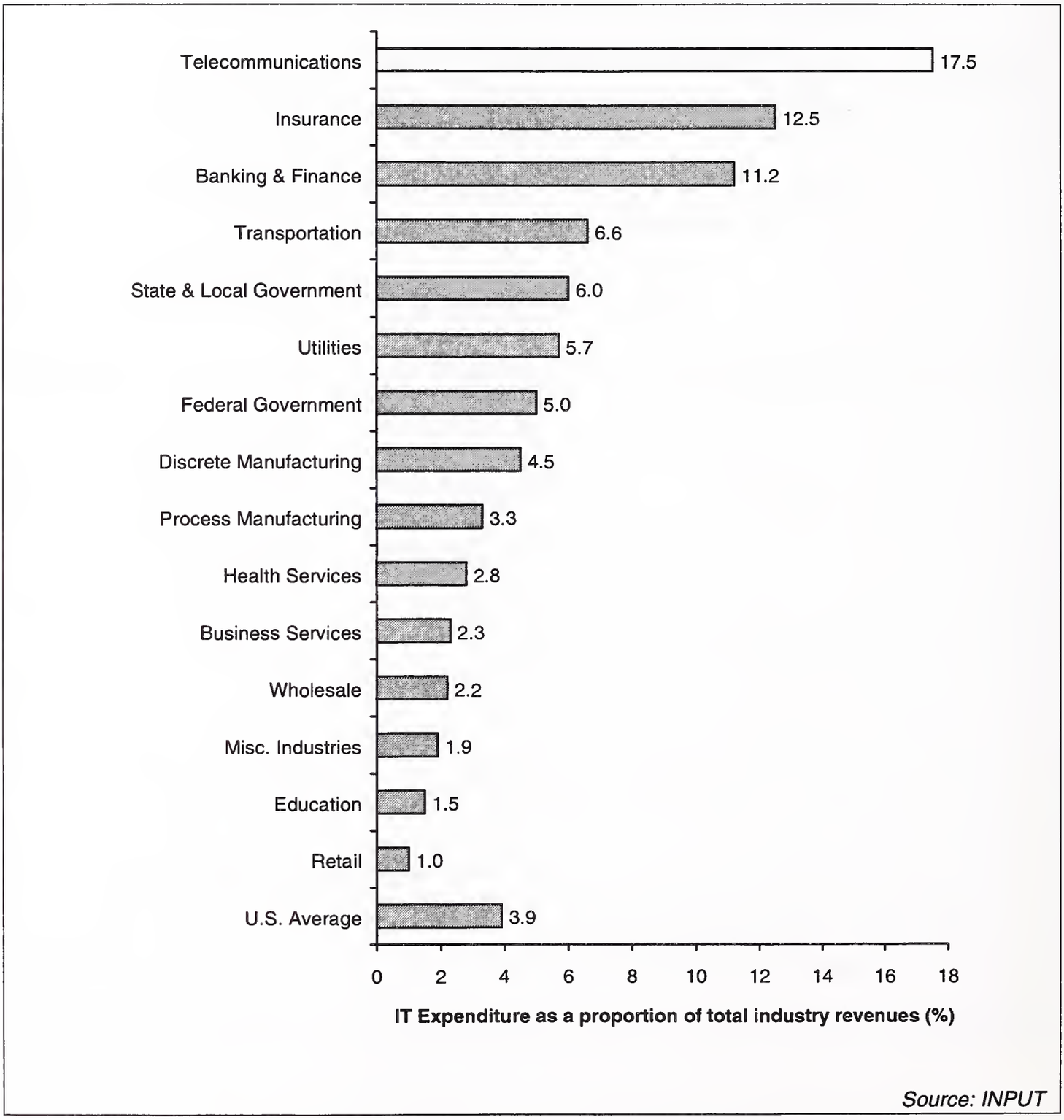
Telecommunications Sector IT Expenditure Comparison



Source: INPUT

Exhibit IV-4

Industry Sector Comparison – IT Expenditure U.S., 1997



Source: INPUT

INPUT analyzes total IT related expenditure into six principal categories. Exhibit IV-5 shows the analysis of total IT expenditure for the Telecommunications sector in the U.S. .

These six categories are:

- Equipment sales — expenditure on computer and data communications hardware products.
- Personnel— expenditure on permanent in-house staff excluding all externally provided people and contractors.
- Software products — all expenditure on systems software products and applications software product licenses including support services where these are included within the basic license fee.
- IT services — all expenditure on professional services, systems integration, outsourcing, processing services, network services, turnkey systems and systems software product support services and applications software product support services but excluding the provision of any products whether hardware or software. (NB. This is a narrower definition of services than used by INPUT for its full assessment of IT Software & Services markets as provided in Section B of this Chapter below.)
- Communications — all expenditure on IT-related data communications services.
- Facilities — IT budget expenditure on overheads such as space, heating, lighting, furniture, vehicles etc.

Exhibit IV-5

Telecommunications Sector – IT Budget Analysis - 1997

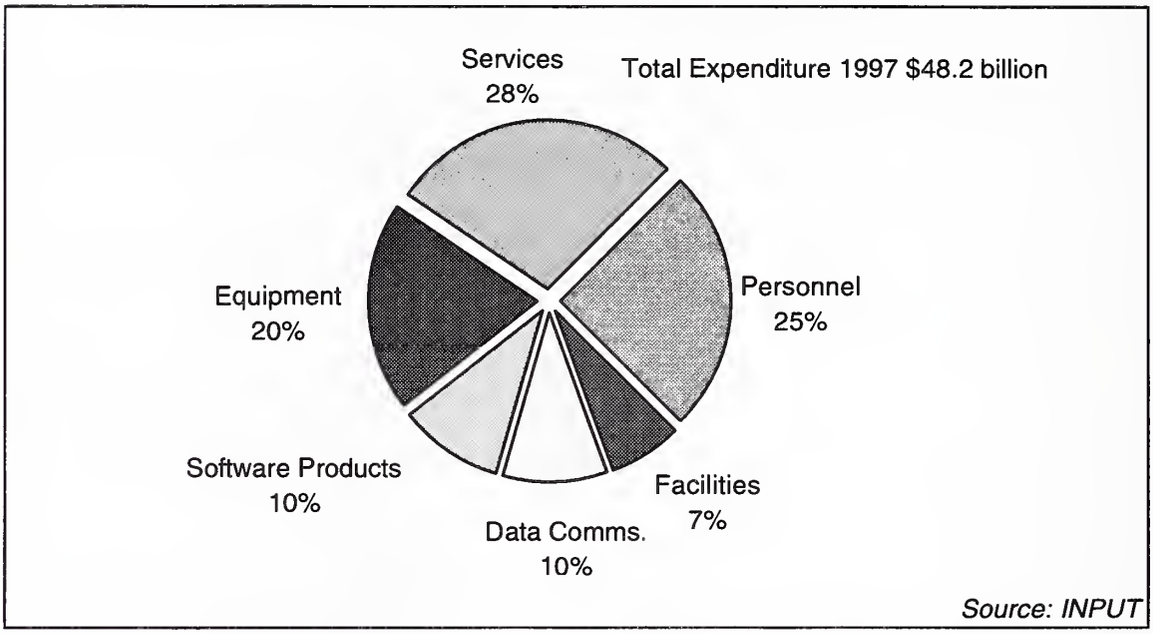


Exhibit IV-6 shows the same analysis (as in Exhibit IV-5) but for the whole U.S. market.

Exhibit IV-6

U.S. – IT Budget Analysis - 1997

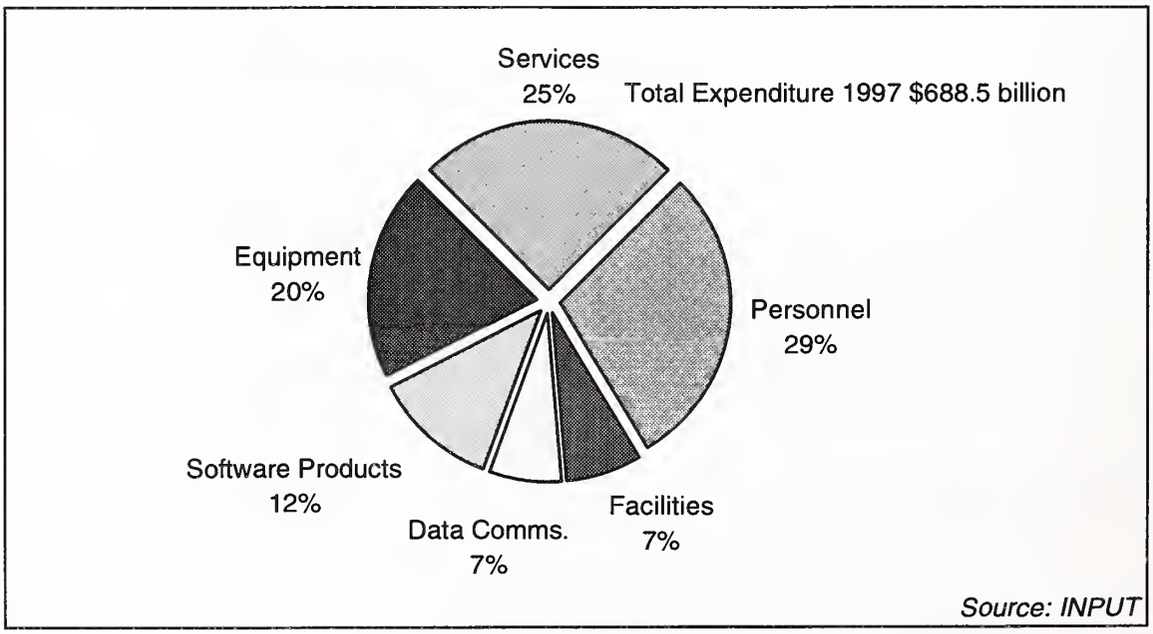
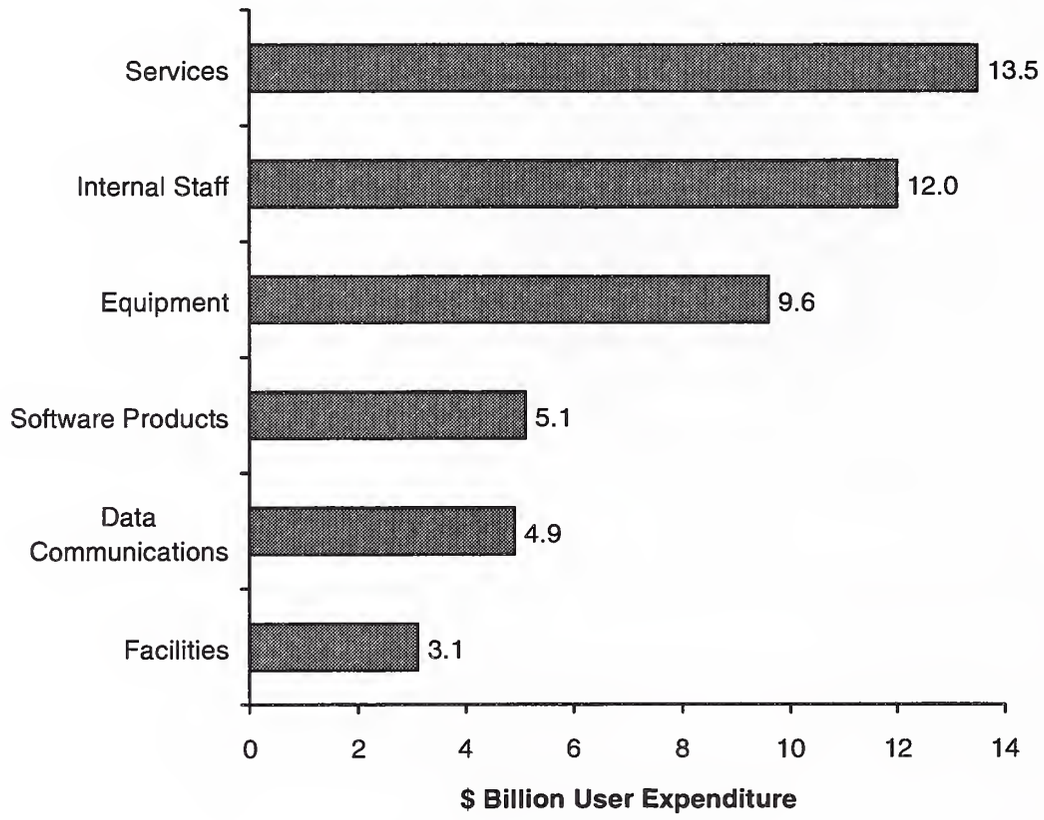


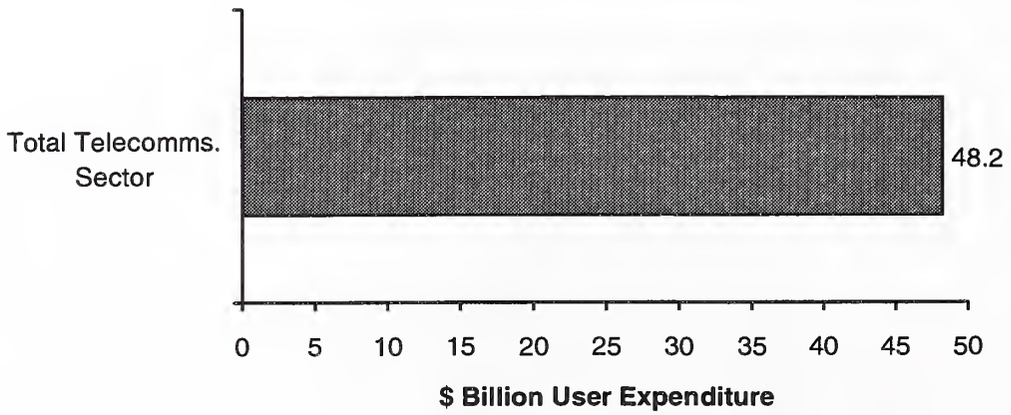
Exhibit IV-7 shows the relative size of each of the six principal segments of IT related expenditure for the Telecommunications sector.

Exhibit IV-8 shows the comparative table for the whole of the U.S. market.

Exhibit IV-7

IT Related User Expenditures – U.S. Telecommunications Sector, 1997

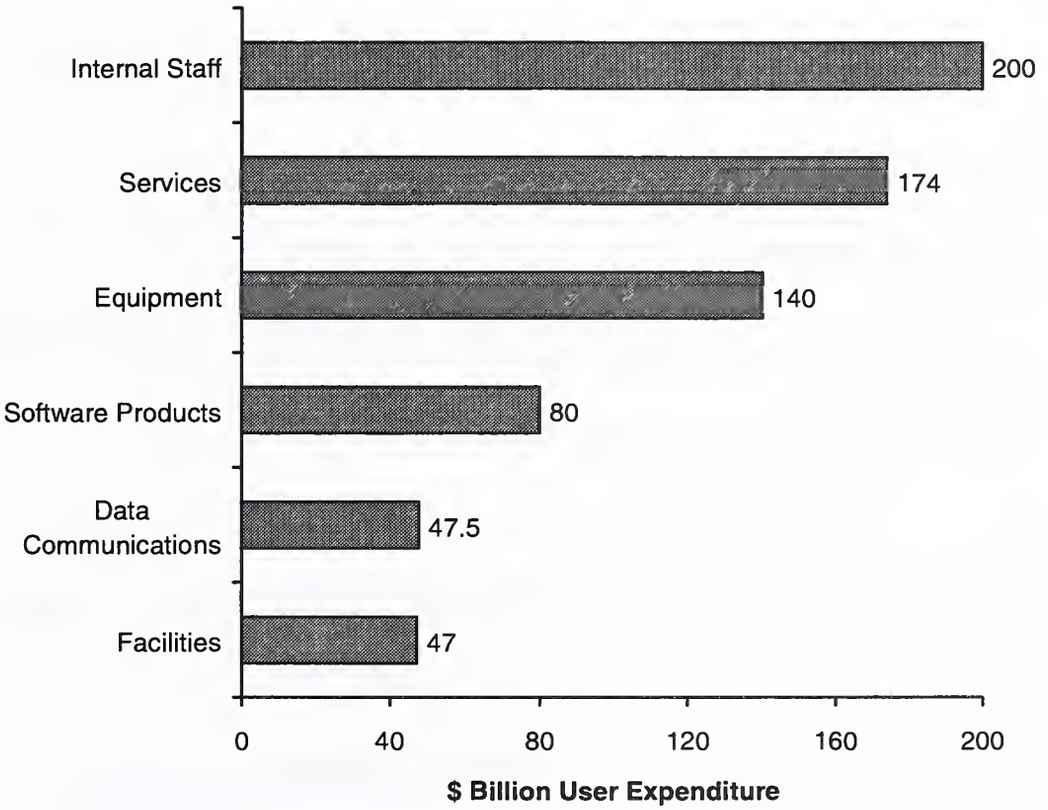


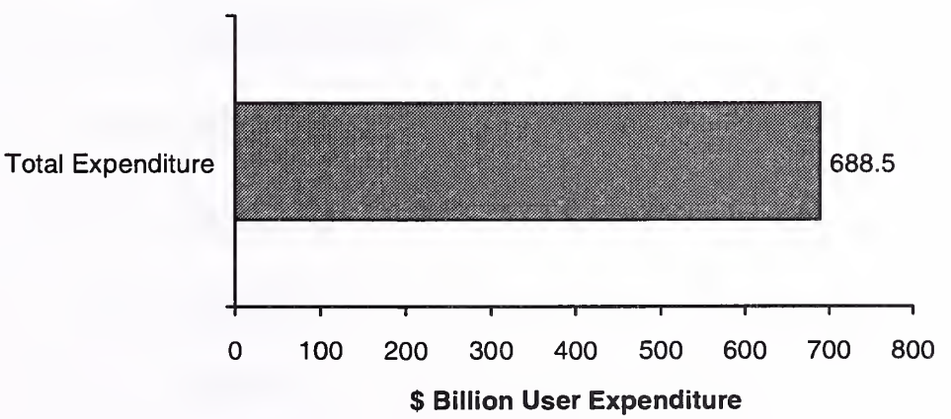


Source: INPUT

Exhibit IV-8

IT Related User Expenditures–U.S., 1997





Source: INPUT

B
IT Software & Services Market

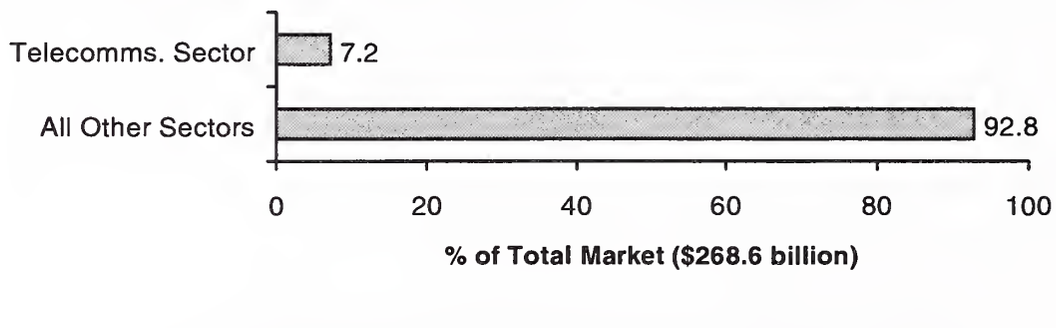
1. Total IT Software & Services Expenditure

a. Telecommunications Sector IT Software & Services Expenditure

Exhibit IV-9 shows the proportion of IT Software & Services expenditure within the Telecommunications sector in comparison to the total U.S. market.

Exhibit IV-9

Telecommunications Sector IT Software & Services Expenditure – U.S., 1997

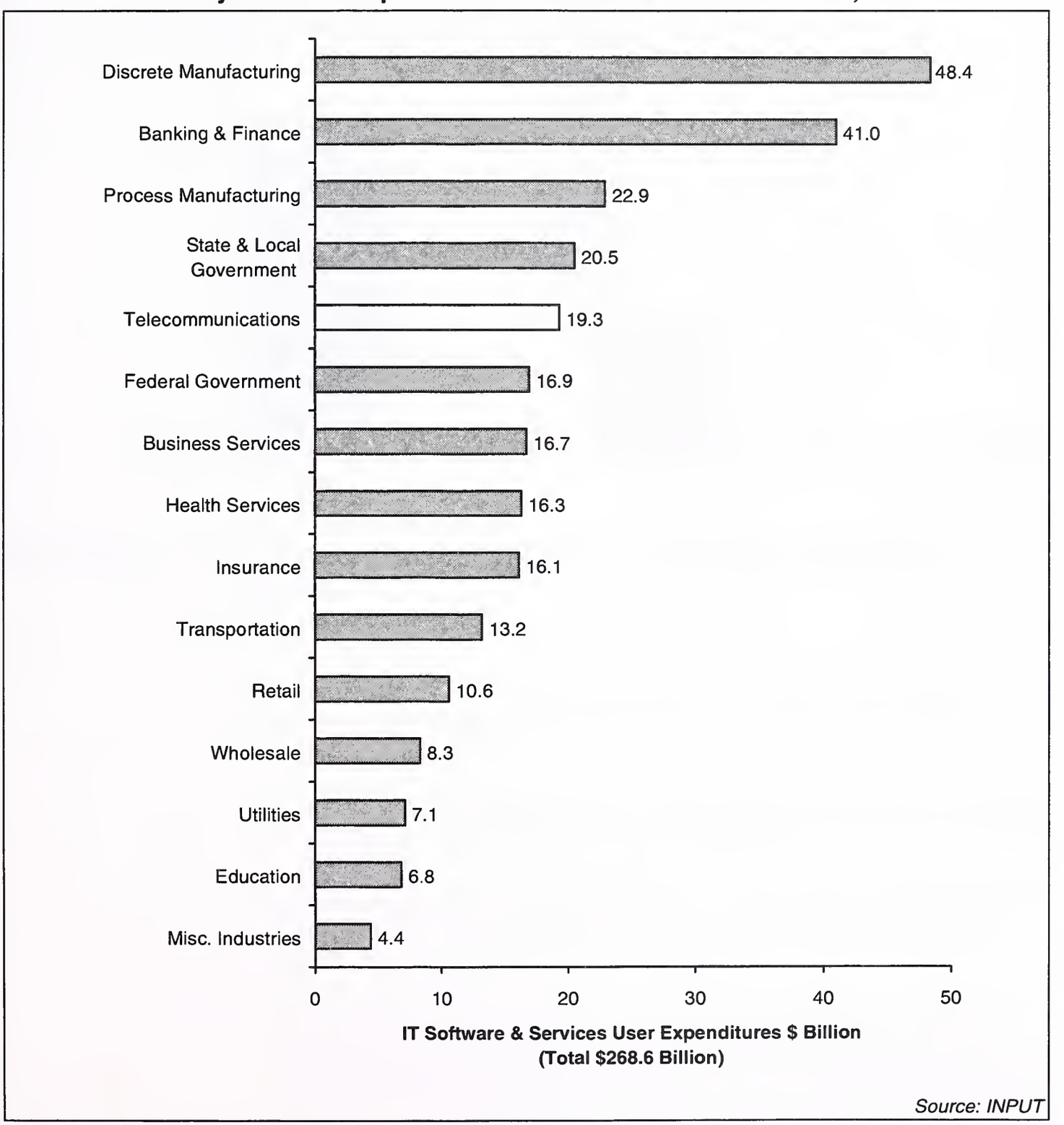


Source: INPUT

Exhibit IV-10 shows a comparison between the Telecommunications sector IT Software & Services market and other U.S. industry sectors.

Exhibit IV-10

Industry Sector Comparison – IT Software & Services – U.S., 1997

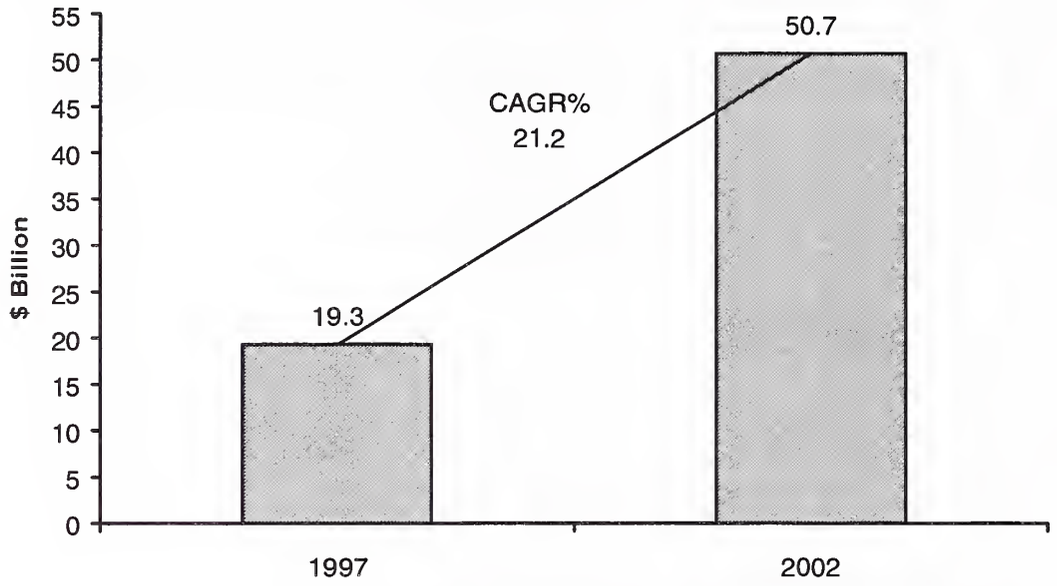


Source: INPUT

Growth expectations for the Telecommunications sector IT Software & Services market are shown in Exhibit IV-11 and in comparison with the total U.S. market for IT Software & Services in Exhibit IV-12.

Exhibit IV-11

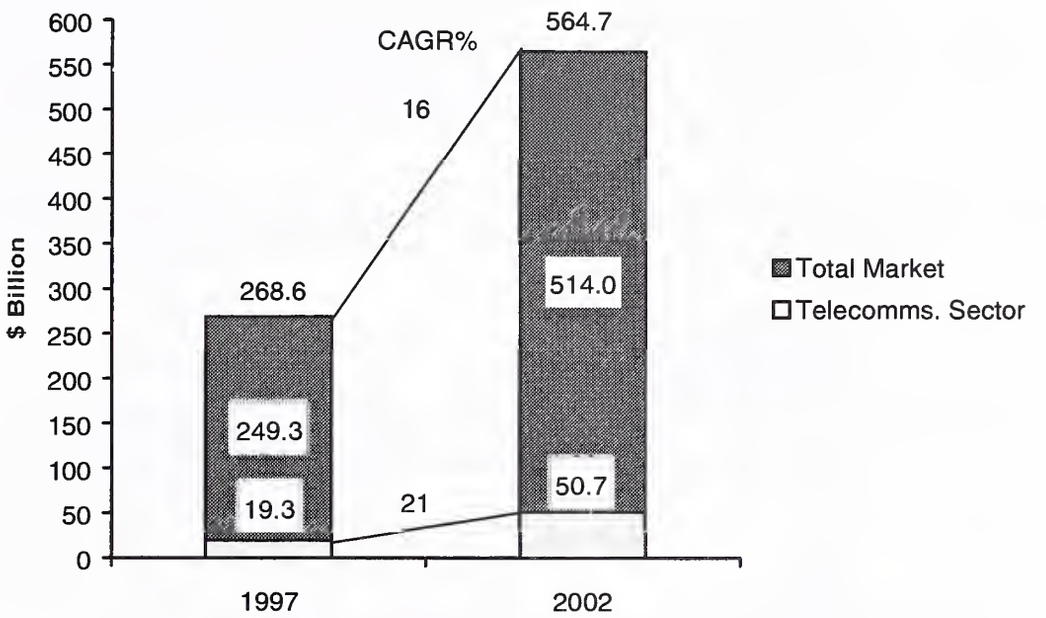
Telecommunications Sector IT Software & Services Market – U.S.



Source: INPUT

Exhibit IV-12

IT Software & Services Forecast- U.S.



Source: INPUT

b. Industry Sector Composition of IT Software & Services Markets

The total volume of expenditure for IT Software & Services in the Telecommunications sector, described above, is analyzed by INPUT into three separate categories:

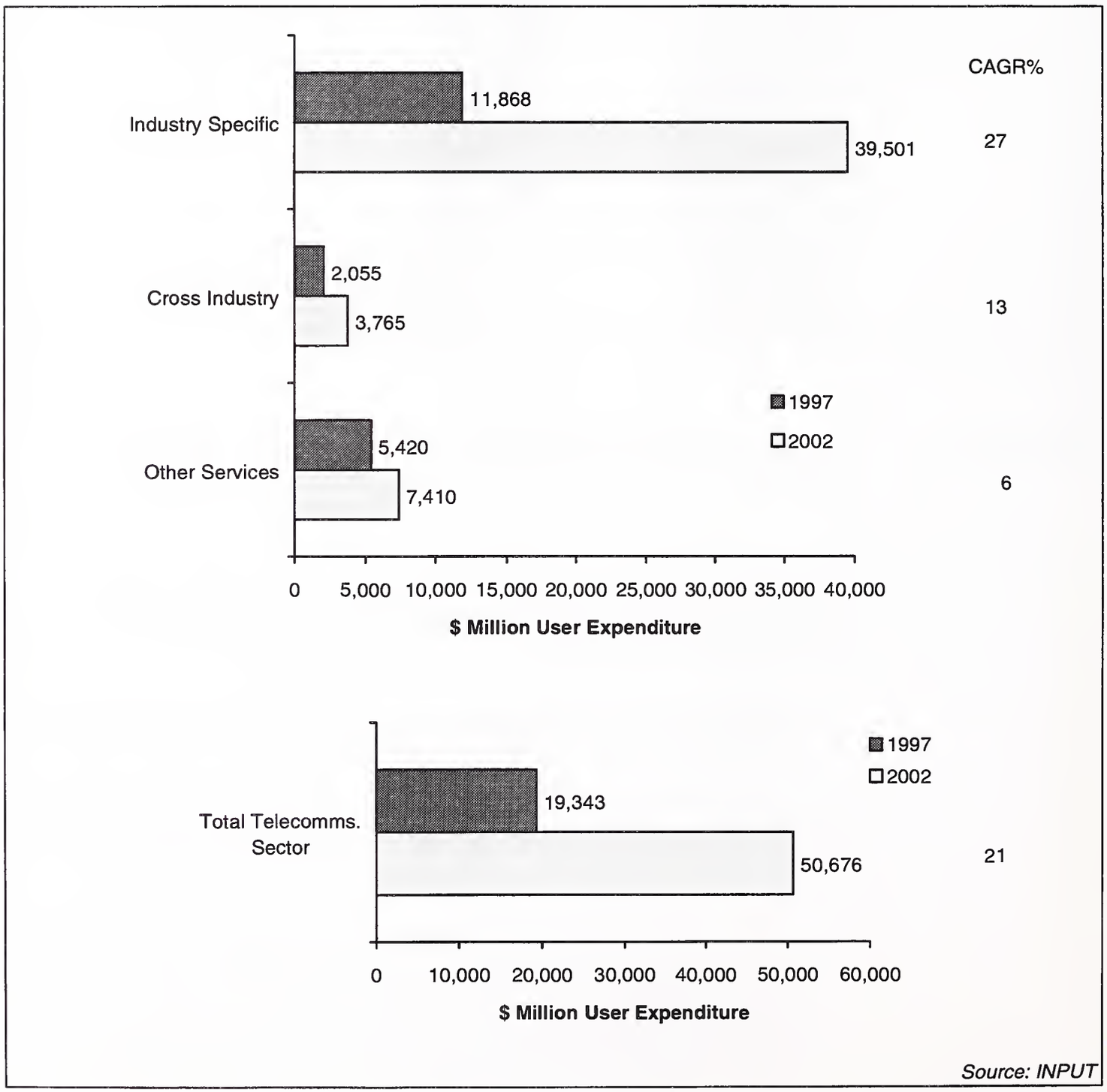
- Industry Specific expenditures – these are for services that are related specifically to the Telecommunications industry.
- Process or Cross-industry expenditures – these are for multi-industry applications such as human resource systems, accounting systems, etc.
- Other services expenditures – these are for general services that do not fall into the two categories described above. The two principal sectors classified in this 'other services' category are Systems Software Products and Equipment Services. The category also includes some types of expenditure in Processing services and Network Services.

The analysis of IT Software & Services expenditure within the Telecommunications sector according to this breakdown is shown in Exhibit IV-13.

Exhibit IV-14 provides a more detailed numerical tabulation of this analysis.

Exhibit IV-13

Total IT-Related User Expenditures– Telecommunications Sector U.S.



Source: INPUT

Exhibit IV-14

Analysis of IT Software & Services Expenditure – Telecommunications Sector U.S., 1997

Segment		User Expenditures $ Billion		
		Industry Specific	Cross Industry	Other Services
Professional Services	Total	3,350		
Systems Integration	Total	1,350		
	Software Products	134		
	Equipment	283		
	Other	933		
Outsourcing	Total	1,848		
Processing Services	Transactions	2,450	650	
	Other services			1,000
Network Services	Total	500		100
Applications Software Products	Total	1,340	1,300	
Turnkey Systems	Total	1,030	105	
	Software Products	426	40	
	Equipment	367	40	
	Other	236	25	
Systems Software Products	Total			1,900
Equipment Services	Total			1,790
Total		11,868	2,055	5,420

Source: INPUT

The relationship between the different classifications of expenditure can be readily seen from the two previous Exhibits (IV-13 and 14).

Exhibits IV-15 shows the breakdown of the total amount of equipment included within INPUT's IT Software & Services categories.

Exhibit IV-15

Equipment Expenditure – Telecommunications Sector

Sector	1997 Expenditure ($ million)
Systems Integration	283
Turnkey Systems – Industry Specific	367
Turnkey Systems – Cross Industry	40
Telecommunications Sector TOTAL	690

Source: INPUT

Exhibit IV-16 shows the calculation of the total amount of Software Products that are included within INPUT's IT Software & Services categories.

Exhibit IV-16

Software Products Expenditure – Telecommunications Sector

Sector	1997 Expenditure ($ million)
Systems Integration	134
Applications Software Products – Industry Specific	1,340
Applications Software Products – Cross Industry	1,300
Turnkey Systems – Industry Specific	426
Turnkey Systems – Cross Industry	40
Systems Software Products	1,900
Telecommunications Sector TOTAL	5,140

Source: INPUT

Exhibit IV-17 shows the summation of the three different components that combine to form INPUT's definition of the IT Software & Services market.

Exhibit IV-17

IT Software & Services Components – Telecommunications Sector

Sector	1997 Expenditure ($ million)
Equipment	690
Software Products	5,140
IT Services	13,513
Telecommunications Sector TOTAL	19,343

Source: INPUT

Exhibit IV-18 shows the summation of the three different categories of services that comprise the total amount of expenditure on IT Software & Services within the Telecommunications sector in the U.S. .

Exhibit IV-18

Total IT Software & Services – Telecommunications Sector

Sector	1997 Expenditure ($ million)
Industry Specific	11,868
Cross Industry	2,055
Other Services	5,420
Telecommunications Sector TOTAL	19,343

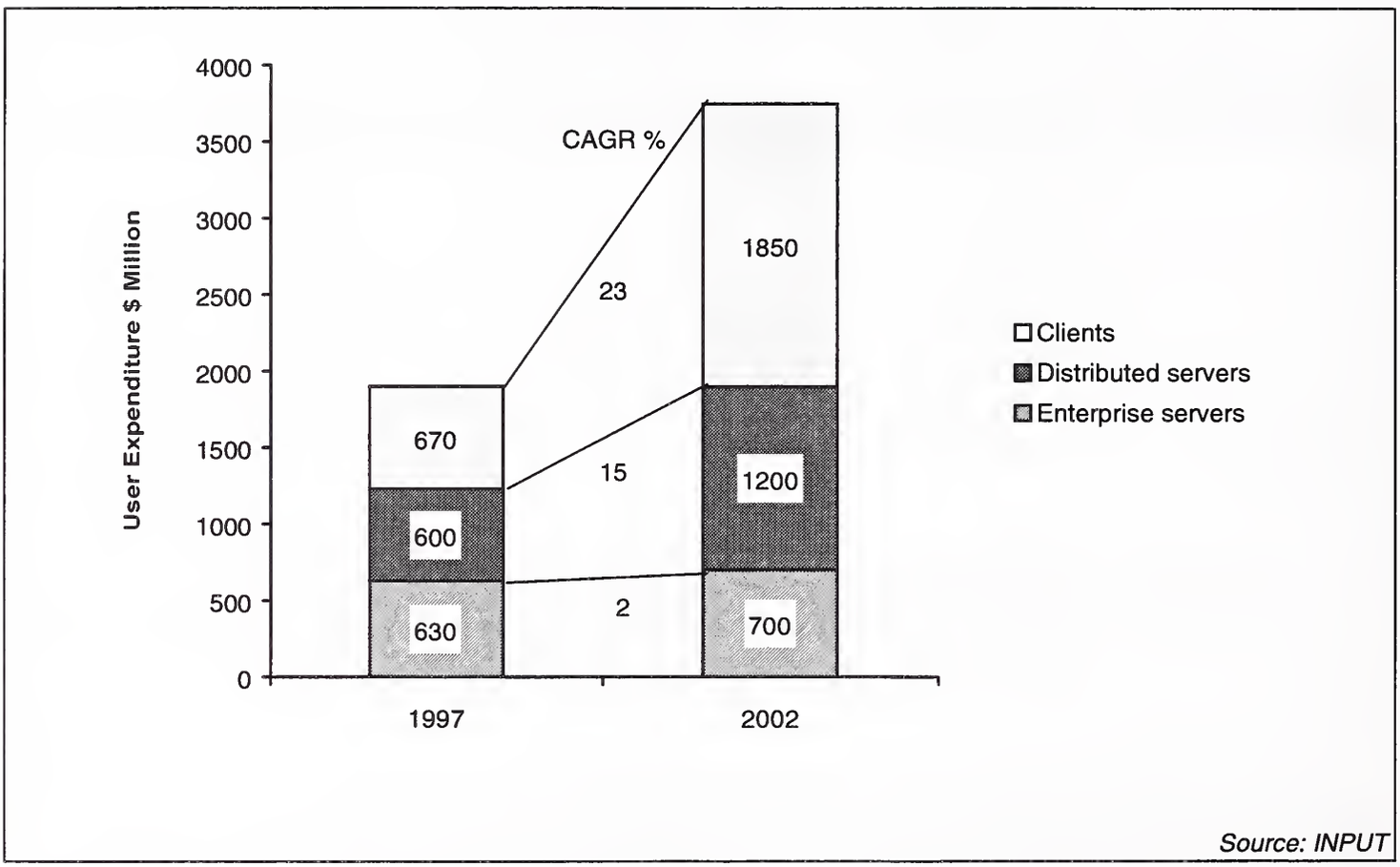
Source: INPUT

The two principal IT Software & Services categories that fall outside the Industry Specific classification are Systems Software Products and Equipment Services, they are briefly discussed below.

Exhibit IV-19 shows the forecast growth for Systems Software Products within the Telecommunications sector.

Exhibit IV-19

Telecommunications Sector - System Software Products Expenditure, U.S.



Source: INPUT

System Software Products enable the computer/communications system to perform basic machine-oriented or user interface functions.

INPUT defines the System Software Products sector as comprising four submodes:

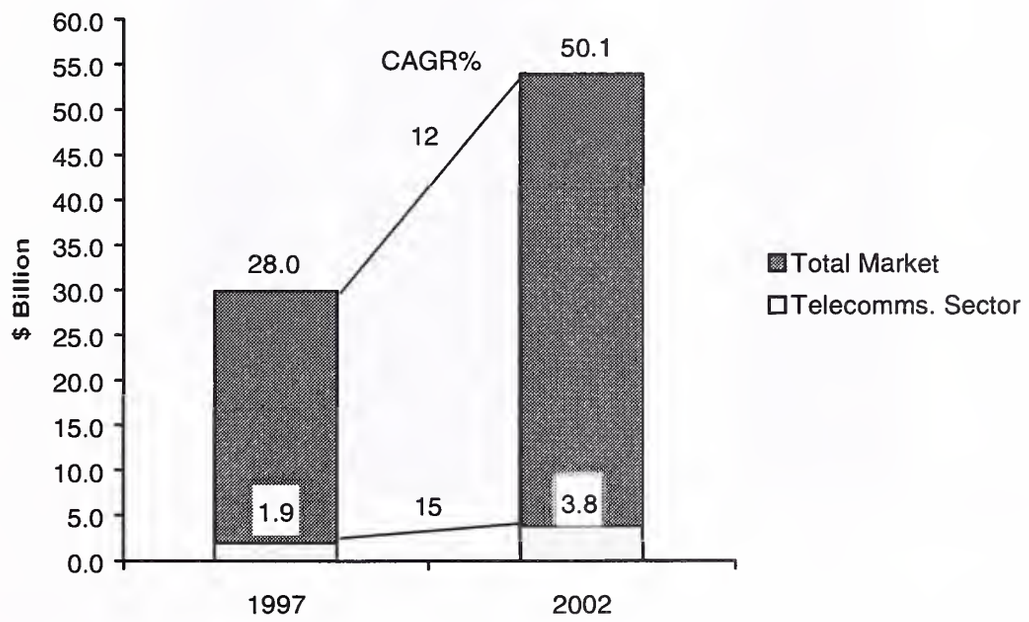
- Systems Control Products – the operating system, network control software etc.
- Operations management Tools – programs used by operational management, for example performance measurement and scheduling tools.

- Applications Development Tools – programming languages, database management systems and other development and productivity tools.
- Database Management Systems.

Exhibit IV-20 shows the comparison of the Telecommunications sector growth with that for the whole market in the U.S. .

Exhibit IV-20

Systems Software Products Market Growth - U.S.

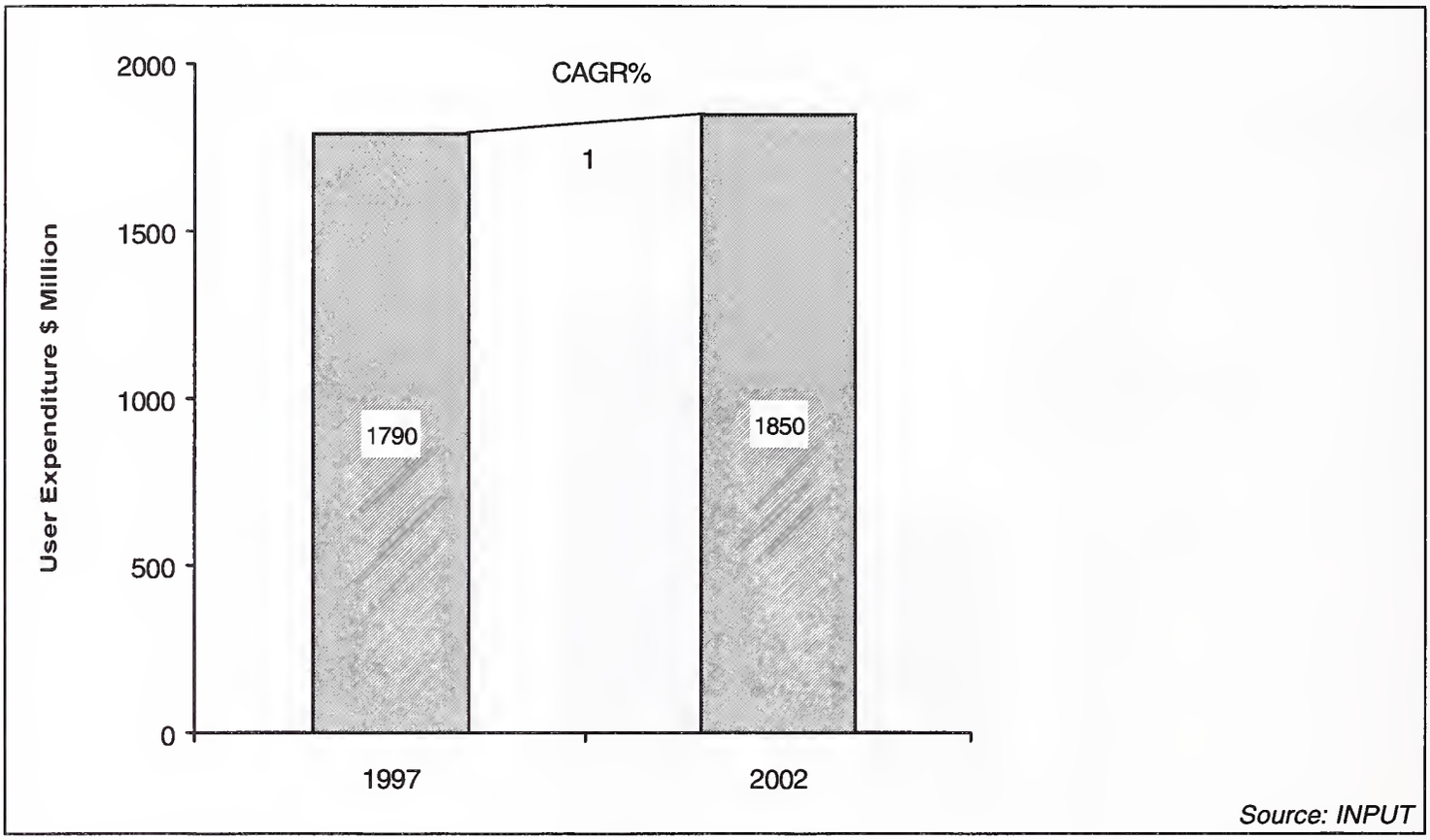


Source: INPUT

The Equipment Services expenditure that is generated within the Telecommunications Sector is analyzed in Exhibit IV-21 below.

Exhibit IV-21

Telecommunications Sector - Equipment Services Expenditure, U.S.



The Equipment Services category is comprised of two principal elements:

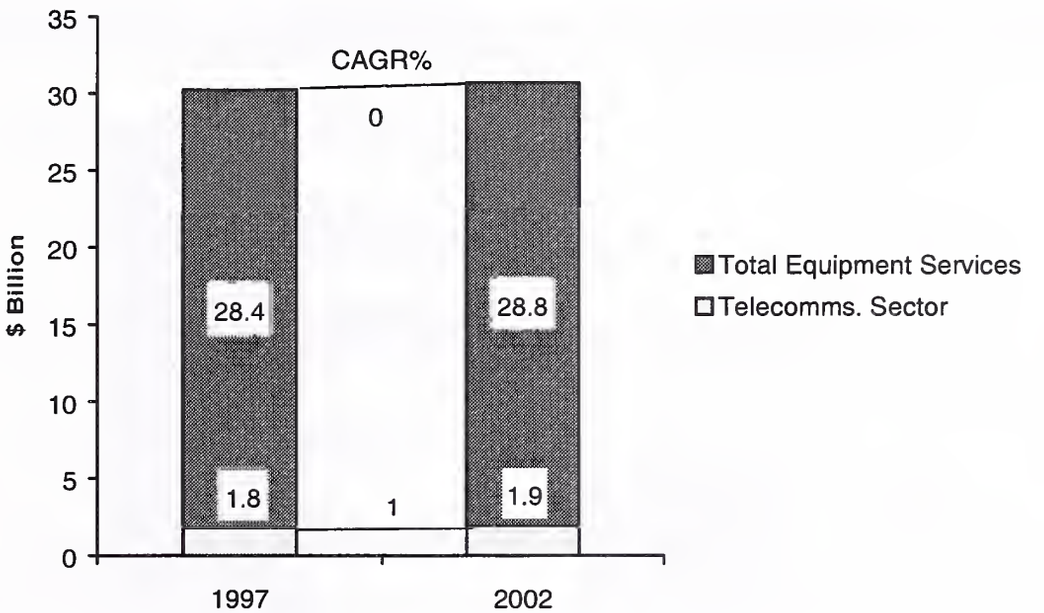
- Product Maintenance- services need to repair, diagnose and provide preventive maintenance both onsite and offsite for computer/communications systems including systems software products where these expenditures are not included within System Software Product License agreements.

- Environmental Services – planning and implementation services which affect the environments in which computer systems are operated. This category therefore covers; computer rooms, electrical power and HVAC systems, network attachments and associated building services.

Exhibit IV-22 shows the comparison of the Telecommunications sector growth with that for the whole market in the U.S. .

Exhibit IV-22

Equipment Services Growth - U.S.



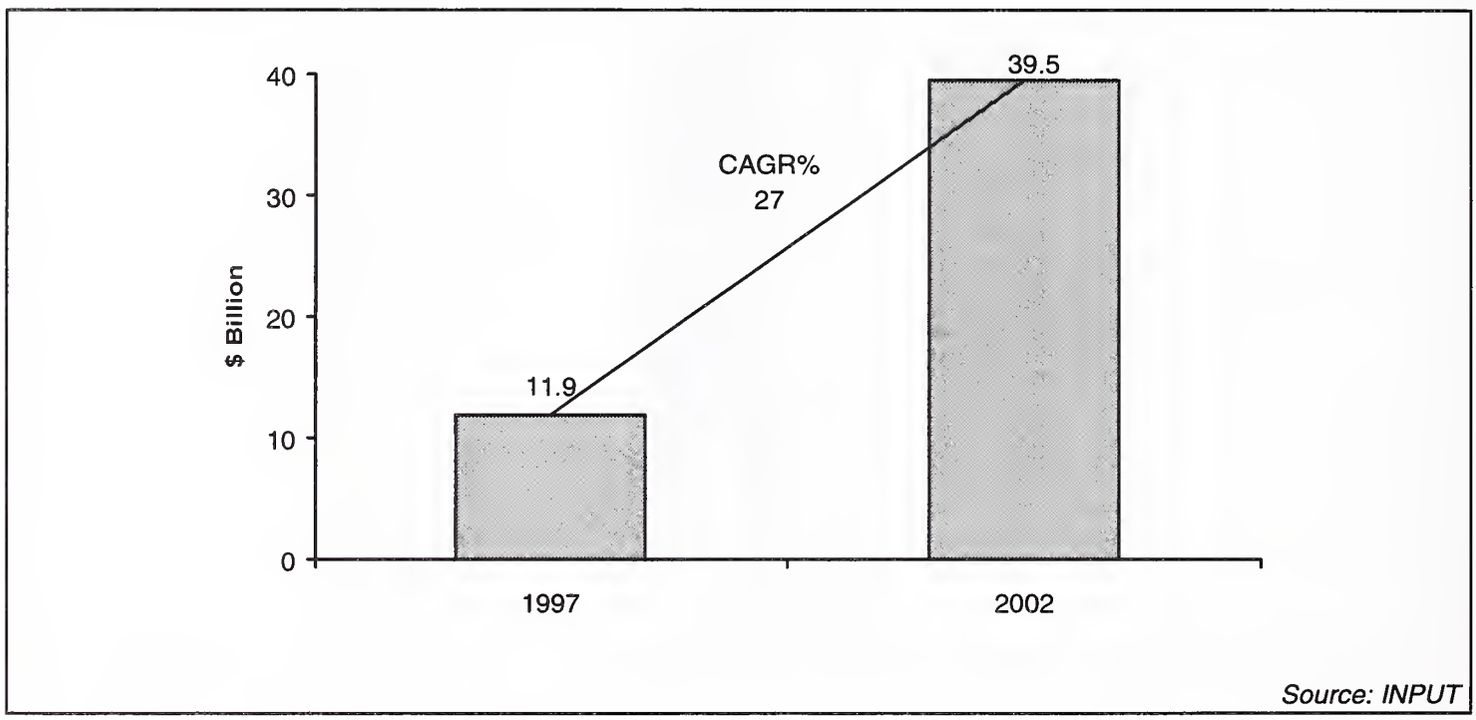
Source: INPUT

2. Industry Specific IT Software & Services Expenditure

This subsection focuses on the *Industry Specific* IT Software & Services market. Exhibit IV-23 shows the expected growth for all expenditure in this category for the Telecommunications sector in the U.S. .

Exhibit IV-23

Telecommunications Sector Industry Specific IT Software & Services Market

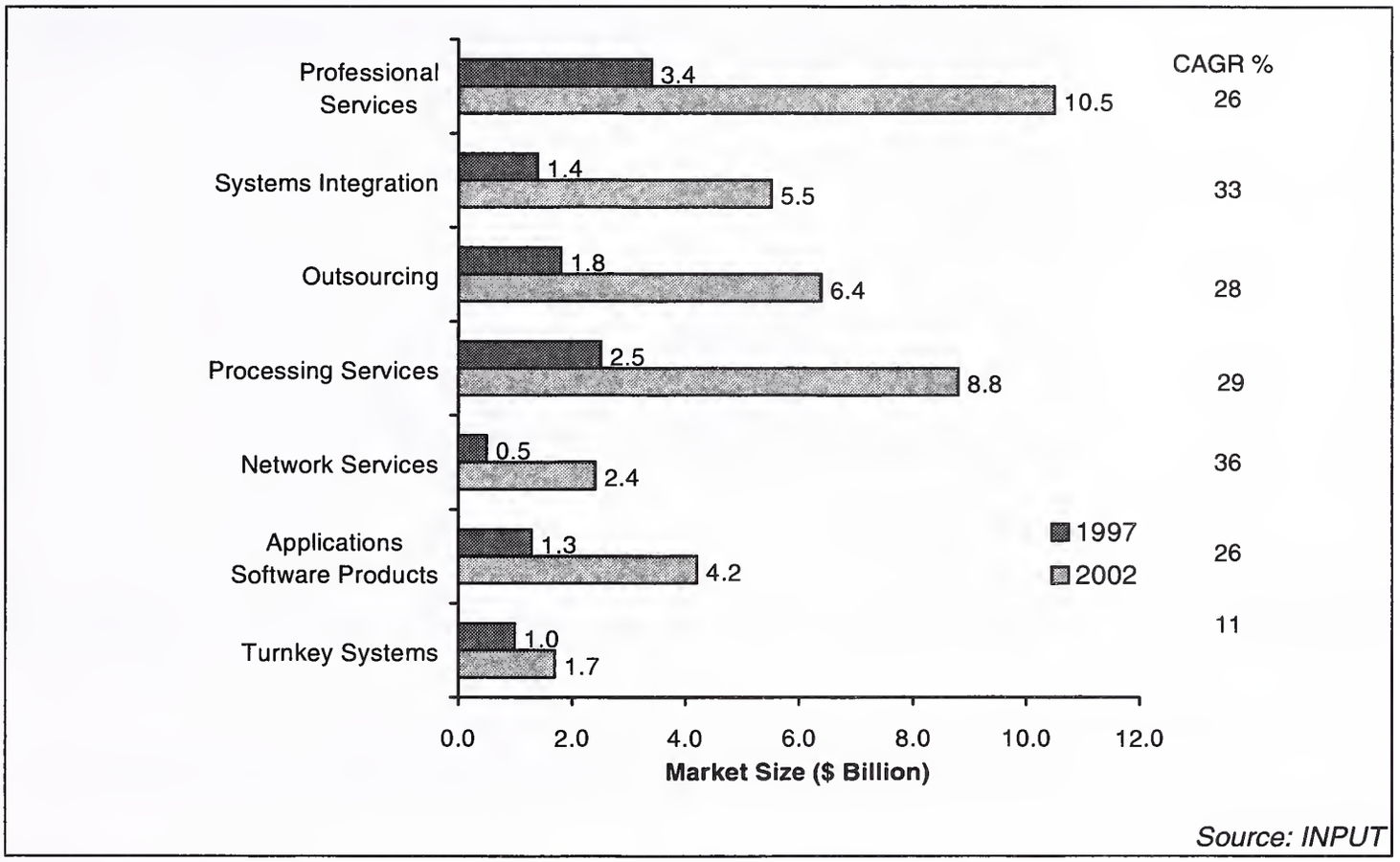


Source: INPUT

Exhibit IV-24 provides analysis of this sector by the principal forms of service delivery.

Exhibit IV-24

Analysis by Service Category – Telecommunications Industry Specific Market, U.S.



Source: INPUT

Exhibit IV-25 provides a tabular analysis showing the detailed data.

Exhibit IV-25

Telecommunications Industry Specific IT Software & Services Market, U.S. ($million)

Sector	1997	CAGR	2002
Professional Services	3,350	25.6%	10,475
Systems Integration	1,350	32.5%	5,516
Outsourcing	1,848	28.4%	6,440
Processing Services	2,450	29.1%	8,800
Network Services	500	36.4%	2,365
Applications Software Products	1,340	25.6%	4,195
Turnkey Systems	1,030	10.7%	1,710
Sector TOTAL	11,868	27.2%	39,501

Source: INPUT

Each of these principal service modes is described in more detail below.

a. Professional Services

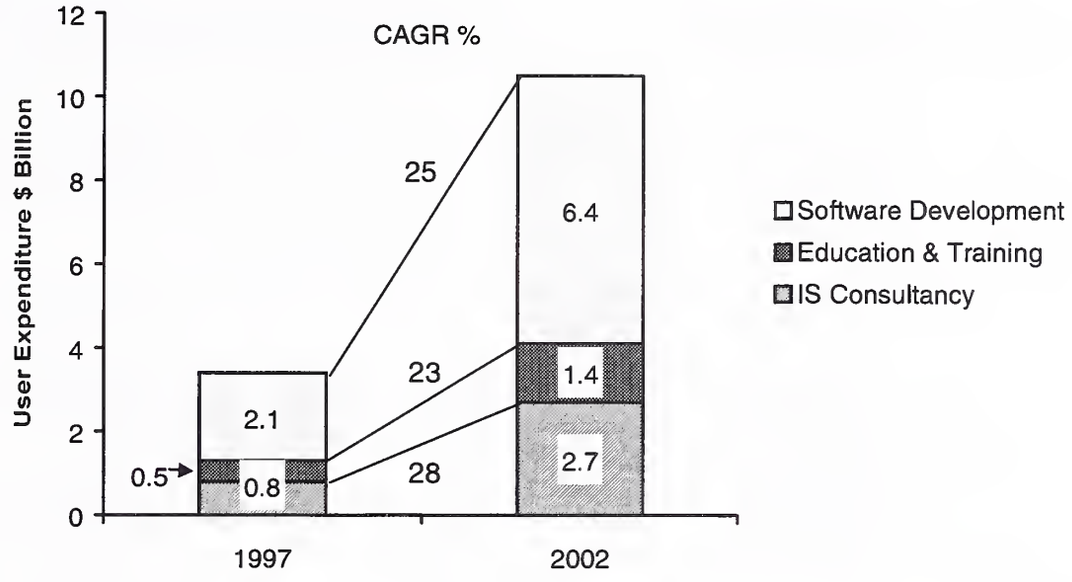
Exhibit II-26 shows the forecast for the Telecommunications sector Professional Services segment, the second largest individual services delivery mode in the sector.

The professional service category comprises three subcategories: consulting, education and training, and software development.

Software development is by far the dominant sector and will remain so over the forecast period even though it is predicted to grow more slowly than the other two subcategories.

Exhibit IV-26

Telecommunications Sector Professional Services Market - U.S.



Source: INPUT

Exhibit IV-27 provides the detailed forecast data in tabular form.

Exhibit IV-27

Professional Services – Telecommunications Sector, U.S. ($million)

Subsector	1997 Expenditure	CAGR	2002 Expenditure
IS Consulting	775	27.9%	2,652
Education & Training	515	23.0%	1,449
Software Development	2,060	25.3%	6,374
TOTAL	3,350	25.6%	10,475

Source: INPUT

b. Systems Integration

Systems Integration is a vendor delivered service that provides a complete solution to an information systems requirement.

The vendor meets the client's needs through the custom selection and implementation of a variety of information systems products and services.

A Systems Integrator is responsible for the overall management of a systems integration contract and is the single point of contact and responsibility to the buyer for the delivery of the specified system function, on schedule and at the contracted price.

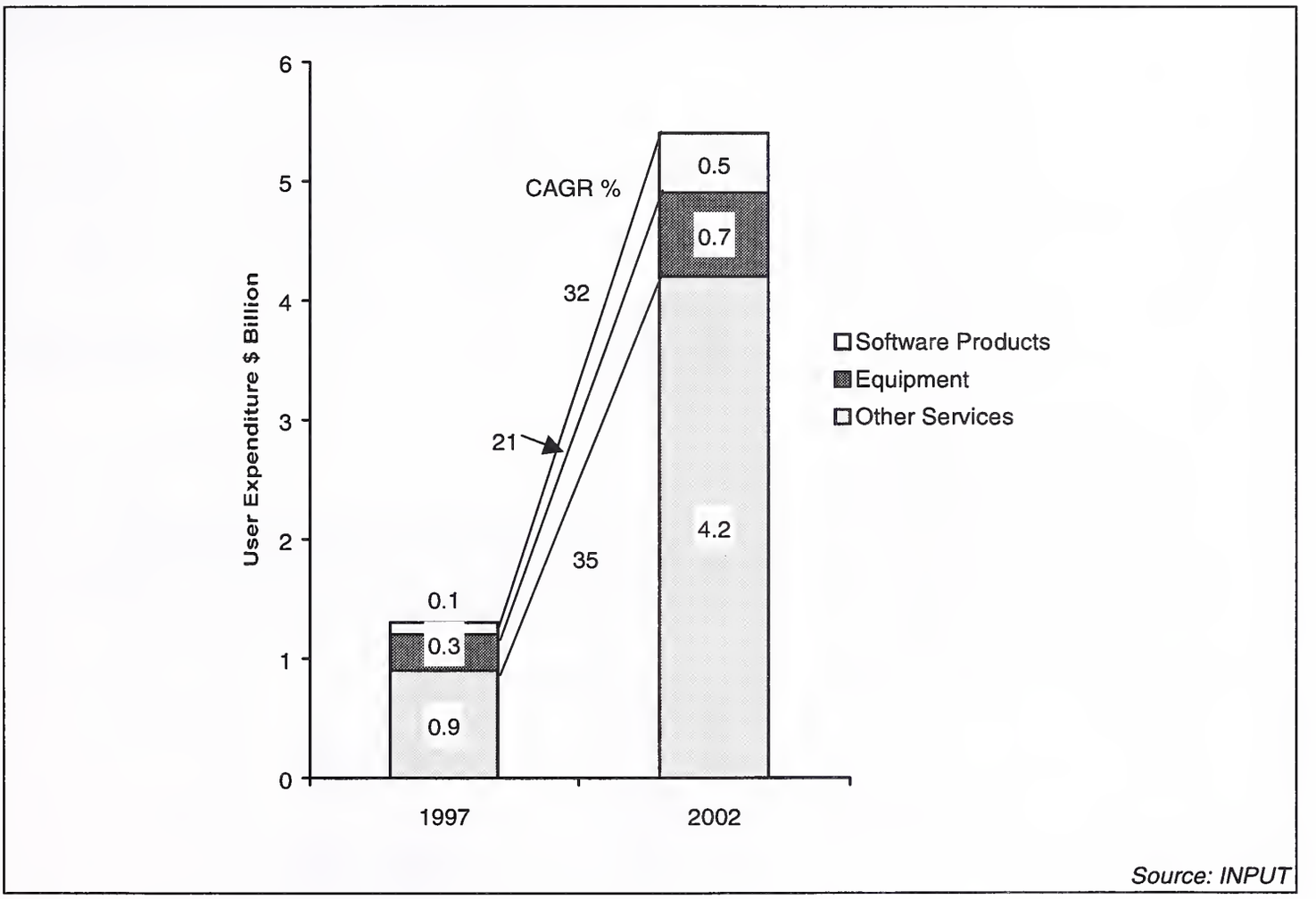
The principal components of a systems integration contract are:

- Equipment – the information processing and communications equipment required to build the systems solution.
- Software products – prepackaged applications and systems software products.
- IT-related professional services - the value added element that develops and implements the client solution.
- Other products and services – miscellaneous items such as engineering services, computer supplies and business support services.

Exhibit IV-28 shows the anticipated development of the Systems Integration market in the U.S. .

Exhibit IV-28

Telecommunications Sector Systems Integration Market - U.S.



Source: INPUT

Exhibit IV-29 shows the detailed forecast data in tabular form.

Exhibit IV-29

Systems Integration – Telecommunications Sector, U.S. ($million)

Subsector	1997 Expenditure	CAGR	2002 Expenditure
Software Products	134	32.1%	540
Equipment	283	21.4%	745
Other Services	933	35.3%	4,230
Telecommunications Sector TOTAL	1,350	32.5%	5,515

Source: INPUT

c. Operational Services

INPUT has in the course of 1997 introduced the term *Operational Services* to distinguish and group together those services that provide continuous computer/network operations and/or support.

The Operational Services sector comprises:

- Outsourcing services.
- Processing services.
- Network services including Internet services.

Each of these subsectors is described below.

i. Outsourcing

Outsourcing is a long-term (greater than one year) relationship between a client and a vendor in which the client delegates all, or a major portion, of an operation or function to the vendor.

The operation or function may either be solely information systems outsourcing based, or include information systems outsourcing as a major component (at least 30%) of the operation.

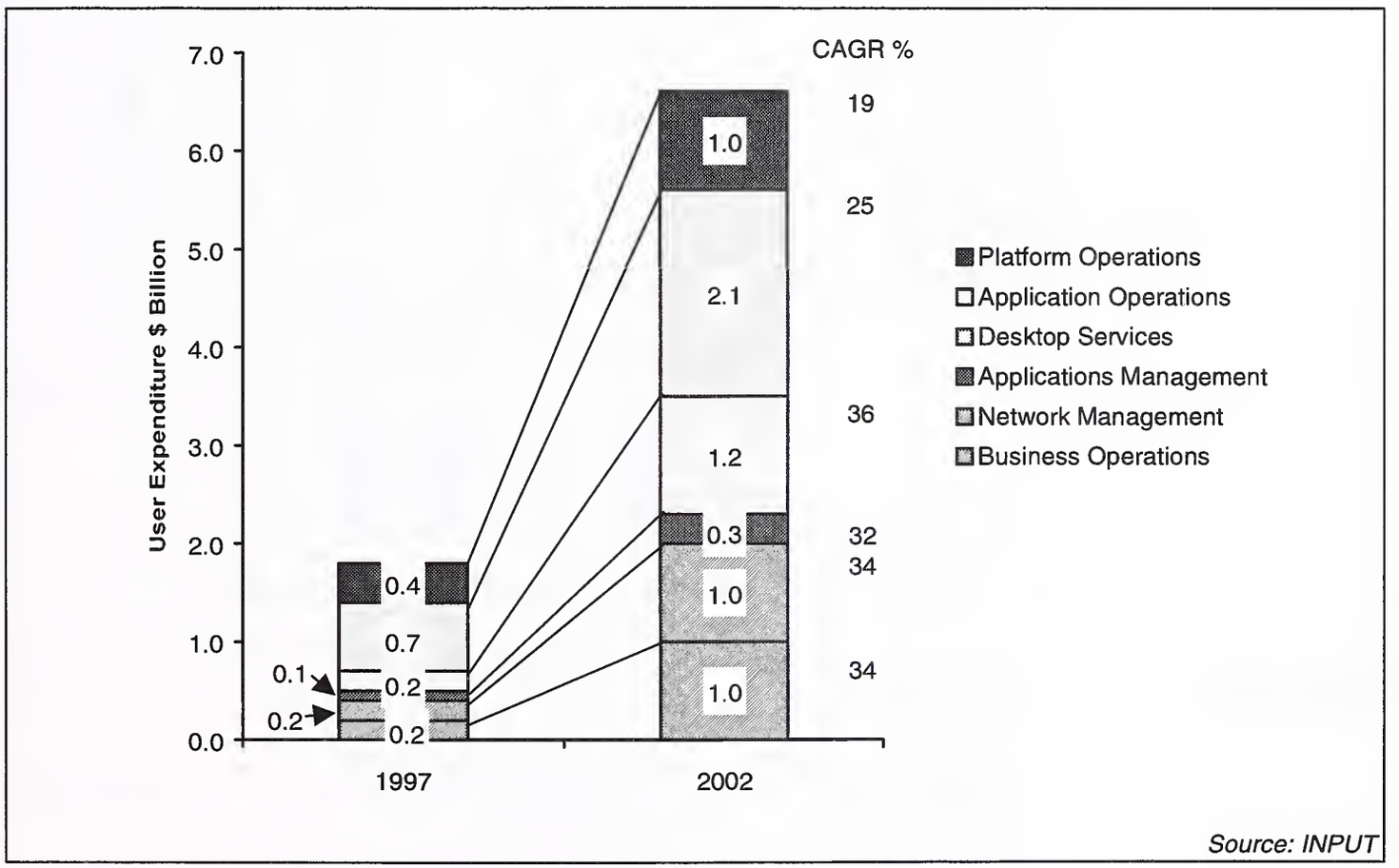
The critical components that define an outsourcing service are:

- Delegating an identifiable area of the operation to a vendor.
- Single-vendor responsibility for performing the delegated action.
- Intentional, long-term relationship between the client and the vendor.

Exhibit II-30 shows the growth forecast for the U.S. Telecommunications sector outsourcing market.

Exhibit IV-30

Telecommunications Sector Outsourcing Market - U.S.



Source: INPUT

Exhibit IV-31 shows the detailed forecast data in tabular form.

Exhibit IV-31

Outsourcing Services – Telecommunications Sector, U.S. ($million)

Subsector	1997 Expenditure	CAGR	2002 Expenditure
Platform Operations	399	19.4%	970
Application Operations	676	24.8%	2,050
Desktop Services	246	36.1%	1,150
Applications Management	72	32.1%	290
Network Management	236	34.3%	1,030
Business Operations	220	34.0%	950
Telecommunications Sector TOTAL	1,848	28.4%	6,440

Source: INPUT

ii. Processing Services

The Processing Services category contains three subcategories:

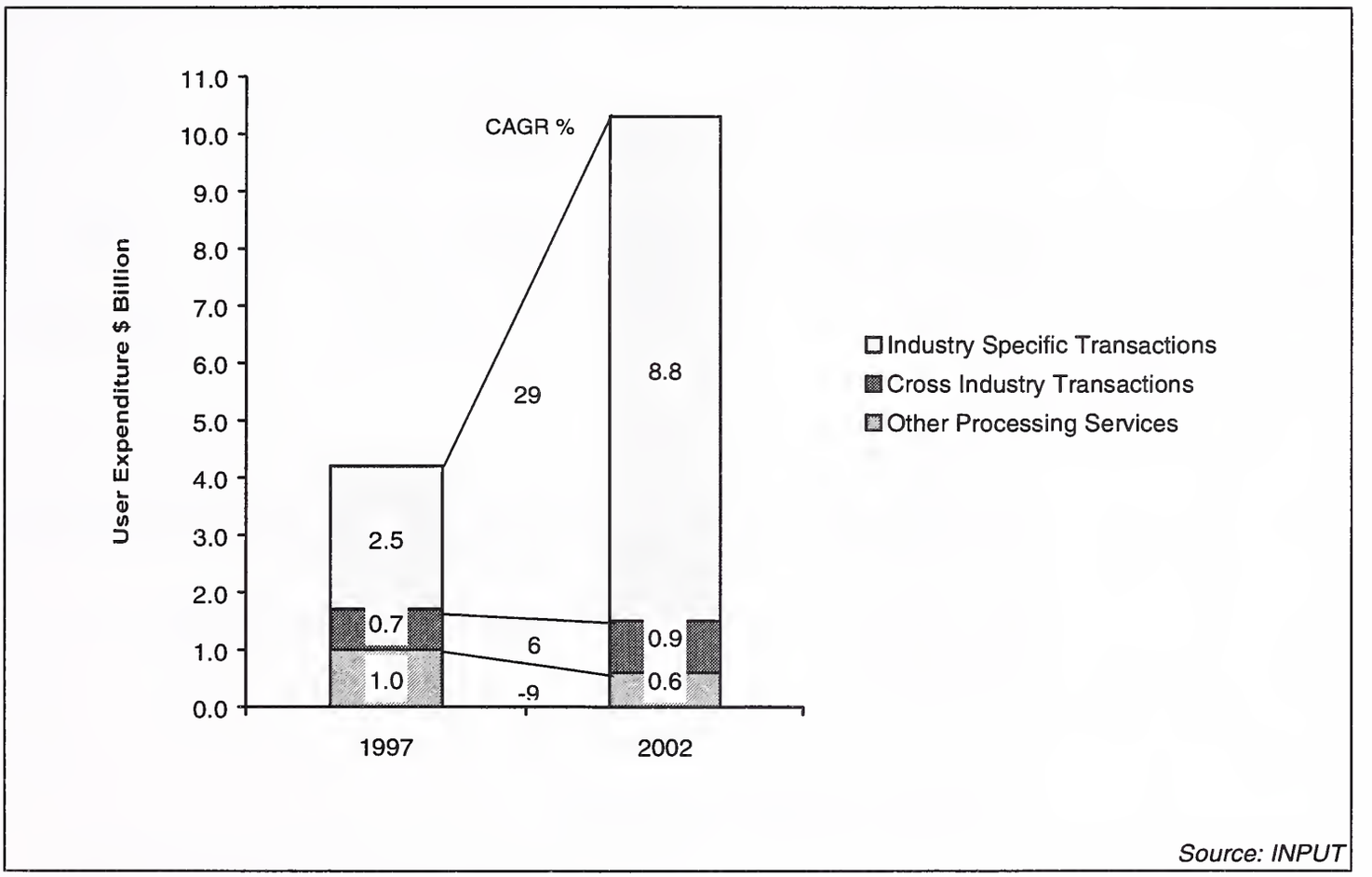
- Transaction processing – the processing of specific applications and client databases.
- Utility processing – clients develop and/operate their own programs or process data on the vendor' system.
- Other processing services – scanning and other data entry services, laser printing, computer output microfilm (COM), CD preparation and other data output services. This category also included backup, contingency and disaster recovery services.

Exhibit IV-32 shows the forecast for the U.S. Telecommunications sector Processing Services market.

It should be noted that in this Exhibit only the portion marked Industry specific transactions is counted within the industry specific part of the market analysis.

Exhibit IV-32

Telecommunications Sector Processing Services Market - U.S.



Source: INPUT

Exhibit IV-33 shows the detailed forecast data in tabular form.

Exhibit IV-33

Processing Services – Telecommunications Sector, U.S. ($million)

Subsector	1997 Expenditure	CAGR	2002 Expenditure
Industry Specific Transactions	2,450	29.1%	8,800
Cross Industry Transactions	650	5.5%	850
Other Processing Services	1,000	-9.4%	610
Telecommunications Sector TOTAL	4,100	20.1%	10,260

Source: INPUT

iii. Network Services

Network Services include a variety of telecommunications-based functions and operations, including those relating to the Internet.

This category, as can be seen from Exhibit IV-34, contains two subcategories:

- Electronic Information Services.
- Network Application Services.

Electronic Information Services are based on databases that provide specific information via a communications network.

Typical applications include stock prices, legal documents, economic indicators, periodical journals, medical diagnosis and airline schedules.

The two main categories of electronic information services are:

- On-line databases – structured, primarily numerical, data on economic and demographic trends, financial instruments, companies, products and materials, etc.
- On-line News (Text) Services – unstructured, primarily textual information on people, companies events, etc. These are most often news services.

There are four types of Network Applications Service:

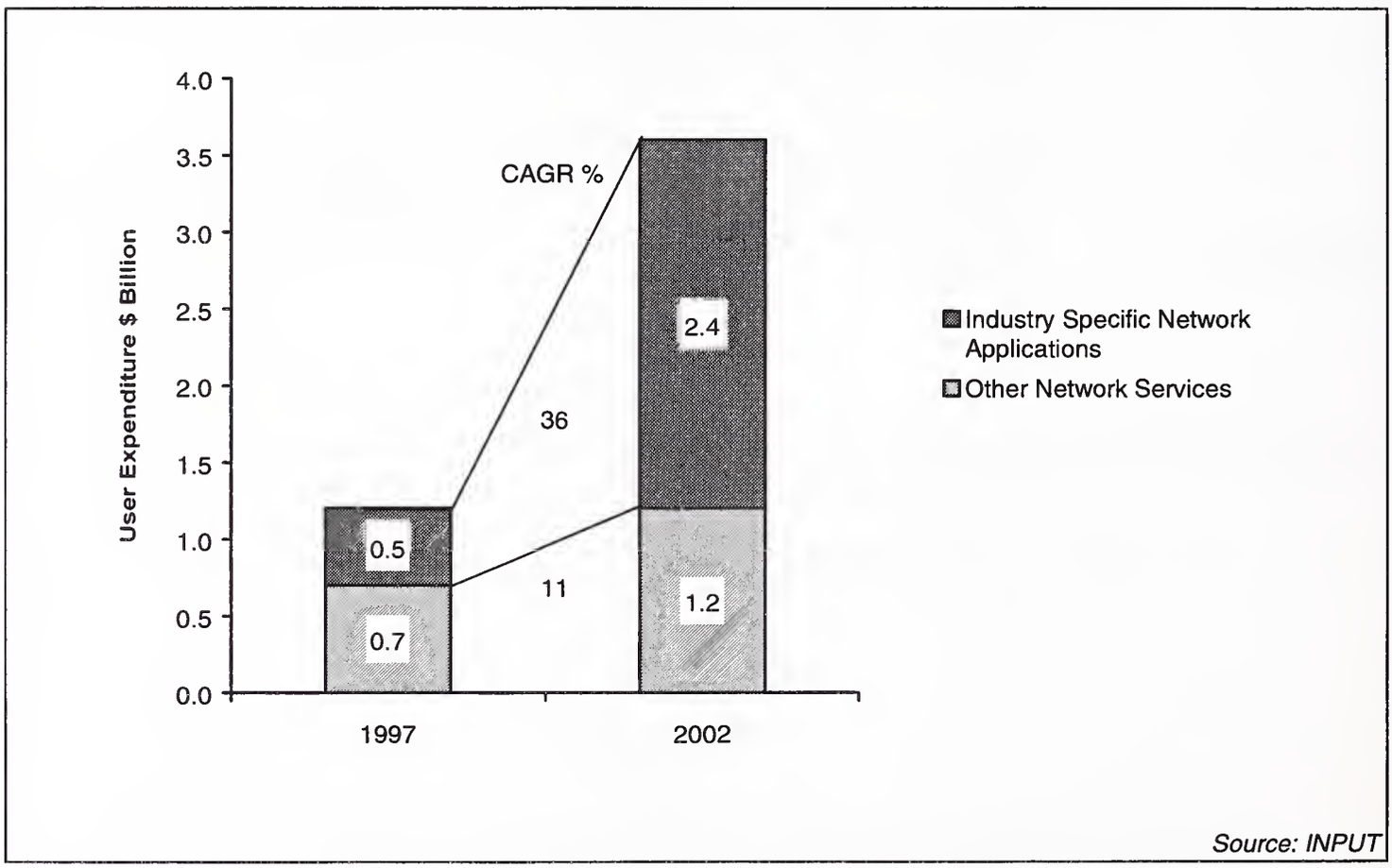
- Value Added Network Services (VAN Services) – are enhanced transport communications services.
- Electronic Commerce Services – a category that is going to become increasingly significant with the commercial exploitation of the Internet.
- Electronic Data Interchange (EDI) Services – traditional electronic commerce provided as application to application electronic exchange of business data between trade partners or facilitators.
- Electronic Information Interchange – the transmission of messages across an electronic network managed by a services vendor, including electronic mail, voice mail and messaging and including bulletin board services.

Exhibit IV-34 provides the forecast for the U.S. Telecommunications sector Network Services market.

It should be noted that Network Services are categorized only as falling within the Industry Specific or Other Network services categories.

Exhibit IV-34

Telecommunications Sector Network Services Market - U.S.



Source: INPUT

Exhibit IV-35 provides the detailed forecast data in tabular format.

Exhibit IV-35

Network Services – Telecommunications Sector, U.S.

Subsector	User Expenditures ($ Million)		
	1997	CAGR	2002
Industry Specific Network Applications	500	36.4%	2,365
Other Network Services	730	10.5%	1,200
Telecommunications Sector TOTAL	1,230	23.7%	3,565

Source: INPUT

d. Applications Software Products

Applications software products are defined as products that enable a user or a group of users to support an operational or administrative process within an organization.

Examples include accounts payable, order entry, project management and office systems.

Applications software products are classified into two groups:

- Industry specific applications software products.
- Cross-industry or process applications software products.

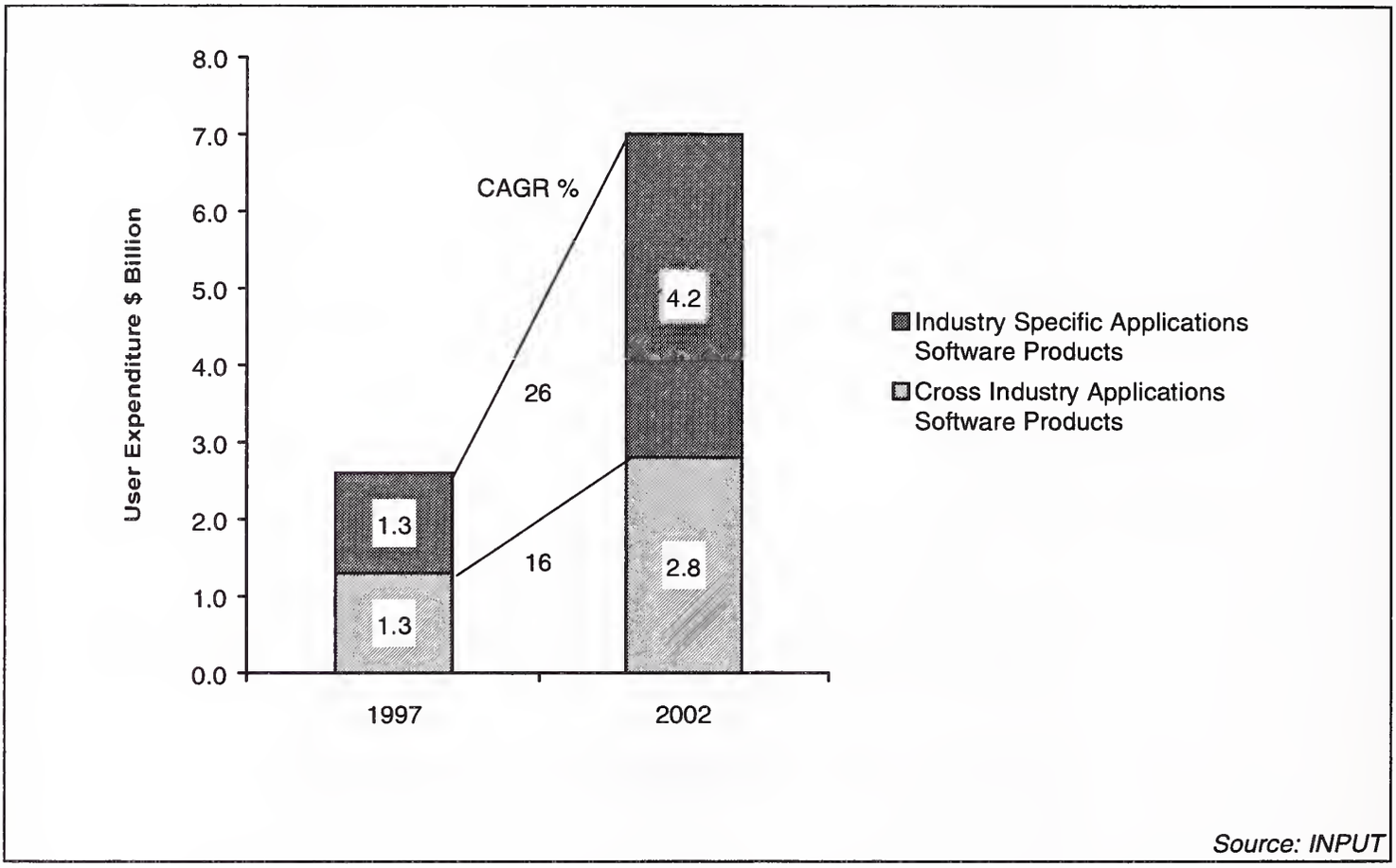
In this section we are only concerned with industry specific applications software products for the Telecommunications sector.

Industry specific applications products perform functions related to fulfilling business or organizational needs unique to a specific industry market and sold to that market only, in this case the Telecommunications industry.

Exhibit IV-36 provides the forecast for the U.S. Telecommunications sector Applications Software Product market.

Exhibit IV-36

Telecommunications Sector Applications Software Product Market - U.S.



Source: INPUT

Exhibit IV-37 provides the forecast data in tabular form.

Exhibit IV-37

Applications Software Products – Telecommunications Sector, U.S.

Subsector	User Expenditures ($ Million)		
	1997	CAGR	2002
Industry Specific Applications Software Products	1,340	25.6%	4,195
Cross Industry Applications Software Products	1,300	16.3%	2,765
Telecommunications Sector TOTAL	2,640	21.4%	6,960

Source: INPUT

e. Turnkey Systems

A turnkey system integrates equipment, systems software products and packaged applications software products into a single product developed to meet a specific set of user requirements.

Value added by the turnkey system vendor is primarily in the software and professional services provided.

INPUT classifies turnkey systems into two groups as it does for applications software products, systems that are industry specific and those that address a cross-industry process market. This section is only concerned with those systems specifically targeted at the Telecommunications sector.

Most turnkey systems are sold through channels known as value-added resellers (VARs) and defined as:

- A VAR adds value to computer hardware and/or software products and then resells it.
- The major value add is usually applications software products but may include many of the other components of a turnkey system

solution , such as professional services, software product support and applications upgrades.

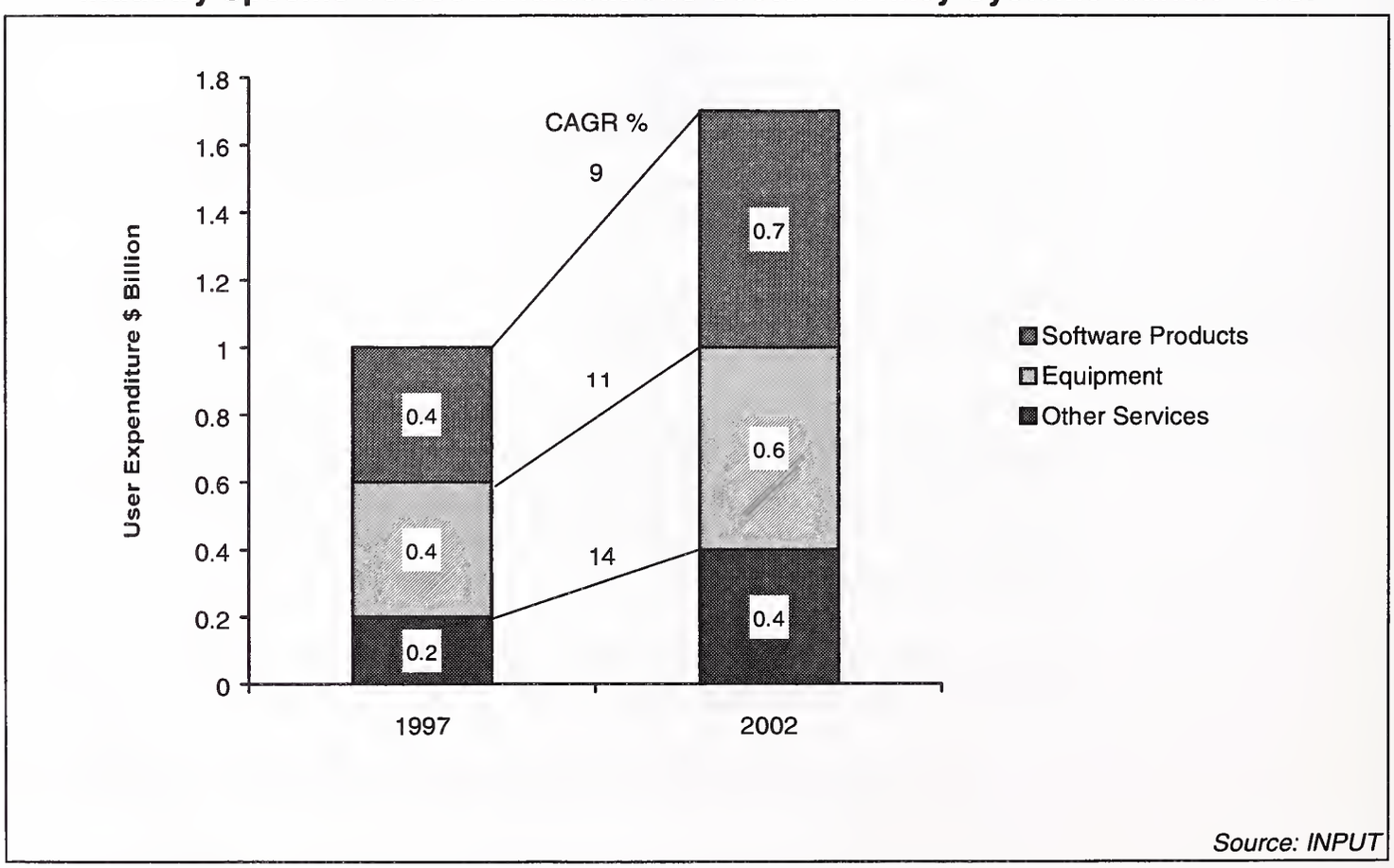
Turnkey systems have three components:

- Equipment – computer hardware supplied as part of the turnkey system.
- Software products – prepackaged systems and applications software products.
- Professional services – services to install or customize the system or train the user, provided as part of the turnkey system sale.

Exhibit IV-38 provides the forecast for the U.S. Telecommunications sector industry specific Turnkey Systems market.

Exhibit IV-38

Industry Specific Telecommunications Sector Turnkey Systems Market - U.S.



Source: INPUT

Exhibit IV-39 provides the detailed forecast data in tabular form.

Exhibit IV-39

Industry Specific Turnkey Systems – Telecommunications Sector, U.S.

Subsector	User Expenditures ($ Million)		
	1997	CAGR	2002
Software Products	426	9.0%	655
Equipment	367	10.7%	610
Other Services	236	13.5%	445
Telecommunications Sector TOTAL	1,030	10.7%	1,710

Source: INPUT

For the sake of completeness Exhibit IV-40 provides the detailed forecast data for the non-industry specific Turnkey Systems sold into the Telecommunications sector.

Exhibit IV-40

Cross Industry Turnkey Systems – Telecommunications Sector, U.S.

Subsector	User Expenditures ($ Million)		
	1997	CAGR	2002
Software Products	40	8.4%	60
Equipment	40	4.6%	50
Other Services	25	9.9%	40
Telecommunications Sector TOTAL	105	7.4%	150

Source: INPUT

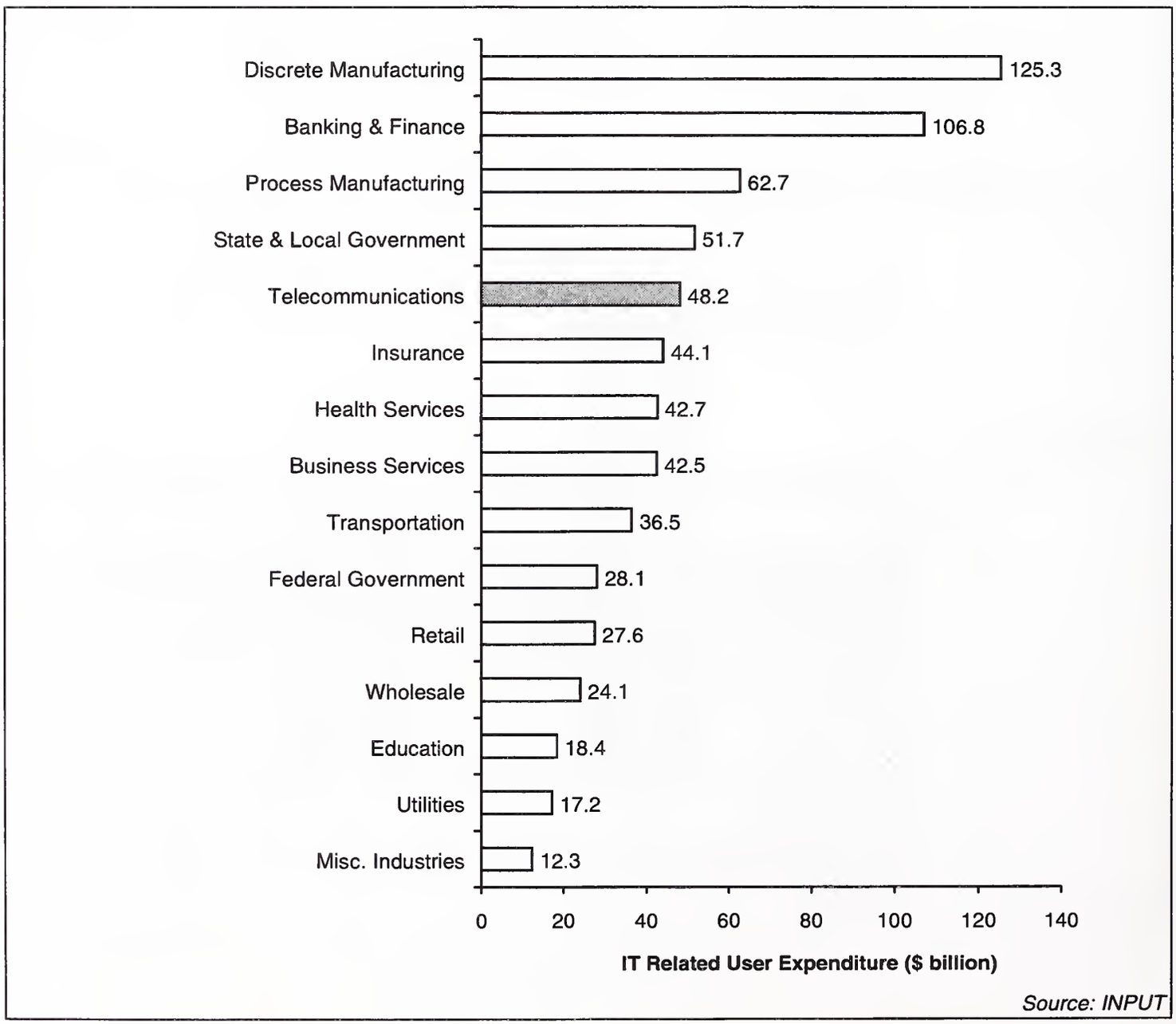
C
Comparison to Other Sectors

This section provides a comparison between the Telecommunications sector and the other industry sectors in the U.S. IT Software & Services market for a number of key statisitcs.

Exhibit IV-41 shows a comparison of the total IT expenditure for each of the U.S. industry sectors.

Exhibit IV-41

Industry Sector Comparison – U.S., 1997

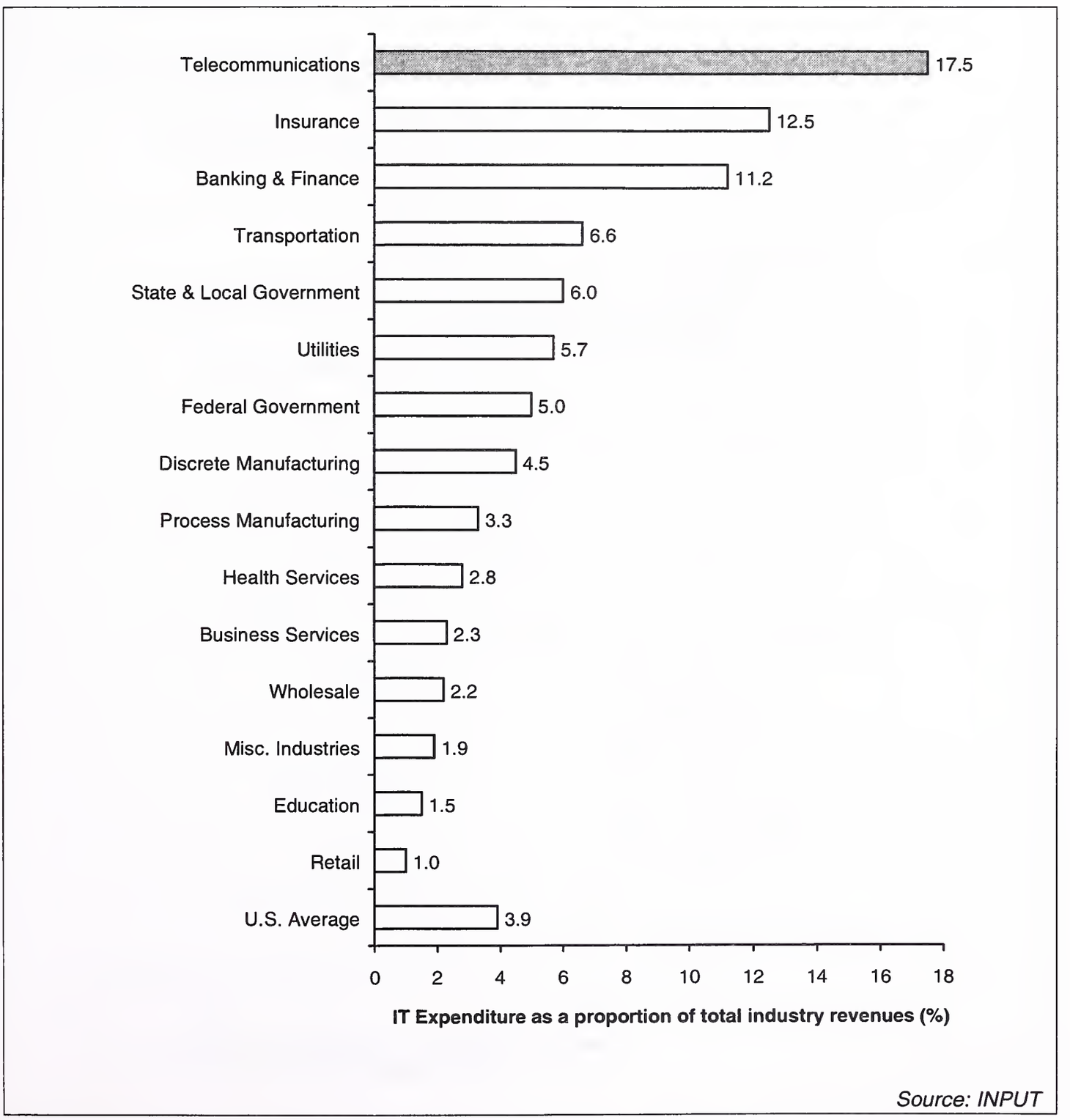


Source: INPUT

Exhibit IV-42 shows the comparison of the percentage of annual revenues spent on average on IT across the different industry sectors.

Exhibit IV-42

Industry Sector Comparison – IT Expenditure U.S., 1997

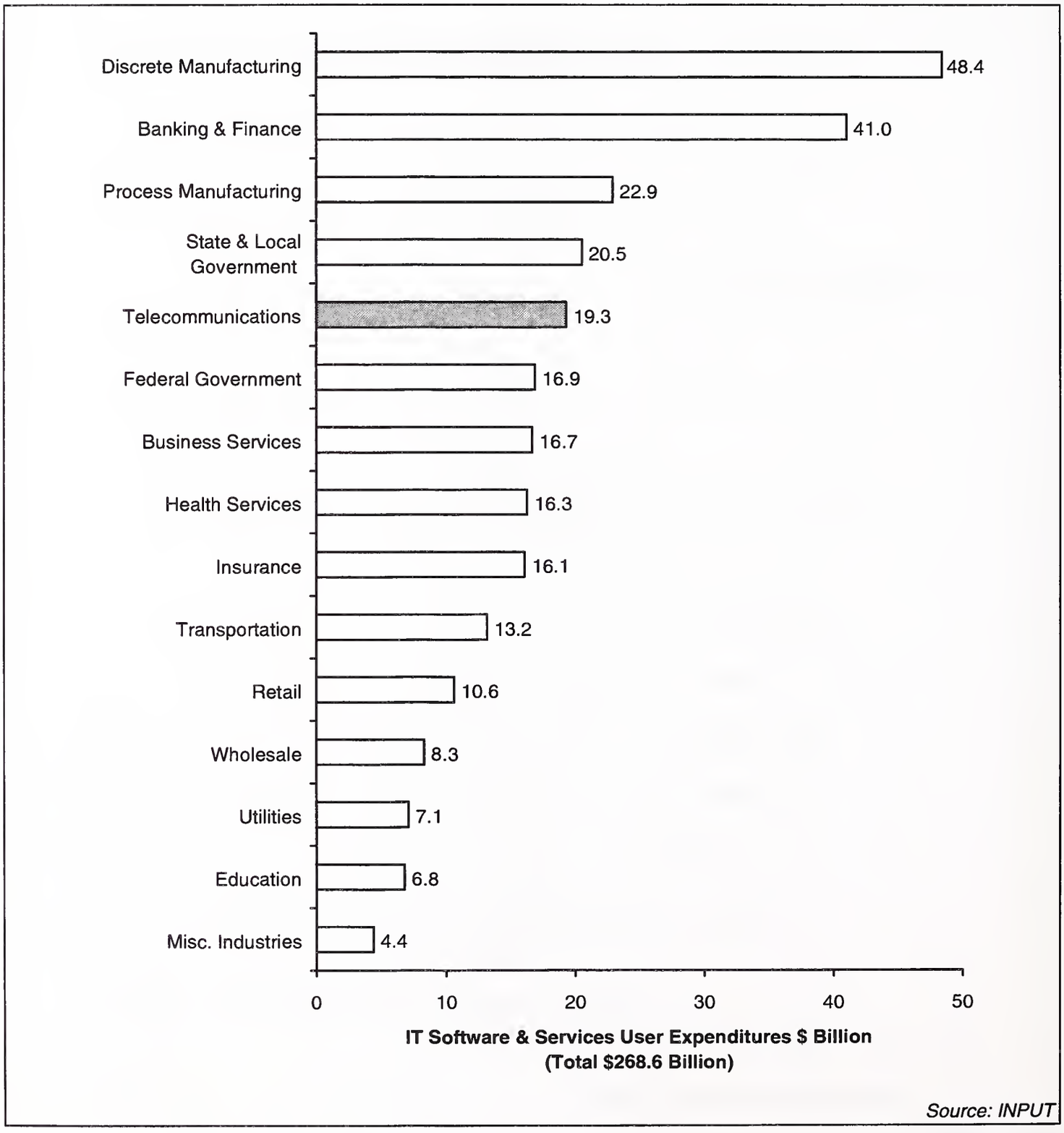


Source: INPUT

Exhibit IV-43 shows the comparison for total IT Software & Services expenditure across the different industry sectors.

Exhibit IV-43

Industry Sector Comparison – IT Software & Services – U.S., 1997

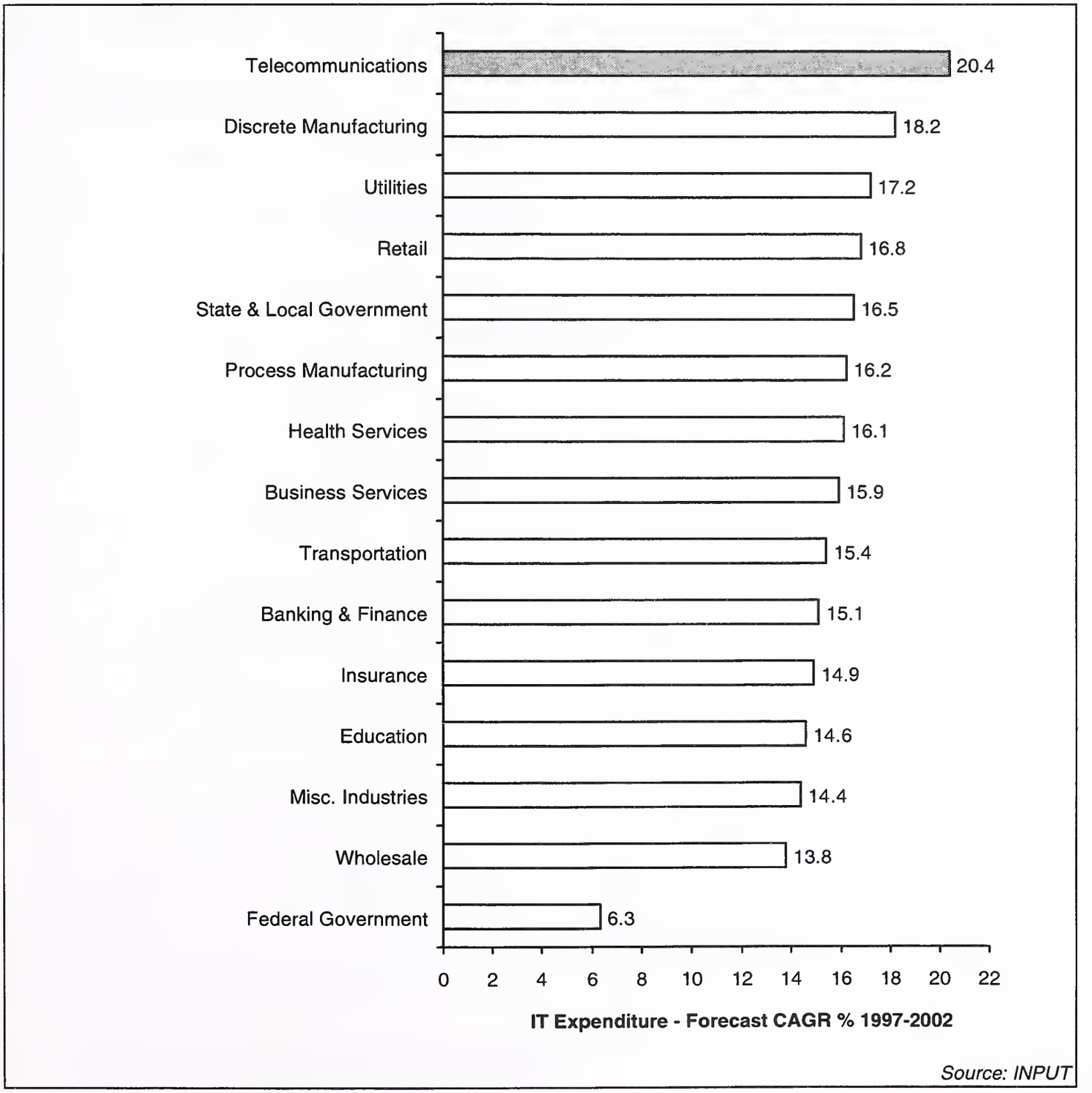


Source: INPUT

Exhibit IV-44 provides a comparison of the expected growth in IT Software & Services for each individual industry sector.

Exhibit IV-44

Industry Sector IT Expenditure Growth Comparison – U.S., 1997

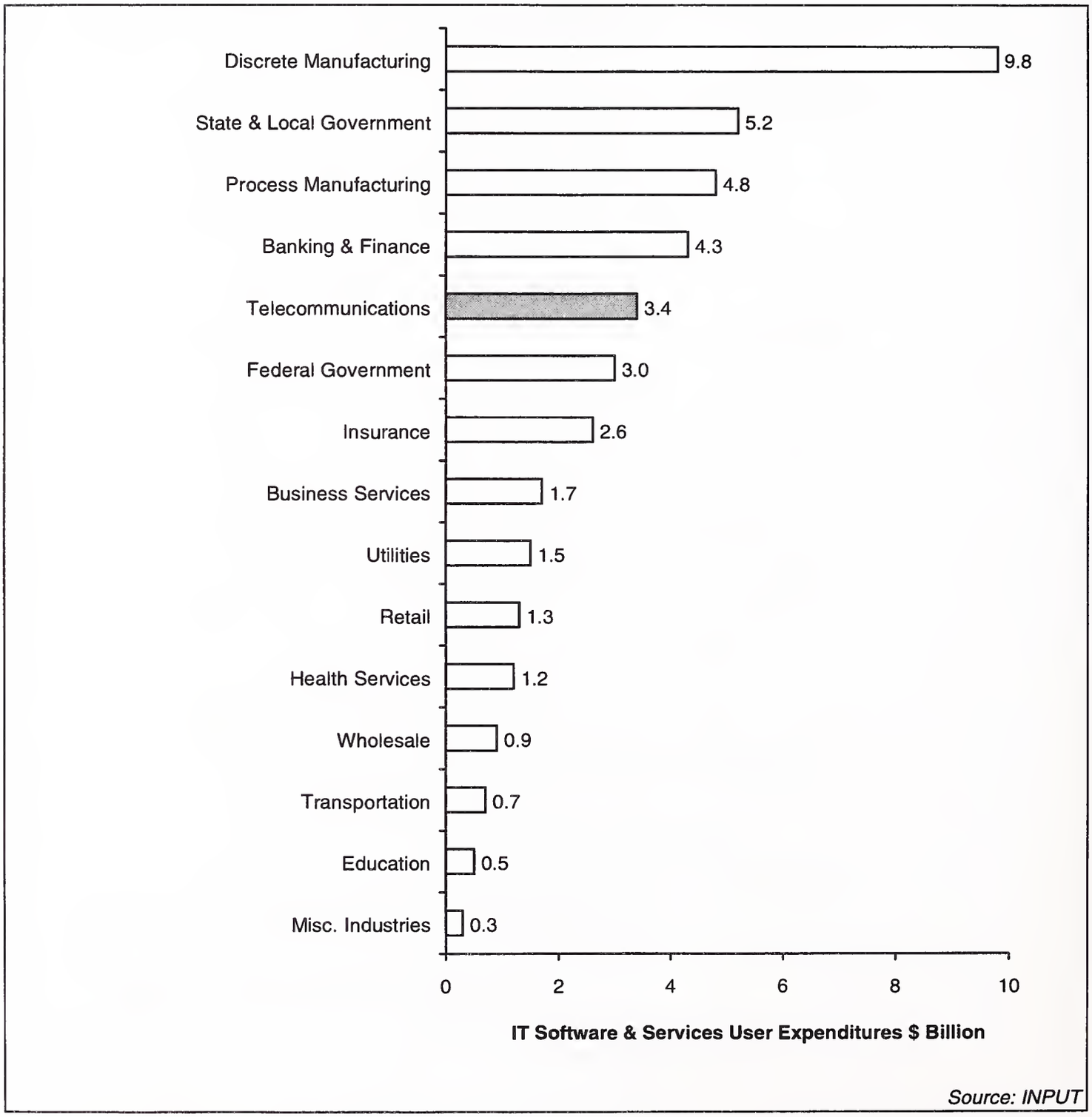


Source: INPUT

Exhibits IV-45 through 47 show comparative industry sector tables for the respectively the Professional Services, Systems Integration and Outsourcing sectors.

Exhibit IV-45

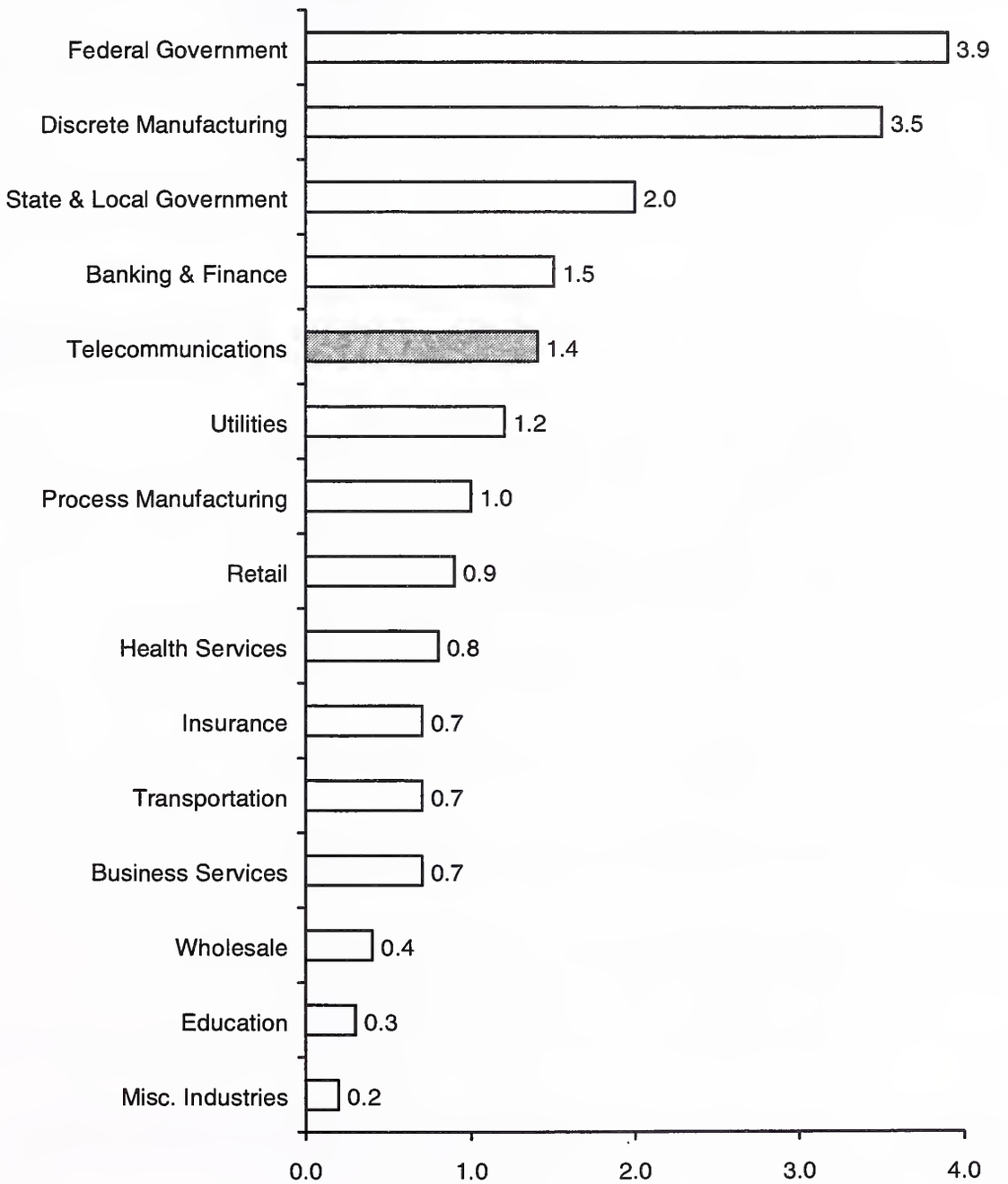
Industry Sector Comparison – Professional Services – U.S., 1997



Source: INPUT

Exhibit IV-46

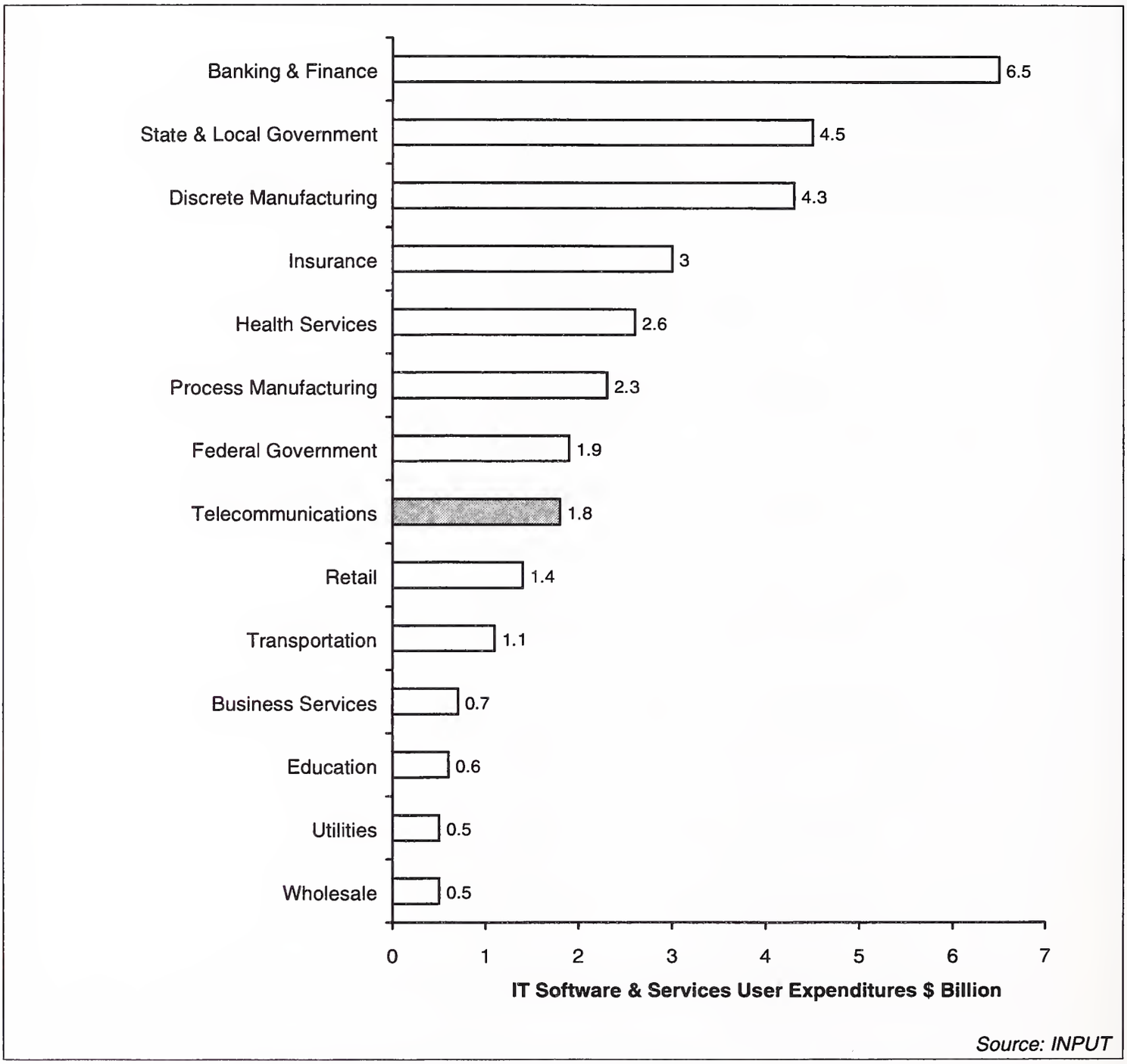
Industry Sector Comparison – Systems Integration – U.S., 1997



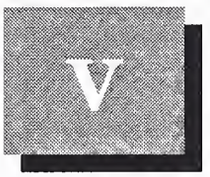
Source: INPUT

Exhibit IV-47

Industry Sector Comparison – Outsourcing – U.S., 1997



Source: INPUT



Electronic Business Directions

A
Electronic Business Futures

The impact of liberalization, rapidly developing technology, particularly the Internet, and the data-centric communications needs of enterprises that are rapidly outpacing voice communications requirements, are challenging the traditional country-centric monopolistic industry model.

IT-based solutions are being deployed by the Telecommunications industry in order to support the development of next generation firms capable of competing efficiently in this new environment.

Key applications of IT in the Telecommunications industry include:

- Customer Care & Billing applications designed to support the building and retention of customers.
- Enterprise Network Management systems to meet the expected future organizational network needs of major users.
- Intelligent Network services for individuals.

Telecommunications organizations are looking to the implementation of IT based systems to support them in these endeavors as well as to support the business objectives of reducing service time to market, cutting operating expenses and improving operations work processes.

Thus the development of advanced IT based systems is not only an enabler of an open competitive market environment for telecommunications services, it is also one of the key supports for effective operation in that environment.

In order to fully benefit form the application of IT to their business, Telecommunications organizations need to implement Electronic Business (EB) systems.

Electronic Business is the combination of Information Technology and business process to form a new way of working.

Electronic Business is all about enterprise wide change. It impacts strategy, business processes, the use of technology, not just IT, and the interactions of the people involved in the enterprise.

Some of the problems and challenges being faced by the Telecommunications sector that can be addressed by the implementation of Electronic Business solutions include:

- Capturing new market opportunities.
- Creation of a market-driven culture.
- Improvements in customer service.
- Process rationalization.
- Redesigning the business.

The remaining sections of this Chapter cover:

- The definition and description of Electronic Business and its distinction from Electronic Commerce.
- The impact of the Internet on the development of Electronic Business systems and processes.
- The effect of Electronic Business developments on corporate computing.

B
Electronic Business and Electronic Commerce

The term 'Electronic Business' is frequently used as a synonym for Electronic Commerce, the latter term being used to describe the conduct of business transactions electronically.

In the past 10 to 15 years, Electronic Commerce implied the use of EDI (Electronic Data Interchange) systems, now the focus has switched to the possibilities for conducting commerce over the Internet.

The term 'Electronic Business' is however used by INPUT to signify something much deeper and more profound about the way that organizations are adapting IT systems, including the Internet, to reengineer and redesign the fundamental processes and value chains of their business.

There is a clear need to be precise about the way in which we use these two terms and what exactly we mean by them.

1. Electronic Commerce Definition

INPUT defines Electronic Commerce as the use of IT systems to carry out the interorganizational business processes of buying and selling goods and services.

This basic definition has been extended by contemporary use to include Electronic Retailing. Usually Electronic Retailing is referred to as Business-to-Consumer (B-to-C) Electronic Commerce and interorganizational trade as Business-to-Business (B-to-B) Electronic Commerce.

Electronic Commerce places emphasis on activities that are external to the organization, how customers are grouped and the firm's interactions with them.

Electronic Commerce is, however, only a part of the wider phenomenon of Electronic Business.

2. Electronic Business Definition

The Electronic Business revolution is possibly the most important change affecting organizations as we go forward into the 21st century.

Whilst Electronic Commerce places emphasis on activities that are external to the organization, Electronic Business places emphasis on the reengineering and/or automation of internal processes based on IT systems, see Exhibit V-1.

Exhibit V-1

What is Electronic Business?

- **Embedding of IT into an organizational process**
  - **IT enables the process to operate**
  - **Differs form old IT support model**
- **Process may be industry or function specific**

Source: INPUT

Electronic Business is the embedding of IT into a business process to create a system that would not be possible without IT support, IT enables that process to operate.

The Electronic Business model differs form the old or traditional model of IT use where it was used just to support the operation of a process which hitherto had run without the use of computer technology at all.

A critical test for an Electronic Business process is whether or not that process can operate at all if the IT system is inoperable.

For example, a reservation clerk that uses a reservation system to make airline bookings is not an example of Electronic Business.

An on-line system that allows a passenger to make a booking, obtain a ticket and a boarding pass electronically without intervention of a reservations clerk, is an example of Electronic Business.

In the 'old' IT support model the expenditure on IT is typically in the range of one to five percent of an organization's annual revenues, see Exhibit V-2.

Exhibit V-2

Electronic Business Expenditure

- **Level of expenditure on IT:**
  - **In support model was 1 to 10% of costs**
  - **In EB model is 20% to 40% of costs**

Source: INPUT

Worldwide, as was shown in Exhibit IV-5 earlier, the average for all industries is currently 2.4% with about half the identified industry sectors spending at a higher rate.

In the Electronic Business model IT expenses are going to be commonly measured in the range of 20% to 40% of organizations revenues or total expenses. In some cases they will be even higher as we continue our journey in the 21st century towards the electronic society.

In the past competitive advantage was based on structural characteristics like market presence/power, economies of scale and the comprehensiveness of a firm's product range.

Today, and increasingly in the future, competitive advantage is based on capabilities that consistently deliver superior value to customers. For example capabilities such as better internal co-ordination, workflow management, product and service customization and supply chain management.

Electronic Business is thus going to have a major impact on the way that commerce and industry, government and consumers conduct business in the 21st century.

C
Impact of the Internet

Improvements in transportation technology, the railway system from the middle of the 19th century, the road systems from the middle of the 20th century, reduced transportation costs and thus revolutionized the movement of goods and people.

Now the Internet is in the process of revolutionizing the transport of information as a result again of a drastic reduction in costs, this time for the transport of bits.

The Internet is particularly important as an enabler of both Electronic Business and Electronic Commerce.

The fabric of business and commerce is transactions.

The broad categorization of business transactions is:

- Transactions for acquiring data and information.
- Transactions for disseminating information.
- Transactions between business parties, B-to-B transactions.
- Transactions between a business and a consumer, B-to-C transactions.

To date there still exist some reluctance to use the Internet.

Characteristics of message handling of importance tot trading partners are:

- Integrity – assurance that the message has not been altered.
- Confidentiality – message not viewed by third party.
- Non-repudiation – senders/receivers cannot deny seding/receiving.
- Authentication – assurance that message did come from the indicated party.

For Electronic Business and Commerce to flourish many common business services need to be established that will provide an infrastructure for facilitating inter firm transactions and the buying and selling process.

We are still at the stage where the technical infrastructure is being established.

D
Issues for Corporate Computing

The movement towards Electronic Business is going to have important implications for corporate computing.

We have already witnessed the march of the Outsourcing business.

We are now seeing the start of the Business Process Outsourcing phenomenon.

One of the most significant impacts on corporate computing has been the Intranet.

Intranets are still most commonly used for low-value applications.

The primary motive for their use is to extend the reach of IT within an Organization, not reduce cost. This is an interesting sign of EB.

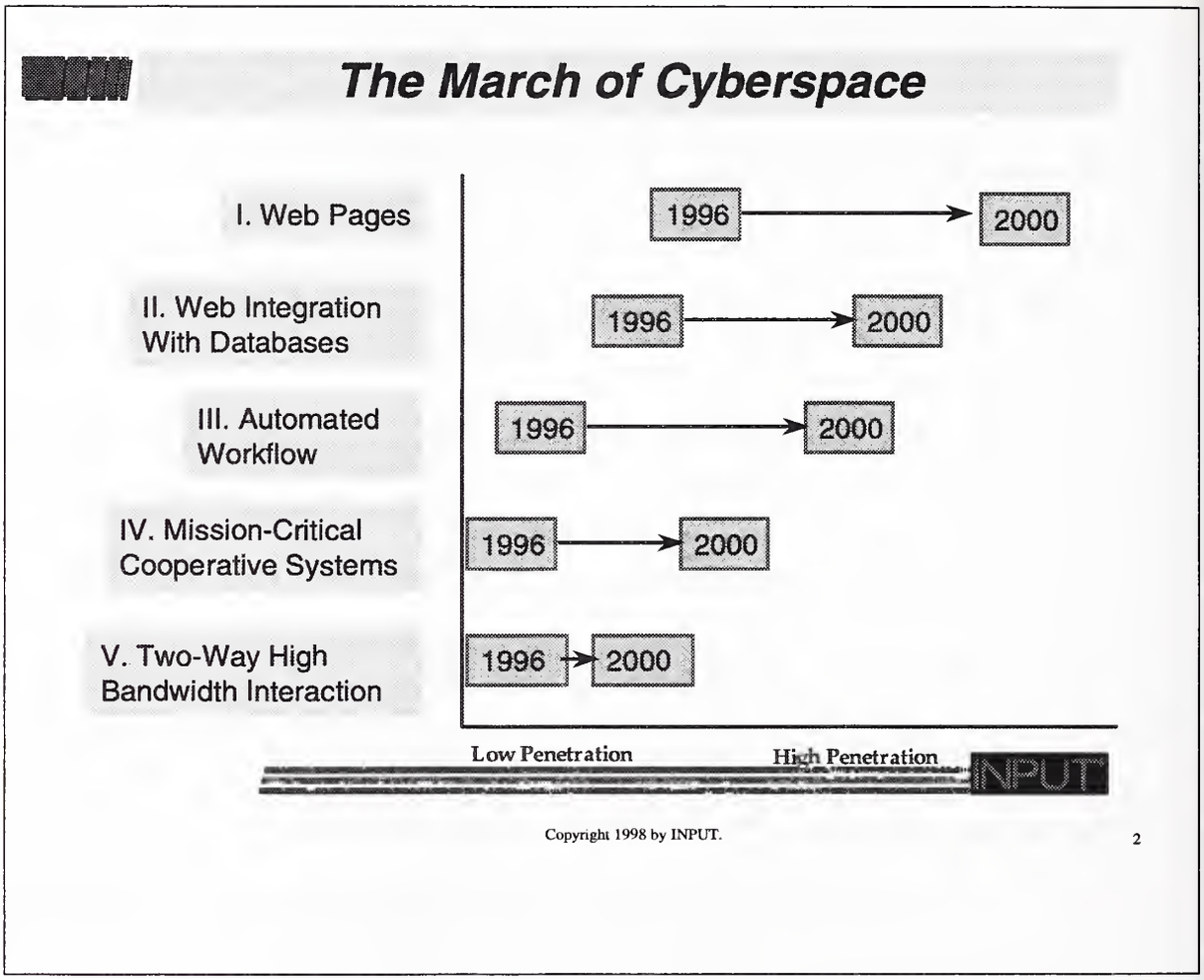
To date Intranets have tended to be funded from centralized budgets and largely been developed in-house.

They are still in early phase of use, mostly used for internal distribution of information and of most help to administrative staff.

Five phases of development are envisaged and observable now, see Exhibit V-3.

Exhibit V-3

Internet Development



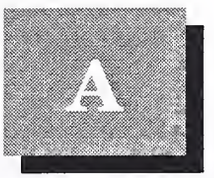
I. Static info distribution, e.g. policies, directories, registers.

II. Information sharing between units/departments. E.g. product plans, financial data, customer services records and sales contacts.

III. Group collaboration. Project management, GroupWare and desktop conferencing.

IV. Integration of existing systems with Intranet. Web enabled data warehouse, front-end to legacy database, live customer queries.

V. Replacement of legacy systems.



Telecommunications Sector Database, 1997-2002, U.S.

This appendix contains data tables from the main body of the report to provide a convenient reference source.

AA
Total IT Software & Services

Exhibit A-1

Analysis of IT Software & Services Expenditure – Telecommunications Sector U.S., 1997

Segment		User Expenditures $ Billions		
		Industry Specific	Cross Industry	Other Services
Professional Services	Total	850		
Systems Integration	Total	340		
	Software Products	90		
	Equipment	75		
	Other	175		
Outsourcing	Total	200		
Processing Services	Total	150	40	60
	Transactions	150	40	
	Other services			60
Network Services	Total	150		100
Applications Software Products	Total	230	170	
Turnkey Systems	Total	500	60	
	Software Products	200	20	
	Equipment	180	25	
	Other	120	15	
Systems Software Products	Total			450
Equipment Services	Total			600
Total		2,420	270	1,210

Source: INPUT

Exhibit A-2

Equipment Expenditure – Telecommunications Sector

Sector	1997 Expenditure ($ millions)
Systems Integration	75
Turnkey Systems – Industry Specific	180
Turnkey Systems – Cross Industry	25
Telecommunications Sector TOTAL	280

Source: INPUT

Exhibit A-3

Software Products Expenditure – Telecommunications Sector

Sector	1997 Expenditure ($ millions)
Systems Integration	90
Applications Software Products	400
Turnkey Systems – Industry Specific	200
Turnkey Systems – Cross Industry	20
Systems Software Products	450
Telecommunications Sector TOTAL	1,160

Source: INPUT

Exhibit A-4

IT Software & Services Components – Telecommunications Sector

Sector	1997 Expenditure ($ millions)
Equipment	280
Software Products	1,160
IT Services	2,460
Telecommunications Sector TOTAL	3,900

Source: INPUT

Exhibit A-5

Total IT Software & Services – Telecommunications Sector

Sector	1997 Expenditure ($ millions)
Industry Specific	2,420
Cross Industry	270
Other Services	1,210
Telecommunications Sector TOTAL	3,900

Source: INPUT

AB
Industry Specific IT Software & Services

Exhibit A-6

Telecommunications Industry Specific IT Software & Services Market, U.S. ($millions)

Sector	1997	CAGR	2002
Professional Services	850	14%	1,650
Systems Integration	340	26%	1,100
Outsourcing	200	25%	600
Processing Services	150	10%	240
Network Services	150	27%	500
Applications software Products	230	12%	400
Turnkey systems	500	12%	900
Sector TOTAL	2,420	17%	5,390

Source: INPUT

Exhibit A-7

Professional Services – Telecommunications Sector, U.S. ($millions)

Subsector	1997 Expenditure	CAGR	2002 Expenditure
IS Consulting	170	18.7%	400
Education & Training	100	20.1%	250
Software Development	580	11.5%	1,000
TOTAL	850	14.2%	1,650

Source: INPUT

Exhibit A-8

Systems Integration – Telecommunications Sector, U.S. ($millions)

Subsector	1997 Expenditure	CAGR	2002 Expenditure
Software Products	90	30.4%	340
Equipment	75	27.2%	250
Other Services	175	23.9%	510
Telecommunications Sector TOTAL	340	26.5%	1,100

Source: INPUT

Exhibit A-9

Outsourcing Services – Telecommunications Sector, U.S. ($millions)

Subsector	1997 Expenditure	CAGR	2002 Expenditure
Platform Operations	45	17.3%	100
Application Operations	90	22.7%	250
Desktop Services	25	32.0%	100
Applications Management	30	32.0%	120
Network Management	10	24.6%	30
Telecommunications Sector TOTAL	200	24.6%	600

Source: INPUT

Exhibit A-10

Processing Services – Telecommunications Sector, U.S. ($millions)

Subsector	1997 Expenditure	CAGR	2002 Expenditure
Industry Specific Transactions	150	10.8%	250
Cross Industry Transactions	40	4.6%	50
Other Processing Services	60	3.1%	70
Telecommunications Sector TOTAL	250	8.2%	370

Source: INPUT

Exhibit A-11

Network Services – Telecommunications Sector, U.S.

Subsector	User Expenditures ($ Millions)		
	1997	CAGR	2002
Industry Specific Network Applications	150	24.5%	450
Other Network Services	100	28.5%	350
Telecommunications Sector TOTAL	250	26.2%	800

Source: INPUT

Exhibit A-12

Applications Software Products – Telecommunications Sector, U.S.

Subsector	User Expenditures ($ Millions)		
	1997	CAGR	2002
Industry Specific Applications Software Products	230	10.0%	370
Cross Industry Applications Software Products	170	12.0%	300
Telecommunications Sector TOTAL	400	10.9%	670

Source: INPUT

Exhibit A-13

Industry Specific Turnkey Systems – Telecommunications Sector, U.S.

Subsector	User Expenditures ($ Millions)		
	1997	CAGR	2002
Software Products	200	10.5%	330
Equipment	180	14.2%	350
Other Services	120	10.8%	200
Telecommunications Sector TOTAL	500	12.0%	880

Source: INPUT

Exhibit A-14

Cross Industry Turnkey Systems – Telecommunications Sector, U.S.

Subsector	User Expenditures ($ Millions)		
	1997	CAGR	2002
Software Products	20	14.9%	40
Equipment	25	19.1%	60
Other Services	15	14.9%	30
Telecommunications Sector TOTAL	60	16.7%	130

Source: INPUT

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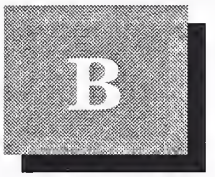


Market Forecast Reconciliation

This appendix provides a reconciliation between the market forecast included in this report in comparison with those previously published by INPUT in 1996 for the Telecommunications sector.

Exhibit B-1

U.S. IT Software & Services
Forecast Reconciliation – Telecommunications Sector 1997
$ Millions

PRODUCT/ SERVICE CATEGORY	1997 Market				2001 Market				1996 Report %CAGR (Fcst)	1997 Report %CAGR (Fcst)
	1996 Report	1997 Report	1996 – 1997 Variance		1996 Report (Fcst)	1997 Report (Fcst)	1996 – 1997 Variance			
			Amount	%			Amount	%		
Professional Services	3,440	3,350	(90)	3	8,135	8,400	265	3	24	26
Systems Integration	1,349	1,350	1	-	3,510	4,250	740	21	32	33
Outsourcing	166	1,848	1,682	1,000	360	5,050	4,690	1,300	20	28
Processing Services	2,448	2,450	2	-	6,976	7,000	24	-	29	29
Network Services	501	500	(1)	-	1,771	1,800	29	2	36	36
Applications Software Products	1,339	1,340	1	-	3,228	3,500	272	8	26	26
Turnkey Systems	1,030	1,030	0	-	1,390	1,600	210	15	7	11
Total Industry Specific	**10,273**	**11,868**	**1,595**	**16**	**25,370**	**31,600**	**6,230**	**25**	**26**	**27**

Source: INPUT

C

Terms and Definitions

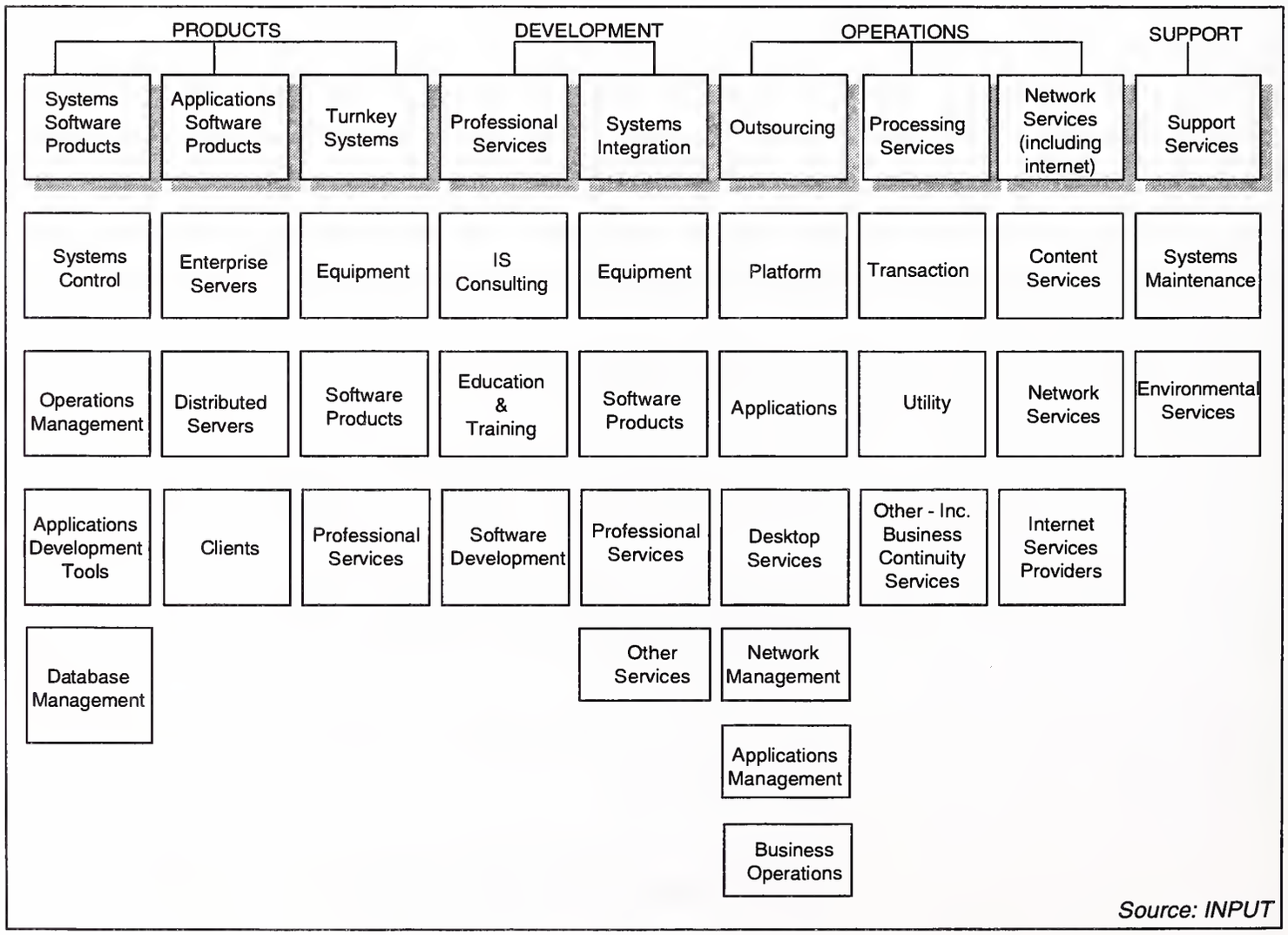
CA
IT Market Structure

- INPUT now recognizes two broad market segments, Electronic Business (EB) and IT Software & Services.
- IT Software & Services expenditures are a component of total user expenditure on IT which also includes equipment and in-house personnel.
- INPUT provides an analysis of total user IT expenditure in its World-wide Market Forecast Program. In this analysis it recognizes six major discrete components of expenditure:
  - Equipment – expenditure on computer and data communications hardware products.
  - Communications – all expenditure on IT - related data communications services.
  - Software Products – all expenditure on systems software products and applications software product licenses including support services where these are included within the basic license fee.
  - IT Services – all expenditure on professional services, systems integration, outsourcing, processing services, network services, turnkey systems.
  - Staff – direct in - house staff costs directly concerned with IT or the support of it.
  - Facilities – IT budget expenditure on overheads such as space, heating, lighting, furniture, vehicles etc.

- INPUT's service sectors, described in detail below, can involve the delivery of a combination of components of people, computer processing and software products.
- The six categories defined above represent, however, the basic components or `inputs' to the operation of IT by a user
- N.B that the IT Services category defined above does not correspond to INPUT'S definition of the IT Software & Services market since the latter includes all software products and the equipment delivered through service channels.
- The structure and components of the IT Software & Services market are shown in Exhibit C-1.

Exhibit C-1

IT Software & Services Market Structure



CB
Industry Sectors

1. Industry Sector Definitions

Industry sectors are based on the most recent revision of the Standard Industrial Classification (SIC) code system, as shown in Exhibit C-2.

Exhibit C-2

Industry Sector Definitions

Industry Sector	SIC Code	Description
Discrete Manufacturing	23xx	Apparel and other finished products
	25xx	Furniture and fixtures
	27xx	Printing, publishing, and allied industries
	31xx	Leather and leather products
	34xx	Fabricated metal products, except machinery and transportation equipment
	35xx	Industrial and commercial machinery and computer equipment
	36xx	Electronic and other electrical equipment and components, except computer equipment
	37xx	Transportation equipment
	38xx	Instruments; photo/med/optical goods; watches/clocks
	39xx	Miscellaneous manufacturing industry
Process Manufacturing	10xx	Metal mining
	12xx	Coal mining
	13xx	Oil and gas extraction
	14xx	Mining/quarrying nonmetallic minerals
	20xx	Food and kindred products
	21xx	Tobacco products
	22xx	Textile mill products
	24xx	Lumber and wood products, except furniture
	26xx	Paper and allied products
	28xx	Chemicals and allied products
	29xx	Petroleum refining and related industries
	30xx	Rubber and miscellaneous plastic products
	32xx	Stone, clay, glass and concrete
	33xx	Primary metal industries
Transportation Services	40xx	Railroad transport
	41xx	Public transit/transport
	42xx	Motor freight transport/warehousing
	43xx	U.S. Postal Service
	44xx	Water transportation
	45xx	Air transportation (including airline reservation services in 4512)
	46xx	Pipelines, except natural gas
	47xx	Transportation services (including 472x, arrangement of passenger transportation)

Source: INPUT

Exhibit C-2 (continued)

Industry Sector Definitions

Industry Sector	SIC Code	Description
Telecommunications	48xx	Communications
Utilities	49xx	Electric, gas and sanitary services
Retail Trade	52xx 53xx 54xx 55xx 56xx 57xx 58xx 59xx	Building materials General merchandise stores Food stores Automotive dealers, gas stations Apparel and accessory stores Home furniture, furnishings and accessory stores Eating and drinking places Miscellaneous retail
Wholesale Trade	50xx 51xx	Wholesale trade - durable goods Wholesale trade - nondurable goods
Banking and Finance	60xx 61xx 62xx 67xx	Depository institutions Nondepository credit institutions Security and commodity brokers, dealers, exchanges and services Holding and other investment offices
Insurance	63xx 64xx	Insurance carriers Insurance agents, brokers and services
Health Services	80xx	Health services
Education	82xx	Educational services

Source: INPUT

Exhibit C-2 (continued)

Industry Sector Definitions

Industry Sector	SIC Code	Description
Business Services	65xx	Real estate
	70xx	Hotels, rooming houses, camps, and other lodging places
	72xx	Personal services
	73xx	Business services (except hotel reservation services in 7389)
	7389	Hotel reservation services
	75xx	Automotive repair, services and parking
	76xx	Miscellaneous repair services
	78xx	Motion pictures
	79xx	Amusement and recreation services
	81xx	Legal services
	83xx	Social services
	84xx	Museums, art galleries, and botanical/zoological gardens
	86xx	Membership organizations
	87xx	Engineering, accounting, research, management, and related services
	89xx	Miscellaneous services
Federal Government	9xxx	
State and Local Government	9xxx	
Miscellaneous Industries	01xx	Agricultural production - crops
	02xx	Agricultural production - livestock/animals
	07xx	Agricultural services
	08xx	Forestry
	09xx	Fishing, hunting, and trapping
	15xx	Building construction - general contractors, operative builders
	16xx	Heavy construction - contractors
	17xx	Construction - special trade contractors
Personal Households	88xx	

Source: INPUT

2. Process or Cross-Industry Sector Definitions

- These sectors or markets involve multi-industry applications such as human resource systems, accounting systems, etc. In order to be included in an industry sector, the service or product delivered must be specific to that sector only. If a service or product is used in more than one industry sector, it is counted as cross-industry.

- INPUT only includes the turnkey systems, applications software products, and transaction processing services in the cross-industry sectors.

- The cross-industry markets are:

a. Accounting/Finance

- Consists of such functions as:
  - General ledger
  - Financial management
  - Accounts payable
  - Accounts receivable
  - Billing/invoicing
  - Fixed assets
  - International accounting
  - Purchasing
  - Taxation
  - Financial consolidation.

- Excluded are accounting products and services directed to a specific industry, such as tax processing services for CPAs and accountants within the business services industry sector.

b. Human Resources

- Human resources companies:
  - Benefits administration.
  - Government compliance.
  - Employee relations.
  - Manpower planning.
  - Compensation administration.
  - Applicant tracking.
  - Position control.
  - Payroll processing.

c. Education and Training

- Education and training consists of education and training for information systems professionals and users of information systems delivered as a software product, turnkey system, or through processing services. The market for computer-based training tools for the training of any employee on any subject is also included.

d. Office Systems

- Office systems companies the following six categories:
  - (1) *Integrated Office Systems (IOSs)* - IOSs integrate the applications that perform common office tasks. Typically, these tasks include the following core applications, all of which are accessed from the same terminal, microcomputer, or workstation:
    - Electronic mail/groupware.
    - Decision support systems.
    - Time management/workflow.
    - Filing systems/document management.

- (2) *Text Processing* - is the most common microcomputer application and is a basic application within the office systems sector. Text processing addresses several levels of functionality, from the production of simple correspondence to large document generation in which many people from different departments have input.

- (3) *Desktop Publishing (DTP)* - refers to the page-design software programs that allow small and midsized organizations to publish printed documents (brochures, catalogs, newsletters, reports, etc.) from the desktop. The primary functions of DTP software include the manipulation of the following functions:

  - Layout and design of columns
  - Text manipulation (font type)
  - Graphic manipulation
  - Print Control (color type, paper type)

- (4) *Electronic Publishing* - includes composition, printing, and editing software for documents containing multiple typefaces and graphics, including charts, diagrams, computer-aided design (CAD) drawings, line art, and photographs. Electronic publishing products may also have different data formats such as text, graphs, images, voice and video.

- The fundamental difference between electronic publishing and desktop publishing is that electronic publishing facilitates document management and control from a single point, regardless of how many authors/locations work on a document. Desktop publishing (DTP), on the other hand, is considered a personal productivity tool and is generally a lower-end product residing on a personal computer.

- (5) *Graphics* - Graphics packages that are used for presentations or freehand drawings and/or are ancillary to desktop publishing are part of office systems. Thus, the graphics component of office systems sector includes the following elements:

- Presentation graphics represent the bulk of office systems graphics. Most presentations involve a combination of graphs and text. They are used to communicate a series of messages to an audience rather than to analyze data.

- Paint and line art drawing programs are used for illustrations, while page layout programs are used to integrate text and graphics.

- Electronic form programs allow users to create and print forms in-house. Some applications work with OCR scanners, allowing users to scan pictures and logos directly onto forms.

  - (6) *Document Imaging Software* - allows users to manipulate (store, retrieve, print) images that have been scanned from paper documents. The applications that imaging software generates include: full text retrieval, document management, and database management. Document imaging software is a component of an imaging system. Hardware components of imaging systems include: scanners, image servers, workstations, optical drives, printers, and storage devices.

e. Engineering and Scientific

- Engineering and scientific activities encompass the following applications:

  - Computer-aided design and engineering (CAD and CAE).

  - Structural analysis.

  - Statistics/mathematics/operations research.

  - Mapping/GIS (Geographic Information Systems).

  - Computer-aided manufacturing (CAM) or CAD that is integrated with CAM is excluded from the cross-industry sector, as it is specific to the manufacturing industries. CAD or CAE that is dedicated to integrated circuit design is also excluded because it is specific to the semiconductor industry.

f. Planning and Analysis

- Planning and analysis consists of software products and information services in four application areas:

  - Executive Information Systems (EIS).

  - Financial modeling or planning systems.

  - Spreadsheets.

- Project management.

g. Sales and Marketing

- Sales and marketing encompasses the following marketing/sales applications:
  - Sales analysis.
  - Marketing management.
  - Demographic market planning models.

h. Other Processes

- Two other process areas that are emerging as significant cross-industry sectors are Customer Services and Logistics. They comprise the following:
- Customer Care/Services:
  - Support.
  - Repair/diagnostics.
  - Help desk.
  - Consulting.
- Logistics:
  - Invoice management.
  - Replenishment.
- Distribution.

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