July 1994

Dear Colleague,

Enclosed is the sixth in a series of reports from INPUT's Client/Server program, entitled Client/Server Application Trends—Telecommunications. Over 150 applications were analyzed in about 100 communications companies. Almost 70% were telecommunications companies, the remainder being radio, TV, cable and other communications services companies.

Client/server computing is well established in the telecommunications market because:

- Directory retrieval systems were the impetus for early database servers in the 1970s.
- Bell Laboratories, the creator of C, C++ and UNIX, was one of the first organizations to develop industrial strength transaction processing systems that connected UNIX systems and mainframes.
- The telecommunications industry understands networking and distributed systems.

Some of the most active areas for client/server computing are:

- Customer service
- Billing systems
- Executive decision support

The report does not reflect the intense activity in video servers and multimedia transmission. This is because most respondents were secretive about their plans and trials are just starting. However, INPUT believes that some of the major opportunities for service providers are in operations support for new services.

The report discusses application trends, leading IS issues, target platforms and project management. It also shows which applications are being outsourced.

I look forward to hearing your comments, perceptions and issues. Clients with full program subscriptions have access to INPUT's library and consultants. You may reach me using the following:

Internet e-mail: amhey@cup.portal.com
APPLELINK: AMHEY
Tel: 415-961-3300
Fax: 415-961-3966

You should now have received all nine vertical market reports for the Client/Server Markets and Applications program. These together with the reports entitled *How Users Choose Platforms* and *U.S. Client/Server Software Market Analysis, 1993-1998*, complete the Markets and Applications program. I am interested in hearing your ideas for future services. If you are interested in more in-depth analysis of key telecommunications applications such as billing systems or video servers, please let me know.

Sincerely yours,

Angela M. Hey

Program Manager —Client/Server

P.S.
I have sent out a client satisfaction questionnaire by fax to all full service clients. If you did not receive one, please call Judy Parks at 415-961-3300 and request a copy. If you did receive, please return it to me promptly. Your assistance in helping INPUT plan new services is appreciated.

Report Quality Evaluation

To our clients:
To ensure that the highest standards of report quality are maintained, INPUT would appreciate your assessment of this report. Please take a moment to provide your evaluation of the usefulness and quality of this study. When complete, simply fold, staple, and drop in the mail. Postage has been pre-paid by INPUT if mailed in the U.S.

Thank You.

1. Report title: ***Client/Server Applications Trends—Telecommunications*** (DV6)

2. Please indicate your reason for reading this report:
   - ☐ Required reading
   - ☐ New product development
   - ☐ Future purchase decision
   - ☐ Area of high interest
   - ☐ Business/market planning
   - ☐ Systems planning
   - ☐ Area of general interest
   - ☐ Product planning
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	Extent		Usefulness (1=Low, 5=High)				
	Read	Skimmed	1	2	3	4	5
Executive Overview	☐	☐	☐	☐	☐	☐	☐
Complete report	☐	☐	☐	☐	☐	☐	☐
Part of report (_____ %)	☐	☐	☐	☐	☐	☐	☐

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Data presented	☐	☐	☐	☐	☐
Analyses	☐	☐	☐	☐	☐
Recommendations	☐	☐	☐	☐	☐

5. How useful was the report in these areas:

Alert you to new opportunities or approaches	☐	☐	☐	☐	☐
Cover new areas not covered elsewhere	☐	☐	☐	☐	☐
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Meet expectations	☐	☐	☐	☐	☐
Other _____	☐	☐	☐	☐	☐

6. Which topics in the report were the most useful? Why? _____

7. In what ways could the report have been improved? _____

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Thank you for your time and cooperation.

M&S 633/01 3/93

INPUT

Client/Server Applications Trends

Telecommunications

July 1994

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VERTICAL MARKET ANALYSIS

Client/Server Applications Trends

Telecommunications

Client/Server Markets and Applications Program

JULY 1994

Client/Server Applications Trends

Telecommunications

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Appendix A

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Introduction

This report analyzes trends in client/server (C/S) applications in the telecommunications market segment. It is the sixth in a series of vertical market reports produced as part of INPUT's Client/Server Markets and Applications subscription service.

A Objectives

Based on a user survey, this report addresses the following issues regarding the telecommunications sector:

- To what degree is the industry migrating to client/server architectures?
- Which applications are likely to be targeted for implementation over the next two years, and which are headed for a downsized client/server environment?
- Who is managing implementation or conversion of client/server applications? The central information systems function (IS), end-user management, its local IS function, or third parties?
- To what degree are industry participants looking to outside vendors for products and services?

B
Scope

The analysis focuses on the telecommunications industry sector within the United States. This particular study surveys 37 companies, some with multiple major subsidiaries or divisions. The number of entities interviewed was 116. The breakdown of these entities and SIC (Standard Industrial Classification) codes are listed in Exhibit I-1.

Most telephone companies have separate information systems (IS) organizations for administrative staff support and telephone operations support. Administrative systems include human resources, accounting and marketing support. Telephone operations include billing, customer service, network operations support and switching support. In addition, directory services may be supported by other IS groups. This report does not differentiate between the various IS departments found in telephone companies.

EXHIBIT I-1

Telecommunications Respondents By Industry Sector

Code	Description	Number of different entities	Percentage of entities
481x	Telephone Communications	78	67
483x	Radio and Television Broadcasting Stations	15	13
484x	Cable and Other Pay Television Services	18	16
489x	Other Communication Services	5	4

C
Methodology

Data for this analysis are taken from INPUT's applications database and built from telephone interviews that took place throughout 1993. Respondents identified 150 applications or

projects they would be implementing over the next two years using their own terminology, rather than using a predetermined set of definitions. Once the survey was completed, INPUT analyzed the 150 project descriptions and coded them into nine application categories.

Exhibit I-2 lists telecommunications applications by category, plus an additional four categories typically found in telecommunications. This report analyzes telephone Customer Support Systems and Operations Support Systems (OSSs). In the INPUT definition of Customer Support Systems, besides customer service and customer records systems, billing, directory assistance and operator support systems have also been added. Operations support systems may be divided further into facilities management, transmission, switching and outside plant.

Other categories like Directory Management, Regulatory Systems and Information Services were not mentioned in the interviews. They are included in Exhibit I-2 because they are other areas where client/server technology can be successfully used in a communications company. In addition, systems development for telecommunications systems creates another applications category, Systems Research and Development. Many of the systems used in this area are found in AT&T Bell Laboratories, Bell Communications Research and GTE Laboratories. Detailed descriptions of each application type are contained in Appendix A.

The sample size is relatively small compared with the size of the market. Graphs and charts are provided to supplement intuition rather than as a statistically rigorous analysis of the market that would have required more interviews.

EXHIBIT I-2

Definition Of Telecommunications Applications Categories

Application Category	Application Type
Telecommunications Applications	
Customer Support Systems	Billing, Customer Records, Customer Service, Directory Assistance, Operator Support
Operations Support Systems	Facilities Management, Inventory, Loop Maintenance, Materials Management, Mobile Craft Support Systems, Network Monitoring, Network Routing, Remote Switching Center Control, Repair Scheduling and Routing, Repeater Management, Service Orders, Service Quality Monitoring & Reporting, Software Defined Networks, Switching Center Maintenance and Monitoring, Switching System Support, Transmission Systems, Work Order Tracking
Directory Management	Yellow, White and Blue Pages Systems Management, Yellow Pages Advertising Support
Regulatory	Pricing of Regulated Services, Regulatory Filings and Tariff
Information Services - Messaging, On-line Databases, Video	Public Electronic Messaging Services (Consumer and Commercial), Information Databases, Video Services
Systems Research and Development	Service Requirements Planning, Systems R&D
Cross-Industry Applications	
Financial	Accounts Payable/Receivable, General Ledger, Integrated Financial Systems, Investment Management, Property Management, Shareholder Services, Treasury Management
Human Resources	Applicant Tracking, Benefits Administration, Labor/Job Scheduling, Management Development, Payroll, Time and Attendance
Infrastructure	Hardware, Software & Network Upgrades
Office Systems	Electronic Mail & Messaging, Desktop Publishing, Integrated Office Systems and Word Processing
Planning & Analysis	Decision Support Systems, Executive Information Systems, Project Management, Spreadsheets
Sales & Marketing	Market Forecasting, Market Research Support, Sales Force Automation, Sales Tracking, Telemarketing
Cross-industry Other	Help Desk (internal), System Administration, Voice Mail, Voice Response

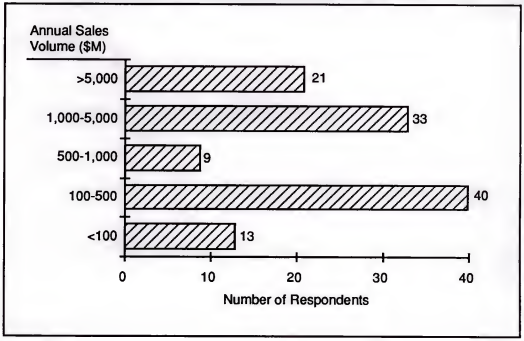
D
Characteristics of the Sample

1. Sample Demographics

Exhibit I-3 shows how the companies are distributed according to annual fiscal year 1992 sales.

EXHIBIT I-3

Distribution of Respondents by Sales Volume



Companies surveyed have an average annual sales volume of $2,930,000. The institutions are grouped into five size categories:

- Very Large – Greater than $5 billion in annual sales
- Large – Between $1 billion and $5 billion
- Medium – Between $500 million and $1 billion
- Small – Between $100 million and $500 million
- Very Small – Less than $100 million

Also, the average number of employees is approximately 29,600.

2. Characteristics of Survey Respondents

User managers with direct responsibility for line or staff operations in a functional area other than information systems responded to a questionnaire. Respondents occasionally referred interviewers to the IS organization. Consequently, respondents, whose distribution is shown in Exhibit I-4, include:

- Line Manager – A manager/executive responsible for line operations at a corporate, store or divisional level; e.g., vice president of operations, vice president engineering, director of product distribution, etc.
- Staff Manager – A manager/executive in charge of staff operations at a corporate or divisional level; e.g., vice president of human resources, chief financial officer, or director of purchasing.
- IS Manager – A manager/executive whose primary responsibility is the management of information systems activities at a corporate or divisional level.

EXHIBIT I-4

Job Classification of Respondents Telecommunications

Job Classification	Proportion of Respondents (%)
Line manager	23
Staff manager	54
IS manager	23

Staff managers represent finance, distribution, inventory, marketing, operations, human resources and warehousing.

E
Organization

The remainder of the report is organized into five chapters:

- Chapter II – *Executive Overview*, summarizes the findings of this study. It provides recommendations for both vendors and purchasers of C/S systems.
- Chapter III – *Applications Analysis*, discusses the key applications that will undergo conversion or re-implementation by telecommunications firms over the next three years. It addresses:
  - Trends in telecommunications applications
  - Leading issues
  - Analysis of the applications by application category
  - Where client/server systems are being installed
  - Target platforms and platform combinations
  - Anticipated changes in the system environment
- Chapter IV – *Management and Budgets*, analyzes who will manage the projects and the size of their budgets. It discusses:
  - Project management and control strategy
  - Outside resources
  - Near-term expenditures for applications development
  - Growth rates for budgets
- Chapter V – *Telecommunications Application Case Studies*, describes client/server implementations in representative industry applications.
- Chapter VI – *Vendor Analysis*, reviews respondents comments on leading vendors and identifies technology vendors that are supplying solutions for the telecommunications market.

F
Related Reports

INPUT has published other reports in the telecommunications market that complement this report:

- *Telecommunications –Vertical Market Analysis*
  This report focuses on the identification of key changes in the market for information services in the telecommunications industry and provides general industry statistics and trends. It addresses industry convergence issues between carriers, cable TV companies, and wireless entities including the implications to information services market delivery modes.

- *U. S. Network Services Market*
  This report targets network applications including EDI, e-mail, VANs (Value-Added-Networks), and Electronic Information Services including on-line databases and news services. The report assesses trends and issues affecting this market.

II

Executive Overview

This chapter summarizes the key findings in the report.

- Section A provides a brief overview of the industry and C/S potentials
- Section B discusses the key findings
- Section C provides key statistics
- Section D makes industry recommendations
- Section E addresses conclusions

A Background

The way in which goods and services are provided is changing in telecommunications and cable TV companies This means that the internal business processes are also undergoing significant changes. These changes are attributable to several factors:

- Convergence in the telecommunications industry of:
  - Telephone companies
  - Cable television companies
  - Wireless companies
- Convergence of telecommunications and computer technologies
- Deregulation of the telecommunications industry
- Rapid competitive exploitation of new technologies and services

The local and long distance common carriers are converging with the cable television industry. This convergence began in 1992 as a result of several activities. The Regional Bell Operating Companies (RBOCs) and other local exchange carriers (LECs) have been under pressure from long distance companies who want to participate in the lucrative "local" long distance marketplace. In addition, these long distance companies—or Inter-exchange Carriers (IXCs)—are paying LECs 45 cents of every long distance dollar for "local access" to the consumer's telephone.

IXCs are continuing to look for ways to directly access the end users and circumvent access charges. They influence regulatory agencies by challenging the validity of access charges. In contrast, these access fees make up a significant part of a local exchange carrier's revenue stream.

In 1983, a decree from the Justice Department dictated that the Bell System would be divided into seven regional entities called Regional Bell Operating Companies (RBOCs). AT&T was allowed to continue to offer long distance services and manufacture equipment. As a result of this decree, RBOCs were prohibited from providing long distance, manufacturing equipment, and providing content-based information services. However, a ruling in 1992 now allows the RBOCs to offer information services.

Small, privately held companies called competitive access providers (CAPs) have begun to appear in larger metropolitan areas. Using fiber optic cabling and some microwave technologies, CAPs have begun to challenge the RBOCs and local operating companies for commercial business.

The cable television (CATV) industry has been essentially unregulated (on a national basis) since 1986 and is now approaching market saturation in the home consumer marketplace. Consumers have become increasingly unhappy with CATV services. Prices have continued to edge up over the years with only limited controls from local city governments. Customer service levels have become increasingly unsatisfactory as well. As a result, the public is pressuring Congress and the FCC to get back in the business of CATV regulation. Regulatory controls have now been put in place that require certain degrees of accountability, and have caused a 17% rollback in consumer prices.

The cellular telephone industry has also been evolving since 1986. This industry has demonstrated significant growth even though it has remained under FCC regulation. While its prices are two to three times higher than traditional phone service, it has recently been growing at 40% per year. Note that the FCC stipulated that each metropolitan and rural service area have a "duopoly" market structure—a minimum of two cellular service companies per service area.

Recent and rapid technology changes have introduced new potentials for the telecommunications and computer industries in the entertainment industry. Video-on-demand, interactive multimedia, high-speed information transfer, on-line directory, imaging, portable terminals, intelligent messaging and voice mail—all require some form of enhanced telecommunications.

From a broader perspective, there are several other forces that are currently influencing and taking advantage of these telecommunications industry changes. In recent years, the basic tenets of business operation have been modified to accept new concepts such as total quality management and just–in–time (JIT) production to meet a more competitive and global environment. These modifications in how business is performed now place additional impetus on the evolution of the telecommunications/technology convergence.

As part of this "evolution," Congress is in the process of re-writing the Telecommunications Act of 1934. The specifics are still unclear, but it looks very probable that a competitive, free market approach will replace a significant amount of regulation. While certain regulatory guidelines must continue to prevail in order to maintain standards, resource management of spectrum, and control of national security, lawmakers are reviewing the benefits of regulating these industries through market cross fertilization.

This cross fertilization of markets should result in local telephone companies being able to manufacture equipment, provide long distance service, and compete in the cable TV marketplace. Keeping with the cross-fertilization philosophy—cable TV companies will be able to provide telephone services in the local telephone marketplace.

So where does client/server technology fit in these developments? C/S architectures are especially suited to telecommunications applications because they:

- Enhance customer service by enabling operators to access multiple databases simultaneously
- Integrate operations support systems to reduce the number of support staff required
- Leverage the considerable investment in existing operations support systems for loop maintenance, inventory, workorder tracking, network operations, switching and customer operations
- Support all forms of transmission media including data, voice, video, and image
- Simplify the maintenance of complex systems

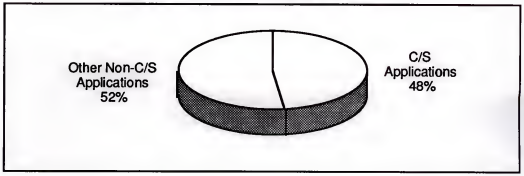
C/S architecture is a computer technology that facilitates, in many positive ways, the new and evolving world of telecommunications.

B
Key Findings

The migration to client/server architecture appears destined to achieve very high penetration rates within the telecommunications industry. As noted in Exhibit II-1, 48% of the respondents to INPUT's questionnaire said that C/S technologies will play a significant role in their architectural plans.

Exhibit II-1

Planned C/S Technology Penetration



Several applications categories have over 50% of new systems being implemented using a C/S architecture, namely:

- Financial
- Infrastructure
- Telecommunications Operations Support
- Telecommunications Customer Systems
- Human Resources

Between 25% and 50% of other applications will be implemented as C/S. This wide acceptance of C/S is attributable to the early beginnings and subsequent development of UNIX technology within the telecommunications industry. The higher than average understanding of networking found in telecommunications system development organizations means that operations support systems have been networked for many years. Greater productivity and superior customer service result from combining multiple applications on a single windowed workstation. Telecommunications companies, with massive customer support staffs, were some of the first to realize these benefits of C/S technology.

Respondents were asked which platforms they were most likely to use for applications undergoing major changes. They indicated that 72% of applications will use a LAN as part of the installation, whereas only 54% of applications will use mainframes.

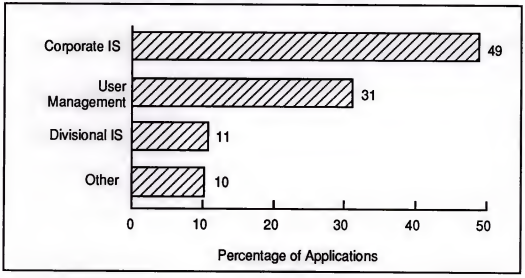
C
Key Statistics

From the perspective of company size, large companies with $1 billion to $5 billion in revenues are planning to commit 54% of their applications to C/S technologies. Both very large companies (above $5 billion) and medium size companies ($500 million to $1 billion) shared a 50% application commitment to C/S technologies.

Corporate IS handles a majority (49%) of the client/server project management duties while divisional IS manages only 11%. Users manage 31% of these projects as noted in Exhibit II-2.

Exhibit II-2

Project Management for C/S Applications



Respondents were asked to identify which outside products and services they plan to use in implementing C/S systems. Of the total applications:

- 24% will use outside services
- 33% will use packaged software
- 21% will use systems integrators

D
Conclusions

With 48% of all applications being planned for client/server platforms, one can expect a very high penetration of this technology in the telecommunications industry. C/S architecture lends itself to many of the new services being developed in support of the "information highway" and interactive video. These technologies support all forms of media including voice, data, video, and image.

The major opportunities for client/server systems are in:

- Operations support systems
- Systems to support new services

Telephone industry computer systems have always been relatively complex, even during the era of mainframe solutions. C/S architecture heightens the complexity, leading to a strong acceptance of object-oriented client/server development tools. Object-oriented approaches to client/server systems reduce the complexity. C/S systems will overcome current interconnectivity problems and should become a timely and welcome asset for telephone, cable TV, and wireless companies.

E
Recommendations

- **Software Vendors** – Software vendors should find the telecommunications industry a very receptive market for C/S. However, telecommunications companies are cautious buyers and vendors will need patience. Common carriers have been dealing with C/S solutions longer than any other industry. They understand network management. They do not have to be convinced of the value of this technological solution. Application areas destined for C/S solutions include engineering, directory services, logistics, EDI and customer service. In addition, large-scale video-on- demand systems are already under development. (See Chapter VI, Vendor Analysis)

- **System Integrators** – While systems integrators had the lowest potential use of all outside products and services (21%), they will be able to capitalize on some of the problems and issues associated with C/S solutions. In the telecommunications market, system integrators with industry expertise such as GTE, CBIS and Bellcore, present formidable competition for the technology vendor.

- **Outside Services Vendors** – Twenty-four percent (24%) of the new applications will be implemented using outside processing services. However, 50% of C/S applications will be implemented using outside services. C/S systems require significant resources and expertise — home telecommunications and cable companies are looking for external resources.

  Until recently, it was anticipated that processing services were needed to support the numerous smaller carriers that were too large to be able to meet their internal needs with workstations and PCs, and too small to have large information systems organizations. Scalable C/S solutions mean that system integrators will be able to serve both large and small vendors with similar solutions. The small vendor will be able to have powerful support systems on low-cost hardware. This makes the processing services vendors vulnerable.

A good example of these transitional pressures can be seen in the cable TV industry. Many CATV entities have relied on outside processing services to support their billing and operational activities. Pressure is now on the traditional suppliers of these services to come up with C/S alternatives or their clients may seek their own solutions. Also, some of the larger CATV conglomerates have been talking about bringing processing services back in-house. Some of this decision process is driven by the convergence issues mentioned earlier.

Traditionally contract programmers have been hired for major telecommunications projects. In particular, programmers with telecommunications and object-oriented expertise are in demand for network management. This trend is likely to continue.

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Applications Analysis

This chapter analyzes telecommunications applications in detail. It contrasts C/S applications with non-C/S applications.

- Section A discusses leading trends in telecommunications that affect the implementation of C/S systems.
- Section B discusses leading IS issues as reported by respondents.
- Section C discusses C/S applications. It estimates the percentage of new systems that will be implemented using a C/S architecture and describes opportunities for C/S applications.
- Section D reviews a detailed breakdown of data collected
- Section E discusses target platforms, i.e. mainframe, minicomputer, or LAN.
- Section F discusses C/S implementation by size of company

A
Telecommunications Applications Trends

With the convergence of telephone carriers (telcos), cable TV companies, and wireless communications providers, one can expect a great deal of re-thinking about how systems can provide more effective support over the current architectures. Convergence is also taking place on another level as the computer industry seeks to carve out a much larger share of the exploding telecommunications markets.

Re-regulation will play a great part in how these markets evolve over the next 10 to 20 years. It now appears more likely that Congress will decide in favor of allowing free markets to regulate these industries. These events should translate into telco carriers being able to manufacture equipment, provide long distance service and compete in cable TV markets.

The cable TV industry will also be able to compete in what were traditional telco markets, even though the FCC recently placed upwards of a 17% cost of services cutbacks on an industry that has not been regulated by this agency since 1986. However, these cuts are seen as a relatively short-term impairment to the overall viability of a competitive market structure.

INPUT believes the following key trends will shape the telecommunications IT development and implementation in the next few years:

- Convergence of telecommunications and cable TV industries
- Deregulation
- Customer service
- Billing
- Video servers
- Telecommuters/home office
- Mobile users

Competition continues to heighten in the video server arena. Telephone and cable TV companies want to position themselves to control the flow of video and data through larger databases such as Oracle (with or without nCube hardware) providing video-on-demand (VOD) to the consumer marketplace.

The convergence of computers and telephones means that the basic consumer communications device is changing. The PBX is already a LAN component in some companies and headsets connected to desktop computers replace the phone. As computer systems become 100% reliable they will tend to replace the PBX as it is known today. Software that integrates desktop messaging, fax, voicemail and phone management is already transforming

the way that phones are used in the office. Home phones are expected to become more like computers.

Phones are also becoming more mobile as personal communicators that combine wireless communications, electronic mail, calendaring and fax penetrate the market. Wireless telephones will become the norm. Satellite systems, such as Motorola's Iridium venture and Globalstar L.P., will pave the way for wireless global communications services. Competition between low earth orbit (LEO) systems will intensify in the next ten years.

Customer service systems will continue their importance in supporting and responding to competitive environments. Companies are discovering that advanced customer service organizations provide value, not only to their customer base, but to their internal production and inventory control by generating just-in-time (JIT) statistics.

Billing systems will need to become more sophisticated as services are combined under one roof. A single bill for telephone, facsimile, video conferencing, cable TV and mobile/portable wireless services will attract consumers. There will be a war among service providers to own the customer.

The home office is becoming a more attractive work place option as computer architectures become more flexible and communications costs come down. This telecommuting trend becomes even more attractive when coupled with the environmental pressures to reduce pollution. While there are still the traditional management issues including the ability to work alone with less supervision, telecommuting will become even more viable as interactive video media services are delivered to the home. Another telecommuting concept gaining acceptance is that of the regional telecommuters' office. This supports telecommuters from multiple businesses. The benefits to telecommuters are that they have a shorter commute, meet other colleagues and get away from domestic distractions.

Voice and data mobile systems are growing at a substantial rate. Cellular networks were originally designed to support voice traffic using analog technology. Major conversions to digital technologies that are better suited to support data transmission are slated for roll-out toward the end of this year. It should also be

noted that the development of standards in telecommunications and computing will play a very important role as this industry evolves.

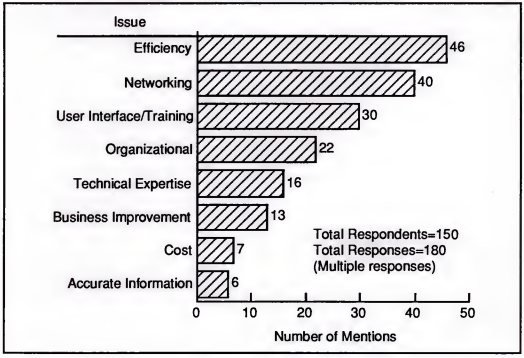
B
Leading IS Issues and User Concerns

1. Ranking of Leading IS Issues

When asked to identify the major issues relevant to IS in the next two years, 116 respondents gave free-form answers that were coded by INPUT. Some respondents gave multiple answers and others gave none, resulting in 180 responses tabulated in Exhibit III-1.

EXHIBIT III-1

Major Information Systems Issues



As shown in Exhibit III-3, the most frequently mentioned IS issue (46%) was the need for greater efficiency relating to:

- Timeliness
- Performance
- Accuracy
- Productivity

About 42% of the respondents cited networking issues. Major concerns were interconnectivity, integration, and standards.

User interface/training and organizational improvement were also fairly significant issues. Telecommunications companies have had a long tradition of retraining employees to adapt to new technology. Client/server systems afford vendors of training services that can understand telecommunications systems an excellent opportunity.

Two-thirds of the respondents were concerned about efficient, interconnecting networks, which provide a strong user focus. Requirements include seamless integration and intuitive interfaces to networks. Telecommunications and cable companies are battling for the consumer. Those that are able to offer the easiest user interfaces with powerful access to a range of services will be the leaders. There will be a demand for third-party software vendors that can provide applications that are simple to understand and that can access multiple networks without user intervention. Internally for network management, trouble shooting and system design, simple user interfaces are needed that can support network management systems that send agents across different network topologies and equipment.

C
C/S Applications

1. C/S Penetration by Application Category

C/S systems will achieve high penetration rates in telecommunications over the next few years. Respondents were asked to identify if they were using or planning to use C/S systems. Exhibit III-2 shows the number of applications surveyed in each of the applications categories given in Exhibit I-2. It also shows the number of those for which the respondent indicated that the

C/S will be a major strategy. Forty-five percent of the respondents indicated that C/S will play a significant role in their systems architecture plan.

Exhibit III-3 takes the same data as Exhibit III-2 and expresses C/S penetration as a percentage of systems installed for each application category. The application categories are then ranked according to the percentage of systems that are migrating to C/S architectures.

EXHIBIT III-2

Planned Application Changes and Use of C/S by Category

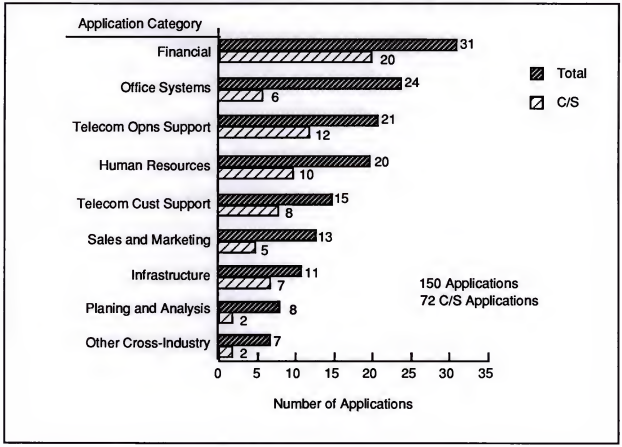
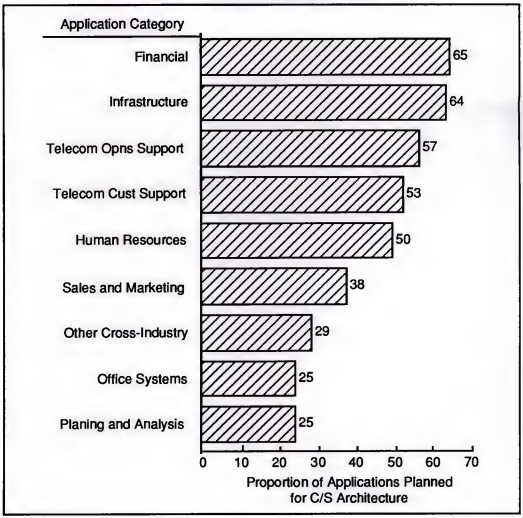


EXHIBIT III-3

Use of C/S by Application Categories



According to the survey, 48% of telecommunications applications are moving to C/S architectures. Financial applications are a key area for client/server computing with 65% being implemented using a C/S architecture. Almost all financial accounting software package vendors provide some support for C/S, as reflected in the survey.

Several respondents mentioned that they were upgrading their servers and PCs/workstations to support C/S architectures. A few respondents mentioned that they were migrating from minicomputers to PC LANs that could access mainframe data. One respondent was adding fax capabilities to mature mainframe applications using a C/S architecture.

OSSs typically connect multiple computing platforms, hence the high penetration (57%) of C/S applications. Whereas in the past, telephone company support staff may have 3270-compatible terminals for mainframe access and ASCII terminals for minicomputer access—these can be replaced with an X-Windows or MS-Windows client PC/workstation. Network management operations support systems are an area where object-oriented C/S systems are growing.

Customer support systems are another area of interest for client/server implementation, with 57% of systems moving to a C/S architecture. This is an area where UNIX workstations are proving popular, because they are compatible with existing UNIX servers and they are more robust than MS-Windows PCs for time-critical customer inquiry systems that access multiple databases. Directory assistance systems have long used database architectures that offer high performance. Indeed, some of the original back-end database machine research that led to C/S databases, was undertaken to support directory assistance systems.

D
Breakdown Of Survey Data

Exhibit III-4 gives a detailed breakdown of the data collected. It shows for each category the number of applications surveyed in the category, the strategy, the main platforms used and major resources used.

EXHIBIT III-4

Applications Group Summary Report

		Strategy		Primary Platform			Resources							
APPLICATION CATEGORY	No. Apps	C/S	Downsizing	C/S or LAN	Mini	Mainframe	Corp IS	Div'l IS	User Staff	SI	Other Outside Svcs	Packaged SW	Using EDI	Outsourced
All Applications														
Financial	31	20	11	13	5	15	23	12	14	5	12	17	8	2
Human Resources	20	10	3	6	5	11	14	5	6	8	9	11	8	0
Infrastructure	11	7	3	8	1	1	6	3	7	3	5	8	4	1
Office Systems	24	6	4	17	2	7	12	4	12	9	5	15	6	6
Planning & Analysis	8	2	2	6	1	2	4	2	1	2	3	4	1	0
Sales & Marketing	13	5	3	12	2	3	4	5	4	4	4	7	5	1
Cross-Industry Systems	7	2	1	2	2	1	6	1	3	1	3	5	1	1
Telecom Customer Systems	15	8	3	4	2	10	13	9	10	5	6	10	7	1
Telecom Operations Support Systems	21	12	6	4	7	4	13	9	15	9	10	10	9	4
TOTAL - All Applications	**150**	**72**	**36**	**72**	**27**	**54**	**95**	**50**	**72**	**46**	**57**	**87**	**49**	**16**

EXHIBIT III-4 (Cont.)

Applications Group Summary Report (Continued)

		Strategy		Primary Platform			Resources							
APPLICATION CATEGORY	No. Apps	C/S	Downsizing	C/S or LAN	Mini	Mainframe	Corp IS	Div'l IS	User Staff	SI	Other Outside Svcs	Packaged SW	Using EDI	Outsourced
Client/Server Applications														
Financial	20	20	9	13	2	7	15	9	13	5	10	13	5	2
Human Resources	10	10	1	4	2	5	7	3	5	3	3	5	6	0
Infrastructure	7	7	3	4	1	1	4	3	6	3	5	5	4	1
Office Systems	6	6	3	3	2	3	6	2	4	4	3	6	3	2
Planning & Analysis	2	2	1	1	1	1	1	1	1	1	1	1	0	0
Sales & Marketing	5	5	2	5	1	1	2	1	3	3	0	2	2	1
Cross-Industry Systems	2	2	0	0	1	1	2	1	1	1	1	1	0	0
Telecom Customer Systems	8	8	3	3	2	4	6	6	5	4	5	7	5	0
Telecom Operations Support Systems	12	12	4	2	4	2	8	8	11	8	8	9	7	3
TOTAL - C/S Apps	72	72	26	35	16	25	51	34	49	32	36	49	32	9
C/S Apps Compared With All Apps														
Percent of all apps (%)		48	17	23	11	17	34	23	33	21	24	33	21	6
Percent of C/S apps (%)		100	36	49	22	35	71	47	68	44	50	68	44	13

An explanation of the column headings follows:

- "Number of Applications" is the total number of applications for each of the application categories.
- The "Strategy" heading contains two subheadings, "C/S" and "Downsizing." The "C/S" count by category indicates the number of applications within the category that will be implemented using a C/S architecture. The count under the heading "Downsizing" represents the number of C/S applications out of the total that are being implemented as part of a general downsizing strategy.
- The "Platform" heading indicates the number of times that one of the three major platform classes was mentioned as the key implementation platform.
- The "Resources" heading covers six sources of potential resources that will be employed as part of the implementation process. As was the case with the question regarding platform, more than one response per application was permitted.
- Finally, for each application, respondents were asked to indicate whether the application would use EDI or be outsourced. The last two columns give a tabulation of those responses.

An explanation of the rows is as follows:

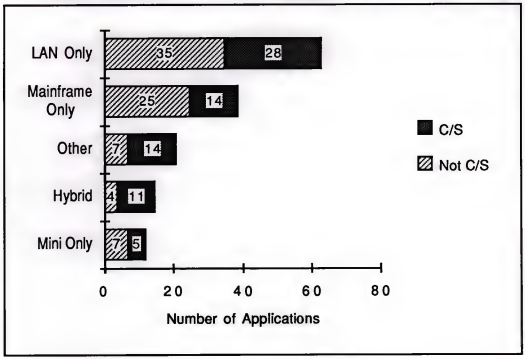
- The first set of rows represents the leading application categories.
- The "TOTAL – All applications" row adds up the rows describing the application categories.
- The above rows are repeated for applications where the respondent indicated that there was a major strategy to move to C/S systems.
- The penultimate row takes the "TOTAL – All applications" and divides each column total by the number of applications to give a percentage. The final row calculates a similar percentage for C/S applications, so that they may be compared with the population as a whole.

E
Target Platforms

Exhibit III-5 shows the target platforms for the 150 applications in the sample for which platform information was available. Users were asked to identify their primary application platform for applications undergoing major changes.

EXHIBIT III-5

Target Platforms For Planned Applications Development



Forty-two percent of all applications development will be accomplished on local area nNetwork platforms. The more traditional mainframe solutions have only 26% of all applications.

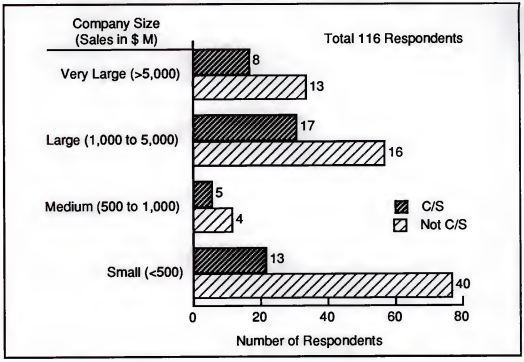
F
C/S Implementation By Size Of Company

Based on company size, large companies with revenues of $1 billion to $5 billion are planning to commit over half their applications to C/S technology.

Exhibit III-6 below shows C/S implementations by size of company.

EXHIBIT III-6

Use of C/S as a Function of Company Size



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Management and Budgets

This chapter discusses applications management and budgeting. The chapter is organized as follows:

- Section A provides an analysis of the role that IS departments and user management play in project management of applications.
- Section B analyzes resources that will be used to implement applications, the emphasis being on development rather than overall project management.
- Section C analyzes expenditure plans, that is estimated budget sizes for investment in new systems.
- Section D analyzes budget growth rates, that is the amount that respondents expect their budgets to grow annually over the next two years.

A
Project Management

Respondents were asked for each application who was managing the project. Corporate IS is the project manager for the majority of new applications.

- Of the 150 applications, 33 (22%) will be managed by user management. This is lower than the 40% found in the banking and finance study.
- Corporate IS will manage 84 (56%) of the projects. Divisional IS will manage 20 (13%).

The remaining projects are typically managed by cross-departmental teams. Of 150 applications, 72 of them are moving or have already migrated to C/S solutions. Exhibit IV-1 graphically shows the project management responsibilities, as a percentage, for all applications.

Exhibit IV-2 shows the number of applications managed by each organization for both the entire application set and just C/S applications. Exhibit IV-3 shows the project management responsibilities, as a percentage, for C/S and for all applications.

EXHIBIT IV-1

Project Management for All Applications

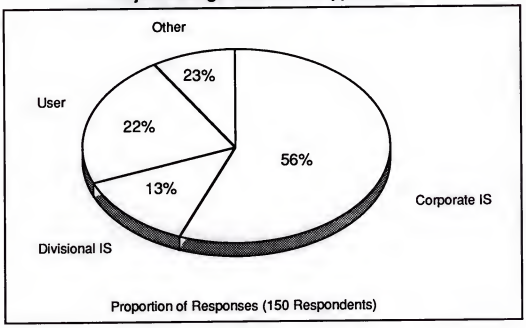


EXHIBIT IV-2

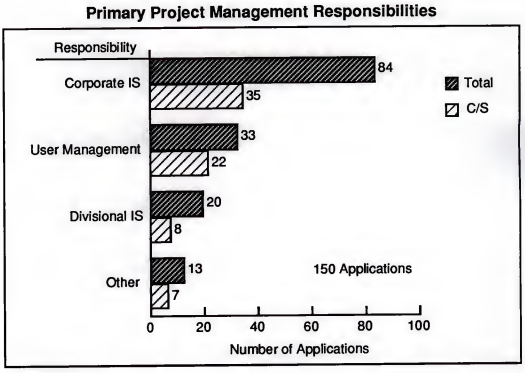
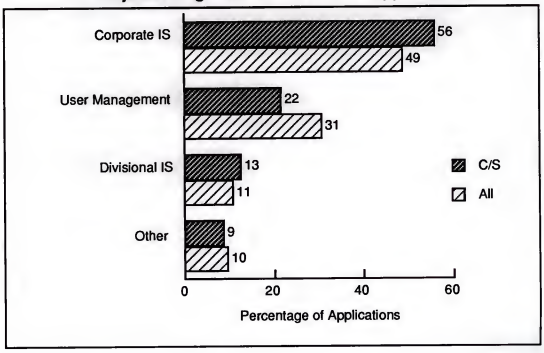


EXHIBIT IV-3



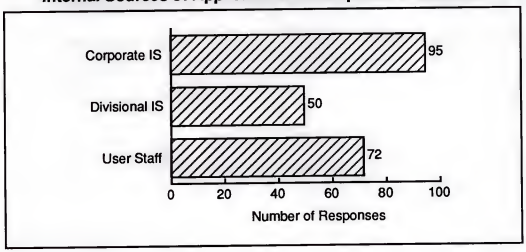
B
Implementation Strategy

1. Sources of Development Resources

Exhibit IV-4 shows the resources required to implement the 150 applications.

EXHIBIT IV-4

Internal Sources of Applications Development Resources



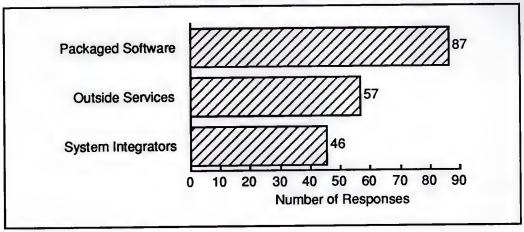
For almost 33% of the projects, user line or staff management will assume direct implementation responsibility. Size of institution is not a differentiating factor for project implementation strategy. Corporate IS continues to have a key role in systems implementation. Whether the organization is large or small, corporate IS is a primary resource in 63% of the applications.

2. Use of Software Products and External Resources

As shown in Exhibit IV-5, over 38% of the implementations planned for the next two years will use packaged software.

EXHIBIT IV-5

Use of Outside Products and Services



C
Expenditure Plans

Exhibit IV-6 shows the anticipated amount that each of 102 respondents expects to spend on applications changes in 1994. The spending amounts, shown as a range, are plotted against the number of mentions. The shading differentiates between respondents that mentioned C/S as a key strategy and those that did not, marked non-C/S. As can be seen in the under $100K range, a high proportion of non-C/S systems is planned. At the top end of the range, 9 out of 12 respondents indicated that they would spend over $10 million to implement a C/S strategy.

EXHIBIT IV-6

Applications Budgets for C/S and Non-C/S Systems

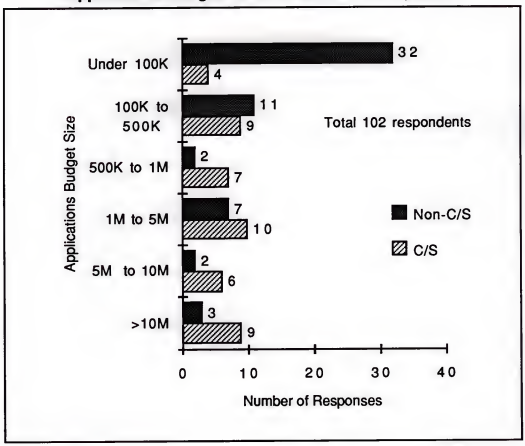
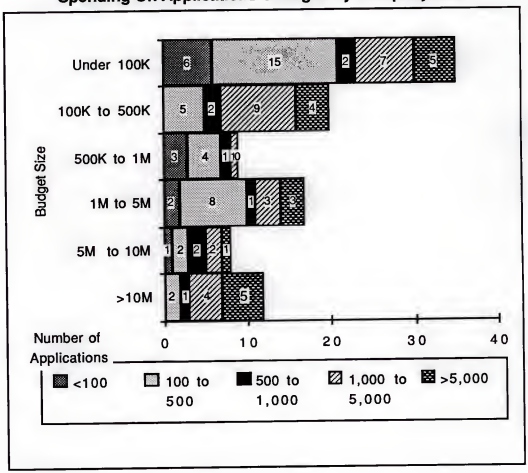


EXHIBIT IV-7

Spending On Applications Changes by Company Size



In Exhibit IV-7, the vertical axis shows budget size and the horizontal axis, number of responses. The legend shows company revenues. Most budgets were in the under $100M range. Most of the large budgets—over $10M—tend to be in larger companies, with over $1B in revenues.

D
Budget Growth Rate

Respondents were asked to identify how much their applications budget would grow annually over the next few years. This includes software and staffing costs associated with applications development. Exhibit IV-8 shows the distribution of application budget growth rates for all applications and for C/S applications. At the lowest budget level, non-C/S budgets are growing faster than C/S budgets. This is because at the low-end budgets are often spent on single user software packages for Windows-based LANs.

EXHIBIT IV-8

Annual Spending Growth Rates for Applications Development

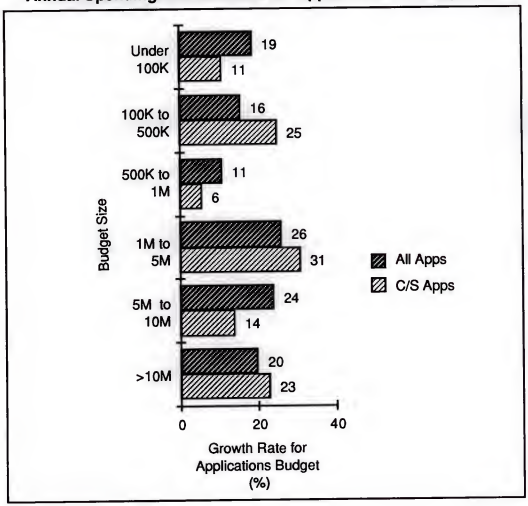
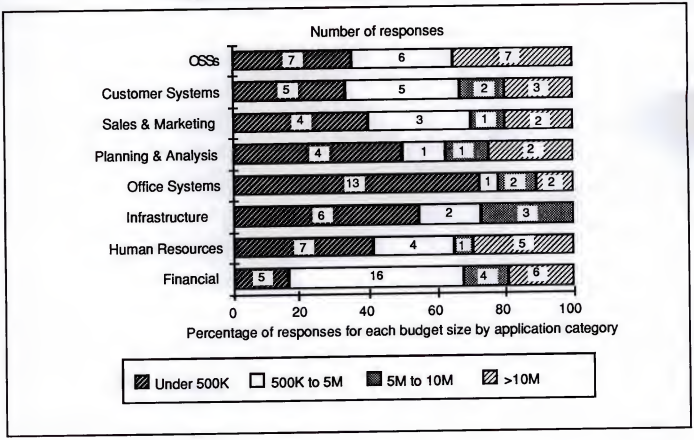


Exhibit IV-9 shows how the budget size varies for each application. The chart shows for each application the percentage of responses that stated a given budget size. The text on each element of the chart shows the number of responses. The legend gives the budget sizes. In the survey, office systems have relatively low budgets compared with financial applications. OSSs and customer systems also have large budgets.

EXHIBIT IV-9

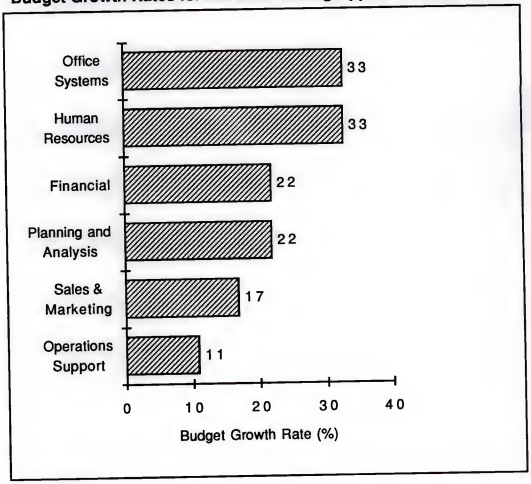
Budget Sizes for Each Applications Category



Examining the data in more detail, the applications being implemented where the budgets are growing the fastest are shown in Exhibit IV-10.

EXHIBIT IV-10

Budget Growth Rates for Fastest Growing Application Categories



Operations support systems budgets, which are traditionally large, are growing at about 11%. This includes inventory and materials management. As companies re-engineer their supply chain there will be opportunities for integrating new systems across company boundaries with existing telephone company systems. Customer support system budgets—that are proving to be an excellent opportunity for C/S vendors—are only growing at about 3% according to the survey. Telephone Directory is also an attractive opportunity because of increasing pressure on telephone companies by alternative directory organizations.

Telecommunications Industry Application Case Studies

This chapter presents case studies based on interviews with three organizations. The interviews included McCaw Cellular Communications, Pacific Bell, and U. S. Computer Services.

A

McCaw Cellular Communications, 5400 Carillon Point, Kirkland, WA 98033

1. Application Description & Reasons for Implementation

McCaw plans to implement three major C/S systems over the next three years.

- Customer Care (Service) System
- Network Management System
- Billing System

The Customer Service System will be needed to handle new products as they are implemented and provide an improved user interface. The Network Management System will be needed to support their networks which are becoming increasingly complex. The Billing System will also need to be converted to support these complex products.

Note that all of these applications are now being developed with the understanding that McCaw will soon become a part of AT&T. This merger activity may present additional considerations as the requirements and performance definitions are developed.

2. Vendors Selected & Alternatives Considered

All three applications will be performed as systems integration projects with companies such as Andersen Consulting or Cincinnati Bell Information Services (CBIS) being considered to develop the Customer Service and Billing systems. Smaller systems integration houses will be considered for the development of the Network Services application. Typically, McCaw looks to outside vendors for development of products and services up to 70% of the time.

The primary architectural focus for these applications will be a choice of distributed, object- oriented, open C/S systems. The most likely platform will be UNIX-based hardware and software because it employs the same operating system on a desktop and server.

3. System Benefits

A key reason for moving all these applications to a C/S environment is for user benefit. To ensure successful implementation of these mission-critical projects, information services will retain primary responsibility for the Customer Service and Billing applications.

An all UNIX-based solution is likely to simplify programming objectives and interfaces, with NeXT being the probable vendor of choice. C/S tools should include NeXTStep and UNIX programmers' workbenches such as Digital's Cohesion and HP's SoftBench.

4. System Costs

All of these new C/S applications will require new hardware, software and network communications. This year, they will need to spend about half of their $60 million budget in order to meet their goals for operational systems within two to three years. The balance of that development budget should be expended over the next five years.

5. Summary

McCaw is obviously convinced that they see a very real trend towards C/S, object- oriented technologies. They believe that there will be more realtime processing versus traditional batch

processing applications. Of significant import, they see a merging of network and information services applications coupled with advanced network services such as Advanced Intelligent Network (AIN). AIN provides realtime access to carrier systems to define networks and change features and functions from a customer's site.

B

Pacific Bell, Data Communications Group, 6533 Sierra Lane, Dublin, CA 94568

1. Application Description and Reasons for Implementation

Pacific Bell needs a logical network monitoring tool using HP's Openview to track their customers' network maintenance activities. Customer demand for a comprehensive network management system provided the impetus for the development of this system.

The Data Communications Group—a part of the non-regulated side of the telephone company—was given the charge to develop a comprehensive system that would track trouble ticket information, maintain records of available network component inventory, and visually display various network trouble locations.

The results of the alternatives analysis dictated the requirement for a three-part system using C/S technology. The system is now used in mission critical LAN and WAN operations and provides remote network management to customer's networks in healthcare, transportation, banking, education, and mortgage loan industries. It has been so well accepted that the company uses the maintenance tool in a value-added capacity to assist in its network sales demonstrations.

2. Vendors Selected and Alternatives Considered

The system was developed internally, as there was no standard application software package that could meet the goals and objectives. It evolved from much simpler computing tools based on Apple Macintosh and then PC-DOS architectures. The Data Communications Group evaluated several vendors and performed its own systems integration effort. It was decided that the system

would operate using UNIX on Sun's SPARC-based workstations using a C/S architecture. The system will use HP's Openview for network management.

The system has been active since October 1992. The company is now planning system upgrades and will probably replace the database function with an Oracle or Informix database. The goal is to attain a truly object-oriented relational database.

3. System Benefits

Pacific Bell believes that this operational support system provides significant benefits to its customers. It significantly enhances the promotion of its networks. Operations staff and customers can now get a more realistic picture of events surrounding an individual or widespread network problem. Logical tools are now in place to "see" the iterative process of fault isolation and repair as it takes place. Follow-up reports provide the necessary information for both customer and vendor to assess service levels and take corrective action as required.

4. System Costs

System cost estimates were not available.

5. Summary

This C/S system gives its participants an effective method to quickly grasp the nature and magnitude of customer problems and manage the longer-term impacts. Significant budgetary performance pressures mean that the C/S system continues to be scrutinized for its ongoing value. As a result, when sales staff use the system in network demonstrations they must provide feedback to management regarding its effectiveness in selling network products and services.

C

U.S. Computer Services, 11020 Sun Center Drive, Rancho Cordova, CA 95670

1. Application Description and Reasons for Implementation

U.S. Computer Services (USCS) plans to re-engineer three major C/S applications within the next two years.

- Customer Service/Support (Alexis)
- Budgeting
- Accounting

The Customer Support and Budgeting systems are considered mission critical and will be converted to C/S to provide increased functionality and improved user interface capabilities. The Accounting application will also gain more functionality and new modules.

The corporate MIS department has implementation and operational responsibility for the new Customer Support and Budgeting C/S applications. However, the Corporate Finance department will retain its responsibility for all financial applications, including the implementation and on-going operation of the new C/S Accounting system.

The Customer Support and Accounting applications are being planned with the telecommunications industry convergence in mind. As part of a value-added marketing/support effort, the company's Corporate MIS group works closely with outside customer MIS organizations to strategically plan for the up-coming convergence.

2. Vendors Selected and Alternatives Considered

Typically, USCS uses outside vendors for about one third of their product and service development needs. For example, the company is currently using ESI's accounting systems for their Accounting application software and plans to evaluate PeopleSoft and EDP for the Human Resources component. Other C/S tools that are planned to be used in developing these applications include PowerSoft, Oracle's C/S Toolset, CDE, and PowerBuilder.

Potential system platforms include UNIX, MS Windows, MS Windows NT, and MAC OS. Some host-based UNIX applications will continue operation for the near-term. However, most of these other applications will make the transition to C/S technology within the next three to five years.

The company has anticipated the implementation of C/S architecture and has already converted much of their LAN/WAN communication networks to a digital transmission medium. This conversion accommodates the faster throughput requirements at substantially reduced error rates.

3. System Benefits

USCS believes that their move to a C/S architecture will result in significant benefits. The user will benefit from increased functionality and a reduction in training needs, while the company will benefit from the exploitation of cheap computing power distributed to the user desktop.

4. System Costs

The Customer Support and Budgeting systems applications will require investment in new hardware and software—the communication networks are already in place. However, some of these application investments were done to concurrently achieve other operational business goals.

USCS indicated that their 1994 development cost for the Customer Support project would approach $150,000 and the Budgeting project would cost approximately $50,000. Over the next five years, the company expects to focus half of its information systems development dollars on C/S applications.

5. Summary

While the MIS organization has some reservations in implementing C/S applications due to the operational and control challenges of a decentralized network, the organization, and the company, have demonstrated a major commitment to C/S architecture.

Vendor Analysis

A
Survey Results

As part of the survey, respondents were asked to identify key vendors. These vendors were then given a satisfaction rating on a scale of 1 to 5 — 1 being dissatisfied and 5 being very satisfied. In addition, the proportion of their customers who mentioned C/S as a key strategy was estimated. Given the sample sizes are very small, these results should be used to aid understanding rather than as absolute measures. A tabulation of the major vendors mentioned is given below—some respondents mentioned more than one vendor. In all, there were 68 vendor mentions, many with a single mention only. Several small regional vendors were mentioned. Only the vendors mentioned more than four times are analyzed in Exhibit VI-1.

The first column gives the vendor, followed by the number of mentions, then the average rating, the percentage of customers mentioning C/S as a strategy and, finally, comments raised by respondents.

Exhibit VI-1

Vendor Satisfaction Ratings

Vendor	Number of Mentions	Average Rating	Percent Migrating to C/S (%)	Notes
Amdahl	5	3.60	60	Struggling with C/S...Good service
Apple	12	3.83	42	Very easy to use...Vendor fixed all problems
AT&T	5	4.00	40	Good tech support...Mediocre marketing
Compaq	14	4.07	64	Very satisfied...Good performance
D&B	8	3.00	63	Weak support...No reporting
DEC	17	4.06	24	Good performer...No problems
Dell	5	3.20	20	Cost effective...Good performance
HP	9	4.22	44	Very good performance...Good service
IBM	54	3.65	54	Cost issues...Mixed applications reviews

B
Video-On-Demand Buyers and Sellers

Video-on-demand (VOD) is an emerging opportunity for C/S systems. A number of vendors are stepping up to supply telephone and cable TV companies. The intent of this application is to provide consumers with information services and video entertainment. Massive databases with high-bandwidth are needed to store video, text and graphics.

Currently, companies such as Time-Warner, are undertaking trials to understand technical challenges and user requirements. It is likely to be a few years before this technology is mass-deployed. However, the players in the trial rounds can expect success at later stages as systems become more robust. A key challenge for providers is to work out the balance between subscriber fees and advertising revenues to finance such services.

None of the user organizations contacted by INPUT in Chapter V, *Telecommunications Industry Application Case Studies*, were willing to discuss their proprietary plans for VOD. However, all major telephone companies and cable companies are making substantial investments in video systems.

Software vendors need to partner with the major UNIX server vendors, database vendors, telecommunications system integrators and communications equipment vendors. There are opportunities for creative user-oriented software, as well as for video operations support software. There is a demand for systems software utilities that can interface the servers to existing systems, network management software and customized databases that can support video objects.

Exhibit VI-2 reviews some of the primary buyers and sellers in the VOD marketplace.

Exhibit VI-2

Video-on-Demand Marketplace

Vendors	Buyers
AT&T Network Systems	GTE, Pacific Telesis, Southern New England Telephone, TCI, & Viacom Cable
Digital Equipment Corp.	Rochester Telephone, USA Video, & U S West
HP	Pacific Telesis
IBM	Ameritech, Bell Atlantic, & Videotron (Canada)
ICTV (uses IBM servers)	Cox Cable & InterMedia Partners
Microsoft	NTT (Japan) & TCI
Oracle/nCube	Bell Atlantic, British Telecom, & US West
Silicon Graphics	Time-Warner

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Applications Details

This appendix provides definitions of all the applications identified in this study. The applications are grouped according to categories. Exhibit A-1 includes all applications that are unique to INPUT's definition of the telecommunications industry sector. Exhibit A-2 contains definitions of applications identified in this study that INPUT defines as cross-industry.

A
Description of Applications

In telecommunications in particular, applications are being integrated to provide better customer services.

EXHIBIT A-1

Telecommunications Industry by Application Types

Application Category/Type	Description/Examples
Telecommunications Applications	
• Customer Support Systems	Billing, Customer Records, Customer Service, Directory Assistance, Operator Support
• Operations Support Systems	Facilities Management, Inventory, Loop Maintenance, Materials Management, Mobile Craft Support Systems, Network Monitoring, Network Routing, Remote Switching Center Control, Repair Scheduling and Routing, Repeater Management, Service Orders, Service Quality Monitoring & Reporting, Software Defined Networks, Switching Center Maintenance and Monitoring, Switching System Support, Transmission Systems, Work Order Tracking
• Directory Management	Yellow, White and Blue Pages Systems Management, Yellow Pages Advertising Support
• Regulatory	Pricing of Regulated Services, Regulatory Filings and Tariff
• Information Services - Messaging, On-line Databases, Video	Public Electronic Messaging Services (Consumer and Commercial), Information Databases, Video Services
• Systems Research and Development	Service Requirements Planning, Systems R&D

EXHIBIT A-2

Cross-Industry Application Types by Category

Application Category/Type	Description/Examples
Cross-Industry Financial	
• Accounts Payable/Receivable	Traditional systems to handle invoicing and payments and manage receivables
• Cost Accounting	Systems to analyze the costs of goods and services
• Financial Reporting	Financial systems for the generation of management information
• Fixed Assets	Systems to track the book value and depreciation of assets
• General Ledger	General Ledger
• Integrated Financial Systems	Integrated accounting modules with reporting
• Other financial	Foreign exchange
General Infrastructure	
• Database Conversion - General	Migration to a new data base architecture
• Database Conversion - Relational/Distributed	Migration to a relational or distributed (or both) architecture
• Data Conversion	Projects to convert the date from one data base environment to another
• Hardware Upgrades	Projects to upgrade or migrate to new hardware
• Imaging Systems	Installation of infrastructure to support imaging applications
• Operating System Upgrades	Operating System Upgrades
• Platform Migration - C/S	Projects to upgrade or migrate to new client/server hardware
• Platform Migration - General	Projects to upgrade or migrate to new general purpose hardware or networks
Human Resources	
• Human resources information system	Human resources information system, HRIS
• Payroll	Payroll processing
Office Systems	
• Electronic mail and messaging systems	Electronic mail systems
• Word Processing Systems	Installation of applications that use word processing

EXHIBIT A-2 (Cont.)

Cross-Industry Application Types by Category (Cont.)

Application Category/Type	Description/Examples
Planning and Analysis	For this report the spreadsheet applications were combined with office systems.
• Executive Information System	Decision support systems for executives
• Financial Modeling	Systems to support financial business modeling and analysis
• Spreadsheets/Databases	Applications that use desktop spreadsheets and databases
Other Cross-Industry	
• Voice mail	Voice mail systems
• Help desk	Support systems for internal computer users
• System Administration	Backup, password management, performance management, upgrade support

Questionnaire

Telecommunications Client/Server Case Studies

I. General Information

1. Name_____Title_____
   Tel. #_____
2. Company _____
3. Address _____

   _____

   _____
4. What are the company's gross revenues for this fiscal year?

   a. $_____

   b. Current domestic percent of market? _____ %

   c. Current international percent of market? _____ %

II. Specific Client/Server and Systems Information

1. What is your company's IS organizational structure?

   a. Centralized Corporate MIS? ____

   b. Distributed Divisional MIS? ____

   c. Is Engineering IS a separate entity? ____

   d. Does Engineering IS report into MIS? ____

e. Which areas are outsourced and why?

2. Which new applications have you implemented in the last 5 years and why?

3.a. Which applications do you plan to re-engineer or replace in the next 5 years and why?

3.b. Are any of these applications being considered in the support of the joint telco/cable TV industry convergence?

3.c. Which division or outside entity will have primary responsibility for each project/application installation?

4. Which of the above applications are C/S and of those, which are mission-critical?

5. In what time frame do you foresee making the transition to each of these C/S application?

6. To what degree are you looking to outside vendors for products and services?
_____%

7. Which critical C/S applications required investment in new hardware, software, and network communications?

8. Which applications are you planning to acquire, and which vendors are you evaluating for each? (such as packaged software, systems integrators, and/or other professional services)

9. Which alternative architectures are likely to be considered?

_____

_____

_____

10. What system platforms are most likely to be used? (regarding hardware and operating systems)

UNIX _____	MS Windows _____	MS Windows NT _____
DOS _____	OS2 _____	AS-400 _____
MAC OS _____	Tandem Guardian_____	Other _____

11. What are the key, most important reasons for moving to a C/S environment? (e.g., user benefits, administration benefits, &/or program development benefits)

_____

_____

_____

12. Which C/S tools do you plan to use in developing C/S applications?
Gupta _____ PeopleSoft _____ PowerSoft _____ Others _____

13. What is your total budget for each C/S application?

a. For this year?

_____

_____

_____

b. Over the next 5 years?

_____

_____

_____

14. What application trends do you see in the telecommunications industry over the next 2 to 5 years?

15. Which applications have been most successful in improving user effectiveness?

16.a. Which applications have been most successful in terms of vendors, staff support, etc.?

16.b. Which applications have been least successful in terms of vendors, staff support, etc.?

17.a. Which applications provided you with the biggest return on investment?

17.b. Which applications did not provide you with the expected return on investment?

Vendors

This section gives the names and addresses of vendors mentioned in the report.

Vendors Noted in Report

Vendor	Address
America On-Line	8619 Westwood Center Drive, Suite 200, Vienna, VA 22182
Apple Computer	20525 Mariani Ave., Cupertino, CA 95014
Ardis	300 Knightsbridge Pkwy., Lincolnshire, IL 60069
AT&T Network Systems	Basking Ridge, NJ
Compuserve	
Digital Equipment Corporation	Maynard, MA
Hewlett-Packard	
IBM Corporation	Armonk, NY
INTEL Corporation	Santa Clara, CA
Internet	
McCaw Cellular Communications	5400 Carillon Point, Kirkland, WA 98033
Microsoft	Redmond, WA
Motorola	1303 E. Algonquin Road, Schaumberg, IL 60196
nCube Corporation	919 E. Hillsdale Blvd., Foster City, CA 94404
Oracle Corporation	500 Oracle Parkway, Redwood Shores, CA 94065
RAM Mobile Data	745 Fifth Avenue, New York, NY 10151
Silicon Graphics	Mountain View, CA
Sun Microsystems	Mountain View, CA

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DATABASES

- **Software and Services Market Forecasts**
- **Software and Services Vendors**
- **U.S. Federal Government**
  - Procurement Plans (PAR, APR)
  - Forecasts
  - Awards (FAIT)
- **Commercial Application (LEADS)**

CUSTOM PROJECTS

For Vendors—analyze:

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

For Buyers—evaluate:

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

OTHER SERVICES

Acquisition/partnership searches

INPUT WORLDWIDE

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