DV3
letter

March 7, 1994

Dear Colleague:

I would like to thank you for the time you gave our consultant regarding your role and views on information systems outsourcing. As promised, I am sending you a copy of INPUT's report: *Client/Server Application Trends: Banking and Finance*. I hope you will find the information both useful and informative.

Once again, thank you for giving INPUT the benefit of your knowledge and experience. If you are interested in more information about INPUT research studies, please give me a call.

Sincerely,

I. Steven Kerns
Manager, Outsourcing Information Systems Program

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.

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1. Report title: ***Client/Server Applications Trends—Banking & Finance*** (DV3)

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   - ☐ Business/market planning
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Recommendations	☐	☐	☐	☐	☐

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Thank you for your time and cooperation.

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August 1993

Dear Colleague:

Please find enclosed the report

Client/Server Applications Trends—Banking and Finance

This is provided through your participation in the *Client/Server Markets and Applications Program* (formerly INPUT's *Downsizing Information Services Program*).

Data for this report was provided by INPUT's continuing interview program which identifies targets of opportunity for clients as well as trends in the market.

Please call me if you have any comments or questions.

Sincerely,

Dan Ryan
Client/Server Research

Enc.

VERTICAL MARKET ANALYSIS

Client/Server Applications Trends

Banking & Finance

Client/Server Markets and Applications Program

AUGUST 1993

CLIENT/SERVER APPLICATIONS TRENDS

BANKING & FINANCE

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Client/Server Applications Trends—Banking & Finance

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List of Exhibits

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Introduction

This is the third in a series of reports analyzing trends in client/server (C/S) applications by vertical industry. These reports are produced as part of INPUT's *Client/Server Markets and Applications* subscription service. Each report focuses on a single industry. Additional reports compare industries in their approach to C/S.

A
Objectives

This report addresses the following issues with regard to the banking and finance industry sector:

- To what degree is the industry as a whole migrating to client/server architectures?
- Which applications are likely to be targeted for implementation over the next three years, and which are headed for a downsized client/server environment?
- Who is managing various aspects of the implementation or conversion of these 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 scope of this analysis is limited to the banking and finance industry sector within the United States. Specifically, INPUT defines this sector as including those industries containing the two digit SIC (Standard Industrial Classification code) shown in Exhibit I-1.

EXHIBIT I-1

Banking and Finance Industry Sector Definitions

SIC Code	Description
60xx	Depository institutions
61xx	Non-depository credit institutions
62xx	Security and commodity brokers, dealers, exchanges and services
67xx	Holding and other investment offices

C
Methodology

Data for this analysis were taken from INPUT's applications data base. This data base is built from a continuous telephone interview program to gather information about companies' applications plans. The field interviewing process was initiated in January of 1993. Over 1,600 interviews have been completed to date.

In many instances more than one interview was conducted per institution. This was particularly true for extremely large firms such as Citicorp and Bank of America, where interviews were conducted with multiple divisions. The number of companies in the banking and finance sample was 63. The total number of interviews was 140.

These 140 interviews were the primary source of data for this report. They provided information on 212 different applications that will be implemented in the next two years.

Respondents identified the applications or projects they would be implementing over the next two years using their own terminology, rather than being required to categorize applications by some predetermined set of definitions. Once the survey was completed, INPUT analyzed the 212 project descriptions and coded them into 48 application types. The 48 types were then further grouped into 15 application categories for purposes of this analysis. Exhibit I-2 describes the applications by category.

Detailed descriptions of each application type are contained in Appendix A.

EXHIBIT I-2

Definition of Banking and Finance Application Categories

Application Category	Application Type
Banking Infrastructure	MIS/Financial Reporting Customer Information File Tax/Regulatory/Compliance Branch Automation
Brokerage	Commodities Securities
Commercial Loans	Corporate Loans Equipment Leasing
Financial	Accounts Payable/Receivable Budgeting Cost Accounting General Ledger Integrated Financial Systems Other Financial Systems
Human Resources	Applicant Tracking Benefits Administration Human Resource Info. Systems Management Development Payroll Position Control Requisition Control

EXHIBIT I-2 (CONTINUED)

Definition of Banking and Finance Application Categories

Application Category	Application Type
General Infrastructure	Data Base Conversion - General Data Base Conversion - Rel./Dist. Hardware Upgrades Imaging Systems Operating System Upgrades Platform Migration - C/S Platform Migration - General Telephone Switching/Voice Resp.
Office Systems	Desktop Publishing Integrated Office Systems Word Processing Systems
Other Banking & Finance	Industry-Specific Applications
Other Cross Industry	Customer Services Purchasing
Payment/Deposit	Account Reconciliation ATM Systems Deposit Processing
Planning & Analysis	Executive Information Systems Spreadsheets/Data Bases
Retail Loans	Personal Loans Mortgage Loans
Sales & Marketing	Marketing Mgt./Support Sales Analysis Telemarketing
Trust & Agency	Pension Trust
Treasury Management	Asset/Liability Management Portfolio Management

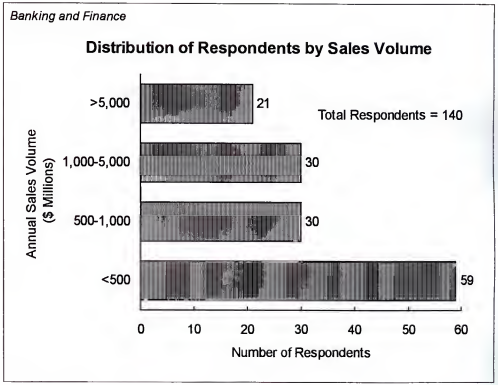
Additional information was drawn from secondary research sources and INPUT's existing library of current information on banking and finance to round out the analysis.

D
Characteristics of the Sample

1. Sample Demographics

In general the sample represents a cross section of banking and finance institutions, including such institutions as Citicorp, Bank of America, Boatman's Bank, MNC Financial Corporation, Fidelity Bank, Smith Barney, First Interstate Bank, Security Savings, etc. The breakdown of respondents on the basis of annual company or divisional sales volume is given in Exhibit I-3.

EXHIBIT I-3

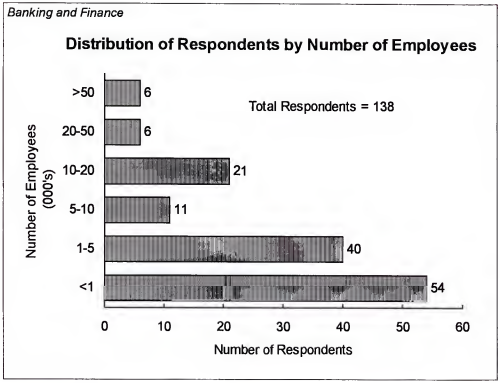


The size categories shown in Exhibit I-3 are used for analysis purposes throughout this report. The following definitions apply:

- Very Large - Greater than $5 billion
- Large - Between $1 billion and $5 billion
- Medium - Between $500 million and $1 billion
- Small - Under $100 million

The average number of employees was approximately 8,000, and the population was distributed as shown in Exhibit I-4.

EXHIBIT I-4



To provide additional parameters for the sample, Exhibit I-5 shows the distribution of respondents across the four major U.S. Standard Industrial Classification codes (SIC) that INPUT defines as banking and finance.

EXHIBIT I-5

Distribution of Sample by Major Industry Class
Banking and Finance

SIC Code Category	Description	Sample Count	% Total
60xx	Depository institutions	96	69
61xx	Non-depository credit institutions	13	9
62xx	Security and commodity brokers, dealers, exchanges and services	17	12
67xx	Holding and other investment offices	14	10
TOTAL		140	100

2. Characteristics of Survey Respondents

Although the surveys are targeted at user managers with direct responsibility for line or staff operations, respondents sometimes referred interviewers to the information systems (IS) function for responses to all or parts of the survey. Consequently, respondents included members of the corporate IS function or divisional IS management as well as non-IS line or staff management. Exhibit I-6 gives the distribution of respondents by job class. The following definitions apply:

- **Line Manager** - A manager/executive responsible for line operations at a corporate or divisional level; e.g., vice president of manufacturing, VP of sales, 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, 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-6

Job Classification of Respondents Banking and Finance

Job Classification	Proportion of Respondents (%)
Line Manager	20
Staff Manager	58
IS Manager	22

This distribution is more heavily weighted toward non-IS managers (78%) than the surveys for the discrete and process manufacturing industry sectors. However, the proportion of staff managers (58%), as compared to banking line managers, created some bias in the sample's application mix. This bias tended to weight the application sample toward financial, human resource and marketing applications. The impact is analyzed in Chapter IV.

In some instances line managers were unable to deal with questions regarding platforms, but were very clear regarding their applications requirements and plans. IS executives filled in the gap with more information on platforms, overall spending, and discussion of the general direction of the IS function.

E
Organization

The remainder of the report is organized into three chapters:

- Chapter II, *Executive Overview*, provides a summary of the findings of this study.

- Chapter III, *Banking and Finance Applications Trends*, discusses the key applications that will undergo conversion or re-implementation by banking and finance firms over the next three years. It addresses such issues as:

  - Target platforms and platform combinations
  - Near-term investment levels in applications development
  - Project management and control strategy
  - Analysis of the applications by application category

- Chapter IV, *Client/Server Directions in Banking and Finance*, analyzes the data at a more detailed level with particular emphasis on the role that client/server will play in banking and finance applications over the next two years.

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Executive Overview

Entering 1992 with guarded optimism, the institutions in the banking and finance sector saw all the signs in place for a badly needed economic recovery. While the direction is still positive the rate of recovery has been disappointing. The much wished for "jump start" that would fuel the banking and finance industry into a rapid recovery in 1992 from several years of turmoil has yet to materialize. The industry remains plagued by issues that clearly influence its business and systems priorities. These include:

- An ongoing recession in both commercial and residential real estate
- Excess capacity, both from a lending and a processing point of view
- Declining margins on transaction processing, and a growing threat in this area from nonregulated nonbank financial services firms, particularly in the credit card arena
- The public's perceived (and sometimes warranted) concerns regarding liquidity and ethics
- Competition from major European and Japanese banks for lucrative parts of the U.S. marketplace
- Weak portfolios of third-world debt, and large inventories of junk bonds accumulated during the 1980s.

Yet, despite all of these problems, the industry has experienced a positive recovery over the past two years.

- Major money center banks have seen significant increases in profitability; and the super-regionals emerging from the industry's consolidation are stabilizing in a profitable mode.

- From a "good news/bad news" perspective, low interest rates have stimulated a migration of funds from deposit-oriented institutions to the stock market, giving the brokerage industry a significant boost.

- The savings and loan debacle appears to have crested and, fortunately, has not spread to the world of commercial banking.

Essentially, the industry entered 1993 under tight budget constraints, but much more comfortably than in 1991 or 1992.

All of this change has had its impact on the systems area. To meet pressures to reduce costs, the industry's institutions have reduced their use of independent programmers, attempted to standardize on fewer applications systems, and consolidated data centers and networks.

The consolidation of institutions in the banking sector of the industry has also stimulated major changes in the systems environment. The focus is on combining the transaction volumes of merged or acquired firms into a single systems environment to gain economy of scale, resulting in reduced transaction processing costs.

To deal with crowded markets and increased competition, the industry appears to be investing more heavily in systems that will provide product differentiation through better customer service.

To gain a greater understanding of how the systems environment is changing in the industry, INPUT analyzed data from 63 financial institutions on 212 applications that are scheduled for implementation, modification or conversion over the next two to three years. Respondents to the survey consisted of user managers, divisional or user IS executives, and managers and executives from corporate IS functions.

A

Expenditure Plans and Key Issues

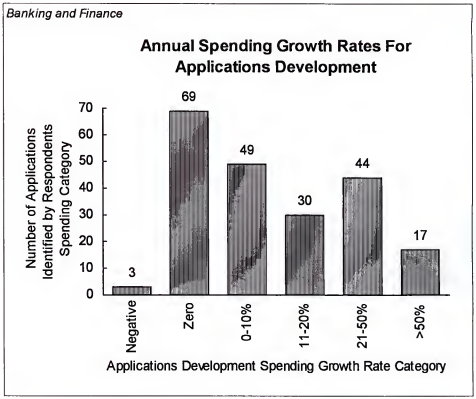
1. Expenditure Plans

Spending rates for both applications improvements and IS overall appear to be much higher than comparable rates at the beginning of the decade. The respondents to this survey planned to increase their spending over the next two years as follows:

- Total IS spending will grow at an annual rate of 12.4% per year.
- Applications development spending will grow at a rate of 13.3% per year.

Exhibit II-1 shows the distribution of annual spending growth rates for applications improvements by growth rate category.

EXHIBIT II-1



Units that reported growth rates for applications expenditures in excess of 20% contributed 61 applications out of the 212. Based on a more detailed examination of this group of applications, INPUT concludes:

- The highest spending rates will occur in the middle-sized to large institutions.

- The areas targeted for maximum growth in spending include major infrastructure projects, both banking (such as branch automation and customer information file) and general infrastructure (such as network consolidation). Marketing, human resources (HR) and integrated financial systems are also candidates for significant investment over the next two years.

The infrastructure investments will position these institutions for new or re-engineered banking applications later in the decade.

2. Key Issues

The survey identified responsiveness as the leading issue facing the industry's systems environment. The ability to react quickly to rapidly changing systems requirements is clearly a problem.

This issue is closely related to those ranked second and third on the list, systems upgrades to handle new functional or increased capacity requirements, and network/systems integration to provide access to data for marketing, customer service and other analytical purposes.

The ability to address these issues in the short term is inhibited by several roadblocks which cannot be easily overcome.

- The big institutions are saddled with a large number of legacy systems architected in the 1980s for mainframe environments. Even if resources for re-engineering these applications were readily available, C/S and distributed relational data base technologies are just not up to the task of dealing with the kinds of transaction volumes that large institutions encounter.

- Priorities for the IS organization have been, and will continue to be, the consolidation of transactions from merged and acquired institutions into existing systems to obtain immediate economy of scale.

However, with 60% of the planned infrastructure applications targeted for C/S environments, the groundwork is being put in place to address the key issues.

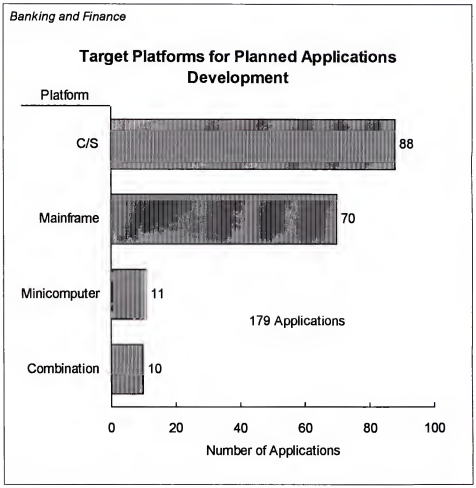
B

Applications Trends in Banking and Finance

1. The Movement to Client/Server

Exhibit II-2 shows the target platforms for the 179 applications in the sample for which platform information was available.

EXHIBIT II-2



In the banking and finance industry, applications are headed to C/S or the mainframe. Unlike other industries, only 6% of the sample is targeted for some combination of platforms and only 6% are considering minicomputers as a standalone alternative. However, there are some significant variations based on institution size.

- For medium-sized institutions, the C/S target runs at 70%, dropping to 36% for very large firms.

- Conversely, large and very large firms will continue to place a heavy emphasis on mainframes, with 56% of the total applications for these two categories using mainframe architectures.

- Small firms report substantial use of C/S, and are the only industry size segment that plans on a significant reliance on minicomputers for both in-house development and turnkey systems.

Overall, 53% of the identified applications will use C/S as some component of the target platform. But many of the applications where C/S is the primary architecture will fall outside the realm of traditional banking and finance transaction processing applications where the requirements for handling high volumes at high speed with faultless integrity are beyond the capabilities of most of today's C/S technology.

2. Project Management and Implementation Strategy

The survey also provided insight into the management of applications development. The direction is clearly toward the user in terms of project management.

- Excluding the 26 applications that will be managed by systems integrators, 172 of the applications in the sample had detailed information on project management strategy. Just over 40% of these projects will be managed by user line or staff executives. This is approximately double the percentage in the manufacturing industry sectors.

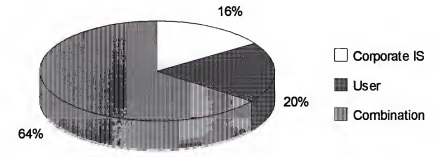
- Another 40% will be managed by corporate IS, and the remaining 20% will be managed by IS organizations reporting directly to end-user management.

Despite the heavy emphasis on user project management in these implementations, it appears that corporate IS will carry the majority of the burden of actual implementation. Exhibit II-3 shows the proportion of projects that will be staffed by corporate IS alone, user organizations alone, or some combination of the two.

EXHIBIT II-3

Banking and Finance

Internal Application Project Staffing



Proportion of Responses (186 Projects)

The proportion of systems that will be totally implemented without the resources from corporate IS (20%) is significantly lower than for other industry sectors.

To some degree, the difference between the heavy emphasis on user involvement in management of these efforts and continued reliance on corporate IS as a primary source of implementation resources seems counter-intuitive. An explanation lies in how the systems management process has evolved in the banking and finance industry.

- Centralized IS has played a dominant organizational role in the industry since the 1960s. Through corporate IS, the industry has made heavy investments in examining and exploiting new technologies, developing project management and implementation methodologies, and maintaining an expert technical staff. In some institutions IS is viewed as the manufacturing arm of the organization, not as staff support.

- The industry's line and staff executives have long recognized the importance of information systems in achieving operational success. They remain a lot more interested in what gets accomplished than how. The heavy integration of these systems into daily operations means a significant organizational impact from new systems implementation, providing heavy incentive for participation in the overall implementation process.

The result has been a partnership (not totally without some conflicts along the way) that appears to remain relatively stable. The continued reliance on corporate IS is further reinforced by today's demands for systems requiring cross-departmental integration, such as customer information file applications and platform automation projects.

Even the emergence of C/S as a viable strategy for some subset of the industry's applications does not appear to be facilitating a mass migration of technical resources into the operating units of banking and finance institutions.

C
Key Client/Server Applications in Banking and Finance

A recent article in *American Banker* states that only 4% of the industry's "on-line" production software runs on distributed computing environments. However, it goes on to say that in three years bankers expect to run 12% of their business-specific production software on distributed networks, and boost the proportion of production software running on PCs from 6% to 13%.

INPUT's findings regarding the trend toward the use of C/S architecture support these statements, and indicate an even more optimistic penetration rate for C/S technology.

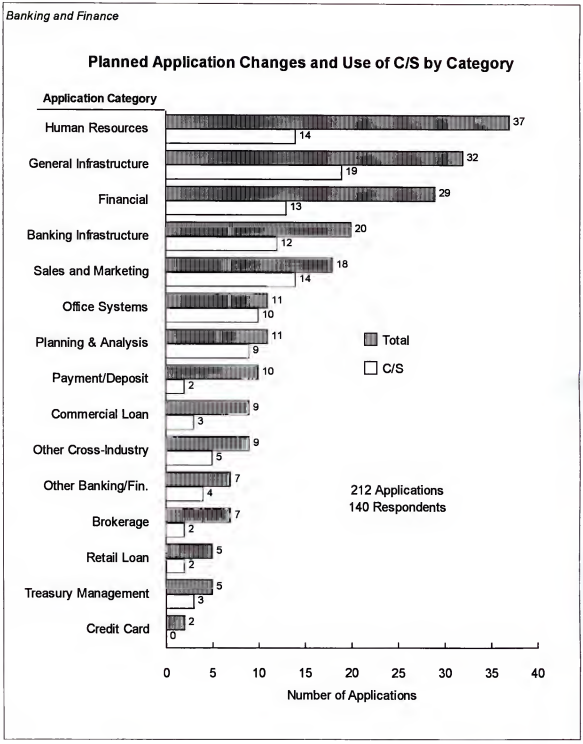
1. Client/Server Penetration by Application Category

Though not as pervasive in banking as in the manufacturing sectors, C/S architecture is targeted for greater than 50% of the applications in 8 out of the fifteen applications categories identified in this study.

Exhibit II-4 shows the distribution of applications in the sample by category, and the number of applications in each category that will be implemented using a client/server architecture.

EXHIBIT II-4

Banking and Finance



- As mentioned earlier, 53% of the 212 planned implementations are targeted for C/S architectures. This is particularly significant in light of the fact that only 24% of the institutions surveyed indicated C/S as a primary strategy for corporate systems.

- Banking and general infrastructure projects represent 25% of the sample, and forecast 60% utilization of C/S. These applications will create the technology platform environments for business applications in the three-to-five year time range, accelerating the C/S penetration rate.

- Higher C/S use rates are forecasted for cross-industry applications categories such as sales and marketing and planning and analysis, than for core banking and finance applications. Depending on how applications are categorized, 38-43% of the core banking applications will use C/S technology, as compared to 53-60% for the cross-industry category. As discussed earlier, this difference is primarily the result of the inability of C/S technology to live up to the volume and integrity requirements that the industry's core transaction processing systems demand.

- Institution size will also play a role in the deployment of C/S. An analysis of C/S use over four size categories indicates that the very large institutions will use C/S in only 36% of their planned applications, while medium- to large-sized firms will run at approximately 60%, and smaller firms at just about 50%.

  - Significant investment in legacy systems, coupled with the transaction volume issue discussed earlier, is clearly an inhibiting factor for the largest institutions. In addition, many of the cross-industry applications in HR and other areas that would be amenable to C/S implementation in more decentralized or smaller firms push the limits of existing C/S technology for the super banks and brokerage houses.

  - Smaller institutions, running about 10% lower in the use of C/S than medium to large firms, are investing more heavily in turnkey systems for many of their applications, and tend to have smaller budgets for experimentation with newer technologies.

2. Leading Targets for C/S Implementation

Excluding office systems and planning and analysis applications, traditional strongholds for the use of C/S, the application categories with the highest C/S implementation rates are clearly sales and marketing (78%), banking and general infrastructure projects (60%), treasury (60%), and the less transaction-intensive banking and finance applications categorized as "other banking and finance" (57%).

Specific applications that rank high on the list include:

- Sales and marketing management
- Branch automation
- Customer information file
- Banking management information systems
- Accounts payable/receivable

D
Conclusions

- Although current penetration levels for C/S technology are lower than those in many other industry sectors, planned implementations for the next two to three years indicate a strong movement to C/S architecture.
  - C/S technology limitations and installed legacy systems are likely to inhibit the heavy use of the technology in the industry's core transaction processing applications for a few more years.
  - Applications not constrained by technology limitations are moving rapidly toward C/S and will continue to do so.
- The industry does not seem to be moving away from its more traditional methods of managing and implementing projects. Corporate IS still plays a critical role in technology strategy and project implementation, and is likely to remain a key player in partnership with end-user executive management, frequently as overall project manager.

- The use of C/S varies somewhat as a function of institution size. In particular, the larger institutions are more constrained than other institutions in the movement to C/S due to technology limitations and legacy systems. Smaller institutions are constrained by lower budgets and a growing movement to buy off-the-shelf turnkey solutions for traditional processing packages.

The industry is on the cusp of a full-fledged movement to C/S technology. All the indicators are present. Despite the turmoil in the industry, rates of investment in systems appear to be quite high. As the current limitations of the technology are overcome, and appropriate infrastructure is put in place, the use of C/S will grow significantly.

Banking and Finance Applications Trends

This chapter presents a detailed analysis of the applications data base. The chapter is organized as follows:

- Section A analyzes the general trends identified in the survey.
- Section B presents the breakdown of applications by class, target platform and the types of resources that will be used to manage and accomplish the implementation.

A
General Trends in Banking and Finance IS

The survey examined a number of key trends with regard to the evolution of old and the development of new applications over the next two years. It included examinations of:

- Anticipated changes in hardware and software platforms
- Expectation levels for total IS and applications spending
- Anticipated changes in the IS organization
- Major IS issues

1. Anticipated Changes in the Systems Environment

Respondents provided information on specific changes in their systems environment over the next two years. Responses fell into three categories:

- **Upgrades** - Forty-three percent (43%) of the respondents anticipate that upgrading existing systems will be the path for application migration rather than the implementation of major platform change. This response is consistent with those obtained from the process and discrete manufacturing surveys, but could be somewhat misleading.

  When the sample is analyzed on the basis of institution size, it becomes evident that the very large institutions (above $5 billion in sales) are planning fewer major platform changes. In fact, 62% anticipate that upgrading existing systems will be the dominant migration route for their firms over the next two to three years. Only 28% of the institutions under $5 billion considered upgrading existing systems the dominant strategy.

  A number of factors may explain this difference in approach.

  - The significantly higher transaction volumes that very large institutions experience in operating applications

  - The very large institutions' significant investments in major applications such as CIF (Customer Information File), creating a reluctance to invest in re-engineering these applications to newer technologies in an era of declining margins

- **Increased/Decreased Standardization** - Movement toward increasing standardization in platforms and operating environments was predicted by 30% of the respondents, and none anticipated any decrease in standards. This percentage is literally double the comparable figure for process manufacturing, and reflective of the tradition of systems management in financial institutions where:

  - Strong centralized management of IS has a history of promulgating and enforcing standards.

- A target of 100% integrity for accuracy on individual transactions demands tighter standards and controls.

- **Migration to C/S** - The results of the survey indicate that institutions in the banking and finance sector are less enthusiastic than firms in several other industries when it comes to adopting a broad-based C/S migration strategy. Of the total survey population, only 24% indicated that migration to C/S would be a primary strategy for upgrading the existing systems environment. However, for some application categories, C/S is a very dominant theme.

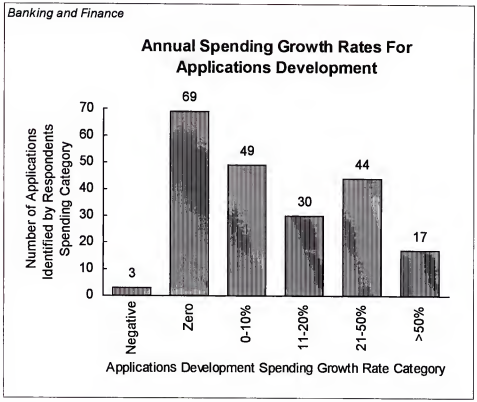
In general, migration strategies vary significantly across this sector. Clearly, the sector as a whole is moving toward an IS strategy that embraces C/S. But depending on the size of the institution and the category of application, the level of aggressiveness varies significantly.

2. Expectation Levels for IS Spending and Application Improvements

One of the most significant findings of the banking and finance survey is the high level of growth anticipated for IS spending over the next two years. Respondents were asked what annual rate of change they anticipated in expenditures for both total IS and applications improvements over the next two years. Only three respondents indicated a negative annual percentage for both categories.

Exhibit III-1 shows the distribution of annual spending growth rates for applications improvements by growth rate category.

EXHIBIT III-1



- On the average, respondents estimated that increases in spending on applications development and upgrades to existing applications suites would be 13.3% per year.

- Their estimates for increases for total IS spending, *including* applications development and maintenance, averaged 12.4%.

These numbers are approximately 1.5 times those for the manufacturing sector and represent a significant change from spending levels at the start of the decade.

Units that reported annual growth rates for applications expenditures in excess of 20% contributed 61 applications to the total of 212 in the sample. A closer examination of this set of applications indicates:

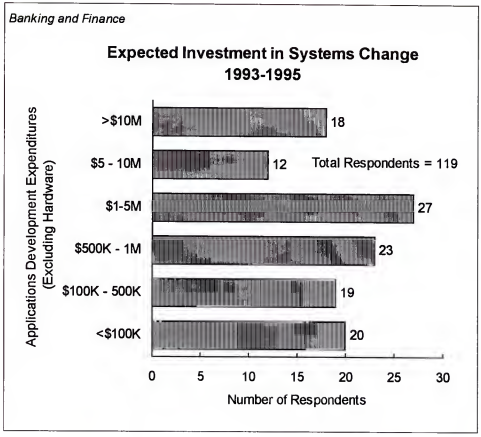
- The very large institutions have only 16 % of their applications coming from units that anticipate growth in expenditure rates in excess of 20%. The rest of the applications coming from units with greater than 20% growth are just about equally split between large, medium and small institutions.

- The dominant application classes for units reporting 20% or greater growth rates in annual spending are infrastructure, human resources, and sales and marketing systems. Branch automation, customer information files, credit card, account reconciliation, payroll, sales force automation and integrated financial systems are the key applications for units that reported above 50% annual growth rates.

One hundred nineteen of the survey respondents agreed to provide estimates of the absolute dollar investments that their organizations would make in systems implementations over the next two years. All expenditures--both in-house and for products and services purchased outside (excluding hardware)--were estimated.

Exhibit III-2 shows the distribution of expenditures.

EXHIBIT III-2



Considering that respondents were speaking about systems investments for their individual departments or operating units (not about total institutional investment in IS) it is significant that over 25% of the respondents expect to be spending more than $5 million in improvements over the next two years.

Further analysis of the group of departments and divisions that anticipate expenditures of $5 million and above over the next two years indicates:

- The institutions making the biggest expenditures are not necessarily the largest institutions. While companies like Bank of America, Mellon and Fidelity appear as part of the group, these large firms don't dominate it. The list is also populated by institutions such as Pittsburgh National Bank, Franklin Savings, and Dauphin Deposit Bank. In short, there is little correlation between an institution's size and the anticipated spending levels identified in the survey.

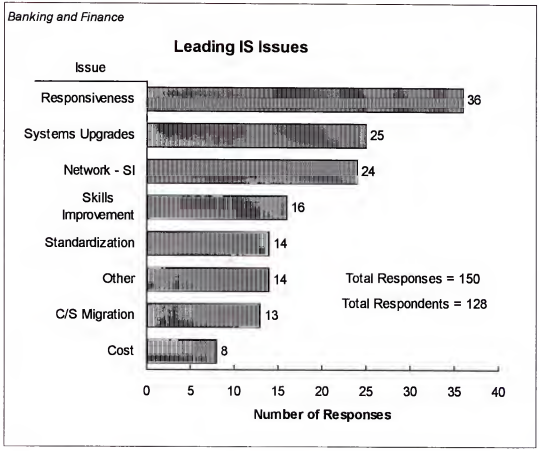
- Likewise, there is no common theme regarding which departments or divisions are forecasting large expenditures for systems improvements. Information systems, finance, human resources, commercial loan, retail banking, marketing, and purchasing all appear on the list. But none of them dominate it.

Even though analysis of the data did not identify leading indicators of high spending levels, it is clear that a large number of institutions are planning to make significant investments in systems improvements over the next two years. Likewise, the rate of growth in spending is on the rise, at least for the immediate future.

3. Major Information Systems Issues

As shown in Exhibit III-3, the most frequently mentioned IS issue was the need to make IS more responsive.

EXHIBIT III-3



A brief explanation of each category follows.

- **Responsiveness** - The ability of the systems environment to respond to changing application needs and user management information requirements
- **Systems Upgrades** - The need to upgrade existing systems to handle new requirements or increased capacity
- **Network/Systems Integration** - Network integration itself or the integration of applications across a distributed network
- **Skills Improvement** - "Re-tooling" in-house staff to deal with changing skill requirements brought on by new technology

- **Standardization** - Improved connectivity, the portability of applications across multiple platforms and the adoption of common standards for workstation/PC and network interfaces

- **C/S Migration** - Planning for, implementing or downsizing to C/S technology

- **Cost** - Downsizing or distribution of existing staff or general budget reductions involving systems expenditures

- **Other** - Miscellaneous other responses

Of the fourteen responses included in the "Other" category, two reflected security concerns, three dealt with organizational issues, and the remainder were associated with the implementation of specific applications.

In general, responses focused more on the applications aspects of systems than on technology.

- That 70% of the issues related to responsiveness and systems upgrades infers a strong need to enhance or re-engineer systems in a manner that would improve flexibility and adaptability to changing business requirements.

- The dominant theme for issues in the network/systems integration category was the need to integrate applications for purposes of providing better overall management or customer-related information.

- Client/server and network/applications integration technical issues account for just about 25% of the total. This is 25% lower than the comparable statistic for discrete manufacturing.

This focus on the applications aspects of systems issues is probably the result of two factors.

- The sample was dominated by user executives (78%) whose perspective is generally on the applications.

- Managers in the banking and finance sector have deployed technology as an integrated part of their business strategy for many years; as a result, they have a more balanced perspective as to its potential and limitations than do executives in some other sectors.

Management in the banking and finance sector remains intensely interested in, and dependent on, a continuous improvement in applications functionality and flexibility as a critical component of business strategy.

- Based on the data presented in Section 2, the industry is willing to make the expenditures necessary to achieve the objective.
- The focus is on rapid turnaround on new systems and systems improvements, not on the technology that will be deployed in getting there.

B
Banking and Finance Applications Trends

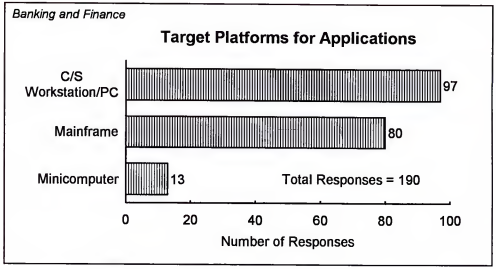
For each application identified as critical in the next two years, respondents were asked to provide information on:

- Target platforms
- Project leadership strategy
- Project staffing
- The use of software packages
- EDI utilization
- Outsourcing
- C/S and/or downsizing strategy

1. Target Platforms

Detailed platform data was obtained for 179 of the 212 applications. Approximately 50% of the applications developed over the next two to three years will employ a workstation/PC-based platform component, as shown in Exhibit III-4.

EXHIBIT III-4



A crosstabulation showing the number of mentions of each type of platform by size category is contained in Exhibit III-5.

EXHIBIT III-5

Use of Platforms by Institution Size
Banking and Finance

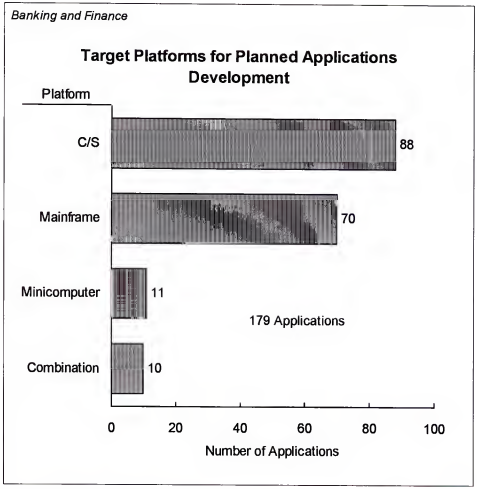
	Institution Size				
Platform	Very Large	Large	Medium	Small	Total
C/S-Workstation/PC	7	20	31	39	97
Mainframe	13	20	12	35	80
Minicomputer	1	2	1	9	13
Total	21	42	44	83	190

- Very large financial institutions are moving in the direction of C/S, but legacy systems and the current limitations of C/S technology in handling high volumes of transactions will limit many large-scale applications to mainframe environments.

- The best targets for C/S technology in the immediate future will be medium-sized institutions. These firms are taking an aggressive approach, with 70% of their applications headed in that direction.

The data shown in Exhibit III-6 clearly indicate that in banking and finance the applications being developed over the next two to three years will most probably be targeted for client/server or mainframe architectures. This is significantly different from the manufacturing industry sectors, where many more combinations of platforms involving minicomputers will be used.

EXHIBIT III-6



Furthermore, the largest proportion of applications targeted for C/S technology will be cross-industry applications, rather than applications unique to supporting banking and finance business functions.

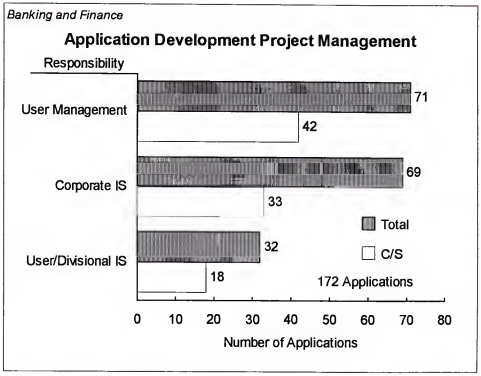
- For the 88 applications targeted for C/S platforms alone, 23% come from the banking set and 77% from the cross-industry set.
- For the 70 applications targeted for mainframe platforms alone, 39% come from the banking set and 61% from the cross-industry set.

Thus, transaction processing requirements and investments in legacy systems seem to be having some inhibiting effect on the adoption of C/S architecture for the industry's core applications.

2. Project Leadership Strategy

User management is playing an increasingly important role in project management for applications development in the banking and finance sector, as demonstrated by Exhibit III-7.

EXHIBIT III-7



Over 40% of the projects will be implemented with user line or staff management assuming direct project management responsibility. This is approximately double the average number for the manufacturing industry sectors. Including the 32 projects that will be managed by user or divisional IS functions, the total percentage that will be implemented outside of the corporate IS function jumps to approximately 60%. Nevertheless, corporate IS will continue to play a strong role in applications development in the banking and finance sector, managing just about 40% of all applications development.

These results are not surprising.

- Operating executives in the banking and finance industry have long recognized their dependence on effective systems as both a product differentiator and the key to managing service cost.

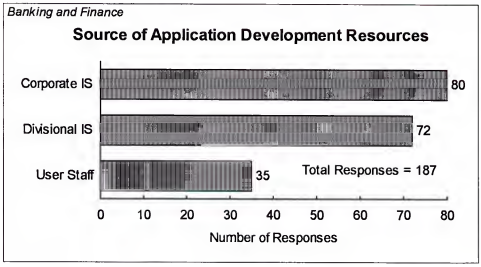
- IS has long held a powerful position within the industry's firms, and facility with information systems technology is viewed as a core competency in most financial institutions. Virtually all infrastructure projects identified in this study, along with the major transaction processing applications, will be managed by IS over the next two to three years.

Size of institution is not a differentiating factor for project management strategy. User management continues to take a very "hands-on" approach to systems management in this industry, whether the institution is large or small.

3. Sources of Development Resources

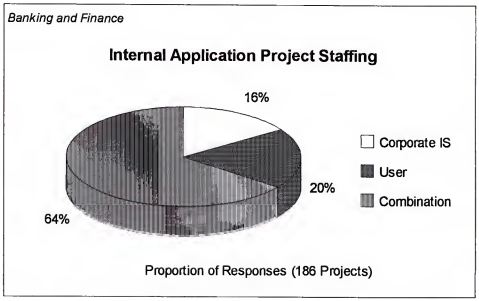
Respondent firms will utilize a wide variety of resources to staff the planned implementations. However, when it comes to the actual development process, corporate IS is still the leading provider of resources, as shown in Exhibit III-8.

EXHIBIT III-8



Only a small proportion of the projects will be implemented using only user staff. As shown in Exhibit III-9, only 20% of the 187 implementations will be both managed and implemented totally within user organizations. This is low compared to the 30% to 50% experienced in discrete and process manufacturing; and again it reflects the strong position that the IS function plays in the industry.

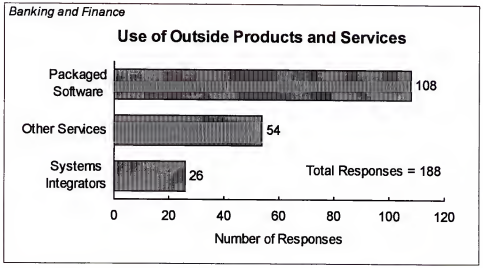
EXHIBIT III-9



4. Use of Software Products and External Resources

As shown in Exhibit III-10, over 50% of the implementations planned for the next two years will make use of licensed or purchased software packages.

EXHIBIT III-10



There appear to be some variations in the use of third-party products and services based on the size of the institution, as indicated in Exhibit III-11.

a. Packaged Software

- The larger the institution, the higher the inclination to use third-party software. Sixty-five percent of the applications planned by firms that fall into the very large category anticipate the use of outside packages.

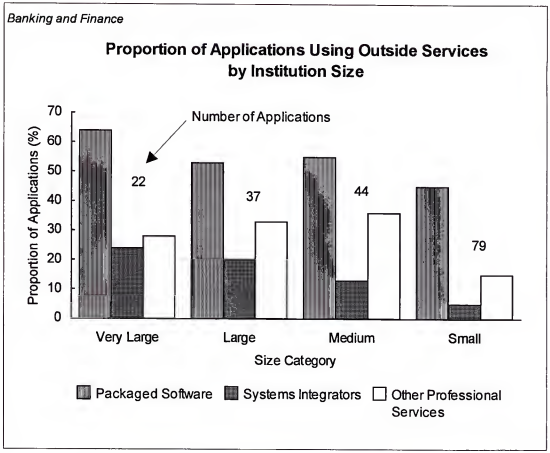
- Only 45% of the applications planned by small institutions are targeted to use third-party software. Medium-sized to large firms tend to fall in the range of 55%.

To some degree these results seem counter-intuitive. One would anticipate that the smaller firms would be the heaviest users of "off-the-shelf" solutions. Further analysis shows that:

- The very large firms are doing more implementations of cross-industy applications than are other groups, and make heavier use of third-party software in the process.

- From an applications perspective, more packaged software is available for the traditional mainframe environment, which still dominates the largest institutions.

EXHIBIT III-11



b. Systems Integration Services

As shown in Exhibit III-11, the very large and large institutions are the biggest users of systems integrators. Institutions in these two categories indicate that they use SI firms in over 22% of their planned implementations. Firms in the medium and small categories forecast a lower utilization of integrators, 13% and 5% of their implementations, respectively.

c. Other Professional Services

In general, the use of traditional professional services isn't anticipated to vary significantly on the basis of size or class of application. With the exception of the smallest firms, which anticipate using supplementary professional services in 15% of their implementations, all other categories forecast that between 28% and 36% of the implementations will use traditional professional services.

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Client/Server Directions in Banking and Finance

The preceding chapter addressed trends with regard to banking and finance applications development. This chapter addresses the types of applications that will be implemented over the next two years, and the role that client/server architecture will play in the implementations. The chapter is organized as follows:

- Section A provides an analysis of the role that client/server is playing for each of the major classifications of applications.
- Section B analyzes the impact of institution size and spending levels on the use of C/S technology.
- Section C identifies the leading client/server applications for the banking and finance industry group.

A
Client/Server Applications Analysis

1. Sample Summary

Exhibit IV-1 shows responses to key survey questions by application category.

EXHIBIT IV-1

Banking and Finance
Implementation Plans by Application Category

		Strategy		Platform			Resources							
Application Category	Number of Applications	C/S - Client/Server	Downsizing	Workstation/PC	Minicomputer	Mainframe	Corporate IS	Divisional IS	User Staff	Systems Integrators	Oth. Outside Svcs.	Packaged Software	Utilizing EDI	Outsourced
Human Resources	37	14	7	12	2	17	10	8	5	4	6	13	4	1
General Infrastructure	32	19	4	19	1	6	16	14	6	4	16	16	10	0
Financial	29	13	8	6	3	18	13	8	4	1	1	17	12	3
Banking Infrastructure	20	12	5	9	1	7	10	8	6	5	5	14	10	2
Sales and Marketing	18	14	5	13	1	5	3	1	1	2	4	10	8	2
Office Systems	11	10	0	10	1	1	5	4	4	2	2	8	6	1
Planning & Analysis	11	9	1	9	0	0	3	1	0	0	1	6	5	1
Payment/Deposit	10	2	1	1	0	8	7	8	2	1	3	5	6	0
Commercial Loan	9	3	2	3	0	6	3	3	2	1	3	4	3	1
Other Cross Industry	9	5	0	5	0	2	4	5	1	3	4	3	6	0
Other Banking/Fin.	7	4	1	4	0	2	3	2	3	0	1	3	3	0
Brokerage	7	2	1	2	3	1	0	4	0	2	3	4	4	0
Retail Loan	5	2	1	2	0	3	1	2	1	1	2	2	1	1
Treasury Management	5	3	1	2	1	3	1	3	0	0	2	2	3	1
Credit Card	2	0	0	0	0	1	1	1	0	0	1	1	0	1
	212	112	37	97	13	80	80	72	35	26	54	108	81	14

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 client/server 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 utilize EDI or be outsourced. The last two columns give a tabulation of those responses.

2. Observations on the Sample Mix

The large number of applications cited for both the human resources (HR) and financial functions seems out of proportion compared to the number of core banking and finance applications. This is partly, but not entirely, due to some bias in the sample, as 34% of the sample's applications come from respondents in the finance or HR functions.

On the other hand, an examination of respondents' reasons for undertaking specific applications indicates that there is significant activity taking place in these two functions.

- The high rate of acquisitions and mergers, particularly in the banking sector, is creating a demand for more sophisticated financial systems in many institutions.

- Changes in federal and other regulatory reporting requirements are outstripping the capabilities of existing systems.

- The most significant motivator for consolidation in the industry is economy of scale resulting in reduced cost per transaction. In the banking and finance sector this rapidly translates itself into staff reductions. The impact in HR is a demand for better information on employment mix, skill sets and analysis tools. This demand is increased by the need to deal with regulatory requirements in multiple states, a new phenomenon for many banks. The result is that institutions are being forced to invest more heavily in HR systems than previously.

Furthermore, a number of applications managed by corporate finance, and considered staff support in other industry sectors, are considered operational systems in banking and finance. These include asset and portfolio management, cash management and other treasury activities. Depending on the particular institution, these might show up as separate departments in the sample or be included in corporate finance. In this sample, of the 39 applications reported by respondents from corporate finance organizations, 16 or 41% are properly categorized as part of banking operations.

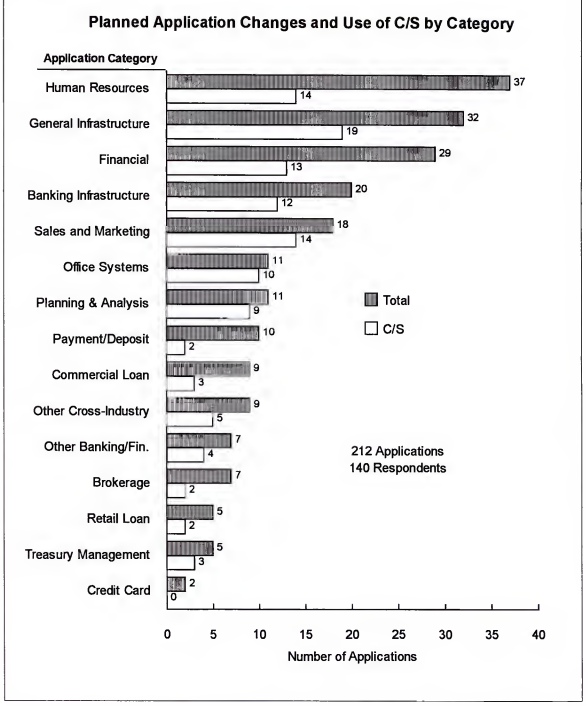
In summary, the sample does contain a slightly disproportionate number of respondents from finance and HR departments. However, the current industry environment is forcing new information requirements on these organizations, resulting in an usually high level of systems activity over the next two to three years.

3. Client/Server Applications by Category

Exhibit IV-2 shows planned application changes by category compared to those that will use C/S architectures.

EXHIBIT IV-2

Banking and Finance



- Fifty-three percent (53%) of the 212 implementations identified in the survey are targeted for some type of C/S architecture. This is particularly significant in light of the fact that only 24% of the institutions in the sample indicated C/S as a primary strategy for new systems. An explanation lies in the fact that it is not clear that current C/S technology can deal with either the transaction volumes or security and integrity requirements of many core banking applications. Consequently, C/S cannot be adopted as an overall technology strategy. Nevertheless, there is obviously a high level of interest in using C/S technology wherever it is applicable.

- The fact that 60% of the 52 banking and general infrastructure efforts are targeted for C/S architecture is an indication that the industry anticipates that C/S technology will have the capability to deal with the volume and integrity requirements of future applications.

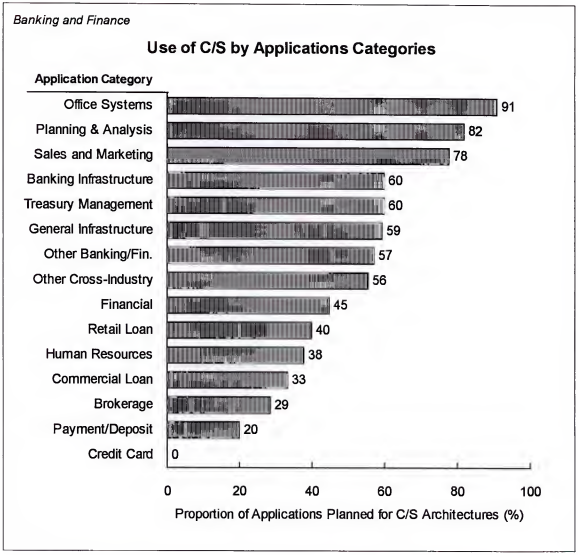
- The sales and marketing application category represents only about 8.5% of the sample, but is clearly the area where C/S has taken a foothold as the dominant architecture. This is largely due to two factors:

  - C/S technology provides an ideal environment for applications that require the flexible data manipulation and graphical presentation of marketing applications.

  - The industy's recent heavy investment in integrated customer information files provides the kind of data base content and structure to support meaningful sales and marketing systems.

Greater insight into the key areas for application of C/S technology can be obtained by analyzing Exhibit IV-3, which ranks the application categories by their proportionate use of C/S technology.

EXHIBIT IV-3



The office systems and planning and analysis categories are established strongholds for the utilization of C/S technology in all industry categories. The sales and marketing and banking infrastructure areas have already been discussed.

If we exclude the human resource applications along with the other cross-industry category, the remaining categories are dominated by the industry's core transaction processing systems.

A tabulation of these categories sorted by number of applications is presented in Exhibit IV-4.

EXHIBIT IV-4

C/S Use in Core Banking and Finance Applications Categories

Category	No. Of Apps.	No. Of C/S	% C/S
Financial	29	13	45
Payment/Deposit	10	2	20
Commerical Loan	9	3	33
Other Banking and Finance	7	4	57
Brokerage	7	2	29
Retail Loan	5	2	40
Credit Card	2	0	0
	69	**26**	**38**

With the exception of "Other Banking and Finance," not one of these categories approaches the average (53% use of C/S) for all applications in the sample. The more transaction intensive the application category, the lower the use of C/S. Conclusions are that:

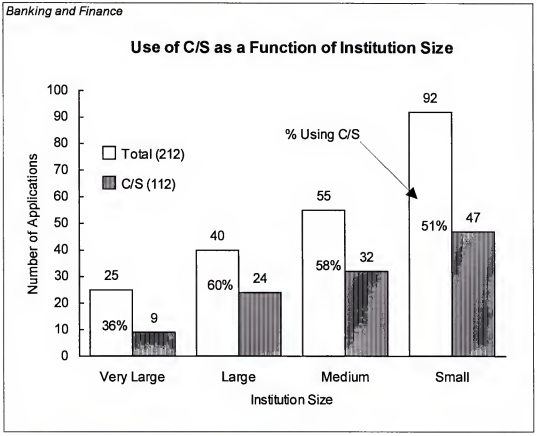
- Until C/S technology can demonstrate superior capabilities in the transaction processing arena from both a volume handling and security perspective, the banking and finance sector will remain with traditional mainframe technology.
- The heavy investment made by banking and finance institutions in rewriting these core transaction processing systems in the 1980s will provide additional inertia to stay with the existing systems.
- Industry applications with lower data volumes, but complex analysis requirements, and most cross-industry applications will move rapidly toward C/S utilizing bridging servers as the gateways between the operational data captured through traditional transaction processing systems and the C/S environment.

B

The Impact of Institution Size

Exhibit IV-5 shows how the total sample and use of C/S compare on the basis of size.

EXHIBIT IV-5



- **Very Large** - For institutions in this category the proportion planning on C/S implementations is significantly less than the sample average of 53%. This is not surprising in light of the fact that the brokerage and banking sectors of the industry in this size category handle the highest transaction volumes; for example, Bank of America processes well over 12 million transactions per day.

- **Large/Medium** - The middle-sized to large institutions seem to be planning the heaviest use of C/S technology.

  Based on a more detailed examination of the specific applications for these two groups, INPUT believes that there are two reasons for this:

  - The systems strategy for dealing with consolidation in these groups is significantly different from that of either the super-regional or major money market institutions. The major money market banks such as Bank of America are using the strategy of migrating all transaction processing for acquired or merged banks into a single system. Smaller regionals are adopting a policy of peaceful co-existence. In other words, they are allowing the transaction processing systems of the banks they acquire to remain on their native systems, and using data consolidation through C/S and other techniques as a method of dealing with the aggregation of information at a corporate level.

  - A significant number of the planned "marketing and sales" and "planning and analysis" applications identified in the survey come from institutions in these two size categories. As pointed out earlier, nearly 80% of all these applications are being implemented on C/S architectures, resulting in a high C/S implementation ratio for firms in these categories.

- **Small** - Smaller institutions represent a significant portion of the sample, and fall just between the medium to large and very large organizations in terms of their anticipated use of C/S technology (47% of new applications). Analyzing the applications being undertaken by these organizations over the next two years indicates that:

  - Most C/S applications will be focused on analysis, marketing support and low transaction volume operational systems.

  - New transaction processing systems will increasingly rely on minicomputer-based turnkey systems. The survey indicates that smaller institutions are the only segment of the industry that anticipates increased use of minicomputer technology.

In the part of the survey addressing target platforms, these smaller institutions had a response rate of 11% for the use of minicomputers compared a maximum response rate of 5% for any other size category.

The data clearly indicates that the size of an institution has an impact on how C/S technology will be used over the next several years.

- The largest institutions will use C/S wherever possible, but are limited by the technology in terms of its application to major transaction processing systems.
- Medium-sized to large firms will have more opportunities to apply the technology (largely as a function of their approach to transaction processing), and appear to be more aggressive in adopting the architecture as a long-term strategy.
- Smaller firms are likely to take advantage of the technology primarily in analysis, sales and marketing, and office situations.

C

Use of C/S in Specific Applications

Exhibit IV-6 shows the number of each type of application in the survey sample and the proportion of each targeted for the use of C/S platforms. Applications are grouped by application category. Appendix A gives specific definitions for each application type.

EXHIBIT IV-6

Detailed Distribution of Applications Planned and Use of C/S Banking and Finance

Application Category	Application Type	Number Apps.	Number C/S	Share C/S (%)
Human Resources	Applicant Tracking	10	5	50
	HR Information Systems	9	4	44
	Payroll	8	3	38
	Benefits Administration	4	2	50
	Management Development	3	0	0
	Position Control	1	0	0
	Requisition Control	1	0	0
	Other	1	0	0
Total		**37**	**14**	**38**
General Infrastructure	Operating System Upgrades	11	7	64
	Hardware Upgrades	5	3	60
	Imaging Systems	5	1	20
	Platform Migration - C/S	4	3	75
	Telephone Switch/Voice Resp.	3	1	33
	Data Base Con. - General	1	1	100
	Data Base Con. - Relational	1	1	100
	Platform Migration - C/S	1	1	100
	Other	1	1	100
Total		**32**	**19**	**59**
Financial	General Ledger	11	2	18
	Accounts Payable/Receivable	8	5	63
	Integrated Financial Systems	5	3	60
	Budgeting	2	1	50
	Cost Accounting	1	0	0
	Other	2	2	100
Total		**29**	**13**	**45**
Banking Infrastructure	MIS/Financial Reporting	11	6	55
	Branch Automation	7	4	57
	Tax/Regulatory/Compliance	1	1	100
	Customer Information File	1	1	100
Total		**20**	**12**	**60**
Sales & Marketing	Marketing Mgt./Support	14	11	79
	Telemarketing	2	1	50
	Sales Analysis	1	1	100
	Other	1	1	100
Total		**18**	**14**	**78**
Office Systems	Desktop Publishing	5	5	100
	Word Processing Systems	4	4	100
	Integrated Office Systems	2	1	50
Total		**11**	**10**	**91**

EXHIBIT IV-6 (CONTINUED)

Detailed Distribution of Applications Planned and Use of C/S Banking and Finance

Application Category	Application Type	Number Apps.	Number C/S	Share C/S (%)
Planning & Analysis	Spreadsheets/Data Bases	8	8	100
	Executive Information System	3	1	33
Total		**11**	**9**	**82**
Payment/Deposit	Deposit Processing	5	0	0
	ATM Systems	3	2	67
	Account Reconciliation	2	0	0
Total		**10**	**2**	**20**
Commercial Loan	Corporate Loans	8	2	25
	Equipment Leasing	1	1	100
Total		**9**	**3**	**33**
Other Cross Industry	Electronic Data Interchange	3	2	67
	Purchasing	3	2	67
	Customer Services	2	1	50
	Bar Coding	1	0	0
Total		**9**	**5**	**56**
Other Banking & Finance	Miscellaneous	7	4	57
Total		**7**	**4**	**57**
Brokerage	Securities	6	2	33
	Commodities	1	0	0
Total		**7**	**2**	29
Retail Loan	Mortgage Loans	3	1	33
	Retail Loan	2	1	50
Total		**5**	**2**	**40**
Treasury Management	Portfolio Management	3	2	67
	Asset Liability Management	2	1	50
Total		**5**	**3**	**60**
Credit Card	Credit Card	2	0	0
Total		**2**	**0**	0
Grand Total		**212**	**112**	**53**

Overall, the best opportunities for C/S beyond office and planning and analysis systems appear to be in sales and marketing, treasury, other cross-industry applications, and banking and general infrastructure. The infrastructure categories are particularly important, not just because they represent a significant number of the projects that will be undertaken over the next two years, but because they will establish the C/S platform environments upon which future applications systems will be built.

Exhibit IV-7 ranks the applications to be developed over the next two years by frequency of mention and shows the corresponding use of C/S.

EXHIBIT IV-7

Ranking of Planned Applications for C/S
Banking and Finance

Application Type	Number Apps.	Number C/S	Share C/S (%)
Sales and Marketing	14	11	79
General Ledger	11	2	18
Operating System Upgrades	11	7	64
Applicant Tracking	10	5	50
MIS/Financial Reporting	10	5	50
HR Information Systems	9	4	44
Accounts Payable/Receivable	8	5	63
Corporate Loans	8	2	25
Payroll	8	3	38
Spreadsheets/Data Bases	8	8	100
Branch Automation	7	4	57
Other Banking and Finance	7	4	57
Securities	6	2	33

Definition of Application Types By Application Category

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

EXHIBIT A-1

Banking and Finance Application Types by Category

Application Category/Type	Description/Examples
Banking Infrastructure	
• Branch Automation	Information systems to support tellers and platform staff. Provide on-line access to customer records and facilitate administrative tasks such as opening accounts, etc.
• Customer Information File	Integrated data from account-oriented processing systems such as checking, mortgage, etc.; to provide an overall picture of a customer's relationship with the institution
• MIS/Financial Reporting	Provide data for internal management to assess institutional performance by customer group, product line, branch, etc.
• Tax/Regulatory Compliance	Systems to support the wide variety of external reporting and control requirements of a financial institution
Brokerage	
• Commodities	Systems to support trading activities for commodities
• Securities	Systems to support trading activities for securities
Commercial Loans	
• Corporate Loans	Applications to track the complex financial and legal aspects typical of large dollar loans to corporations
• Equipment Leasing	Systems to support the finance of goods or equipment where the items financed are used as collateral for the loan
Payment Deposit	
• Account Reconciliation	Applications which provide electronic records of checks paid so firms can reconcile bank statements with their accounts payable records
• ATM Systems	All systems associated with support of automated teller machine operations
• Deposit Processing	Systems to support the physical handling of deposits
Retail Loans	
• Personal Loans	Systems to support the processing of all consumer-oriented loans except mortgage loans
• Mortgage Loans	Applications to support all types of mortgage loan transactions, including variable, rate, initiation, etc.
Trust and Agency	
• Pension Trust	Applications that manage all kinds of pension funds, from individual IRAs and Keoghs to large corporate retirement plans
Treasury Management	
• Asset/Liability Management	Systems to track the maturity and interest rate profiles of all the institution's assets (loans and securities) and liabilities (deposits)
• Portfolio Management	Applications to control the institution's portfolio of investment securities (bonds, T-bills, etc.)

EXHIBIT A-2

Cross-Industry Application Types by Category

Application Category/Type	Description/Examples
Financial	
• Accounts Payable/Receivable	Traditional systems to handle invoicing and payments and manage receivables
• Budgeting	Corporate or divisional applications to facilitate and track the budgeting process and budget management
• Cost Accounting	Systems to analyze the costs of goods and services
• General Ledger	General ledger
• Integrated Financial Systems	Systems that include a complete suite of financial applications such as A/P, A/R, cash management and G/L
• Other Financial Systems	Miscellaneous financial applications
Human Resources	
• Applicant Tracking	Applications that track job applicants and provide management information relevant to status, EEO, etc.
• Benefits Administration	Systems to manage complex or simple benefits plans
• Human Resource Info. Systems	Data base systems to provide information for human resource management
• Management Development	Systems that track employee skill levels, training histories, etc.
• Payroll	Payroll processing
• Position Control	Applications that provide information for controlling job classification, openings in class, etc.
• Requisition Control	MIS applications used for controlling open positions
General Infrastructure	
• Data Base Conversion - General	Migration to a new data base architecture
• Data Base Conversion - Relational/Distributed	Migration to a relational or distributed (or both) architecture
• 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
• Telephone Switching - Voice Response	Projects to install or upgrade telephone switching or telephone voice response systems
Office Systems	
• Desktop Publishing	Installation of workstation/PC software environments, such as spreadsheets, WP, business graphics, Windows, etc.
• Integrated Office Systems	Systems that provide a platform environment for suites of office-related processing activities
• Word Processing Systems	Installation of applications which use word processing

EXHIBIT A-2 (CONTINUED)

Cross-Industry Application Types by Category

Application Category/Type	Description/Examples
Other Cross-Industry	
• Customer Services	Customer inquiry management, hotline, service and support
• Purchasing	Purchase order processing, management, reporting
Planning and Analysis	
• Executive Information Systems	Systems that provide integrated management information directly to management
• Spreadsheets/Data Bases	Applications that utilize desktop spreadsheets and data bases
Sales and Marketing	
• Marketing Mgt./Support	Sales management, market planning, advertising, etc.
• Sales Analysis	Statistical analysis of sales performance and trends
• Telemarketing	Applications to support telemarketing operations

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