

INTEGRATED DEMS - APPLICATION SOFTWARE

INPUT

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INTEGRATED DBMS-APPLICATION SOFTWARE



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INTEGRATED DBMS-APPLICATION SOFTWARE

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INTEGRATED DBMS-APPLICATION SOFTWARE

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I INTRODUCTION

I INTRODUCTION

A. OBJECTIVE AND SCOPE

- INPUT believes that data base management systems (DBMSs) and application software vendors must aggressively integrate their offerings. Vendors that fail to support the trend toward integration of DBMSs and application software face the prospect of significant deterioration of market share.
- INPUT further believes that the quality of this integration must be high. Effective integration must utilize the advanced features available in DBMSs, and the relationship between DBMS vendors and application vendors must be carefully crafted to support multivendor marketing strategies.
- The purpose of this report is to assist application and DBMS vendors in understanding the DBMS-application software marketplace and competitive environment so that vendors may plan for integrating their product offerings.
- Several issues are examined:
 - What is the structure, size, and future potential of the integrated software marketplace?
 - Which applications lend themselves to integration?

- What are the users' priorities for software integration?
- What are the relative contributions of vendors and internal development in implementing integrated applications?
- What are the key decision factors in selecting integrated software vendors?
- How should vendors plan for marketing their software over the next five years?
- What are the characteristics of the leading integrated software vendors, and how do they differ in marketing strategy?
- How do major industries differ in their application priorities, implementation methods, and vendor preferences?

B. DEFINITIONS

- Throughout this report, reference will be made to the following three types of software:
 - Data Base Management Systems (DBMSs).
 - Application Software.
 - Integrated Software.
- The terms are defined as follows:

1. DATA BASE MANAGEMENT SYSTEMS (DBMSs)

- Software systems intended to centralize the creation, control, and maintenance of data files, so that multiple application programs can access the data without having to create duplicate file systems.

2. APPLICATION SOFTWARE

- Software designed to operate as a system for specific applications.

3. INTEGRATED SOFTWARE

- For the purposes of this report, integrated software refers to the combination of DBMSs and application software. It does not encompass integration between multiple applications software and does not include packaging with hardware (which is generally referred to as an "integrated system").
- Application software may be integrated with a DBMS in the following three ways:
 - An application may be developed "in-house" and be deliberately designed to utilize a DBMS.
 - An application purchased from an external vendor may be modified in-house to utilize a DBMS.
 - An application may be purchased from a vendor and be already designed to utilize a DBMS.

C. METHODOLOGY

- The information for this report was obtained from a number of sources.
- INPUT conducted 51 interviews with a random sample of software users. A profile of the interviewees and the user questionnaire are contained in Appendixes B and C.
- Responses were grouped and compared for four major industries: discrete manufacturing, process manufacturing, banking, and insurance.
- Interviews were also conducted with ten users of installed integrated software to compare their responses with those of the 51 users interviewed.
- Vendor activities and plans were ascertained from several sources:
 - In-depth personal interviews with nine vendors (see Vendor Questionnaire in Appendix D).
 - Review of trade publications and vendor literature.
 - Discussions with industry lenders, observers, and INPUT staff members.
- Previous INPUT studies were also reviewed and relevant information extracted. A listing of related INPUT reports is contained in Appendix E.

D. REPORT ORGANIZATION

- The remainder of this report is organized as follows:
 - Chapter II is an Executive Summary formatted as a presentation for group discussion.
 - Chapter III forecasts the integrated software market for the period from 1984 to 1989.
 - Chapter IV analyzes the end user's perspective on integrated software.
 - Chapter V examines vendors' responses to market demands for integrated software.
 - Chapter VI outlines a methodology for developing an integrated software strategy.
 - Chapter VII reviews the major findings, conclusions, and recommendations.
 - The Appendixes contain definitions, interviewee profiles, sample questionnaires, and related INPUT reports.

II EXECUTIVE SUMMARY

II EXECUTIVE SUMMARY

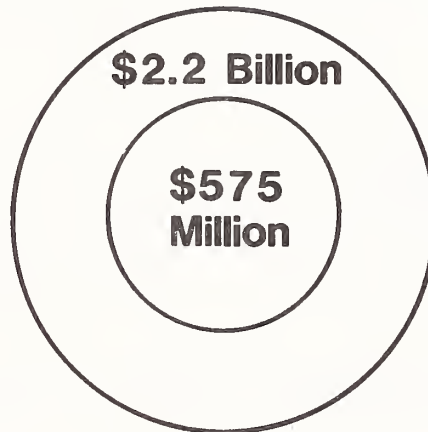
- Note: this executive summary is designed in a presentation format in order to:
 - Help the busy reader quickly review key research findings.
 - Provide a ready-to-go executive presentation, complete with a script, to facilitate group communication.
- The key points of the entire report are summarized in Exhibits II-1 through II-7. On the left-hand page facing each exhibit is a script explaining its contents.

A. MARKET PROJECTIONS: IBM AND PCM MAINFRAME SOFTWARE

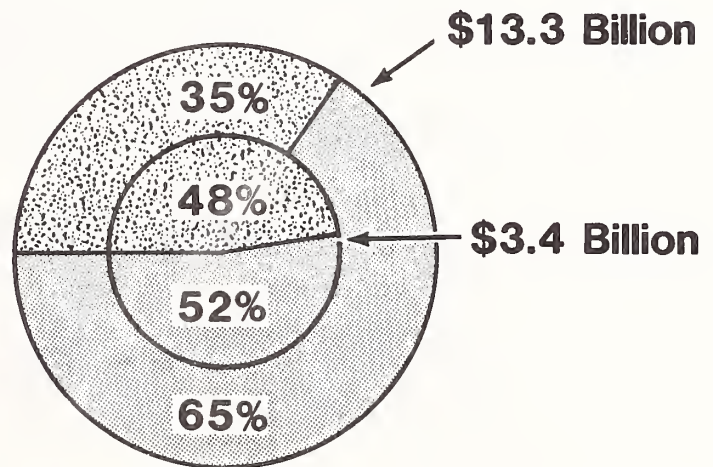
- Expenditures on DBMS software for running on IBM and PCM mainframes will grow at an average annual rate of 30%, increasing from less than \$600 million in 1984 to over \$2 billion in 1989.
- IBM and PCM mainframe application software expenditures will increase from less than \$3.4 billion in 1984 to nearly \$13.3 billion in 1989, with an average annual growth rate exceeding 30%.
- Integrated DBMS-application software expenditures will exhibit the most dramatic growth, increasing 30 times from 1984 to 1989.
- Expenditures for industry-specific integrated software are expected to grow over 50% faster than expenditures for cross-industry applications.
- Reasons for this dramatic growth include:
 - Increasing use of distributed data bases and data dictionaries.
 - Greater reliance on relational data structures.
 - Merging with "office-of-the-future" technology.
 - Greater applications development by end-users.
- The following exhibits highlight several of these applications.

MARKET PROJECTIONS IBM AND PCM MAINFRAME SOFTWARE

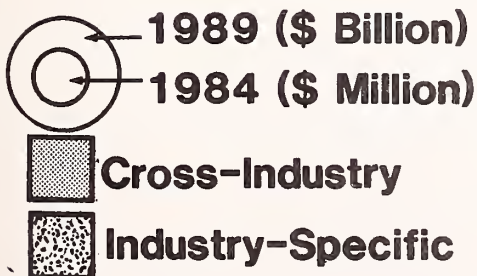
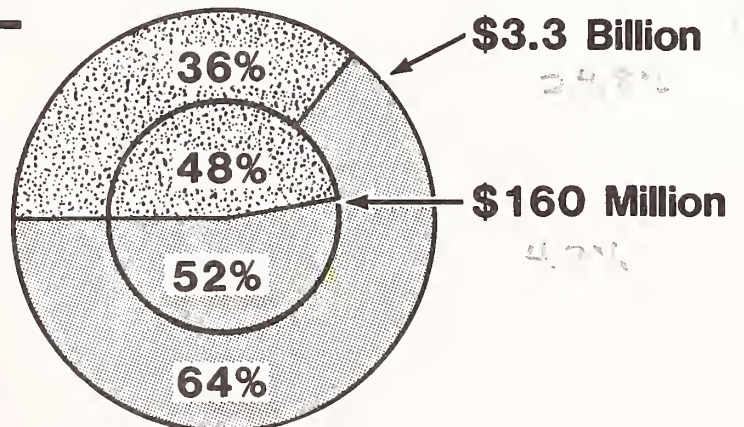
**DBMS
Software
Expenditures**



**Application
Software
(Integrated and
Nonintegrated)
Expenditures**



**Integrated DBMS-
Application
Software**



B. INTEGRATED APPLICATIONS CHARACTERISTICS

- Almost all surveyed users are already using a DBMS.
- Seventy percent report above-average satisfaction with their integrated software; only 5% indicate below-average satisfaction.
- Applications are almost evenly divided between cross-industry and industry-specific.
- The applications most frequently integrated with data base management systems are customer information files and systems in banks and insurance companies.
- The integration of manufacturing and production-oriented applications are the second most frequently reported type of integration.
- Marketing and sales management applications are ranked third.
- The relatively low ranking of financial applications (general ledger, accounts receivable and payable, etc.) is attributed to their typically being the first data processing systems installed and generally having less demanding data base requirements than manufacturing and marketing applications.

INTEGRATED APPLICATIONS CHARACTERISTICS

- **70% Indicate Above-Average Satisfaction**

- **50% Cross-Industry/50% Vertical Market**

- **Most Common Applications:**
 - **Customer Information Files/Systems**

 - **Manufacturing/Production**

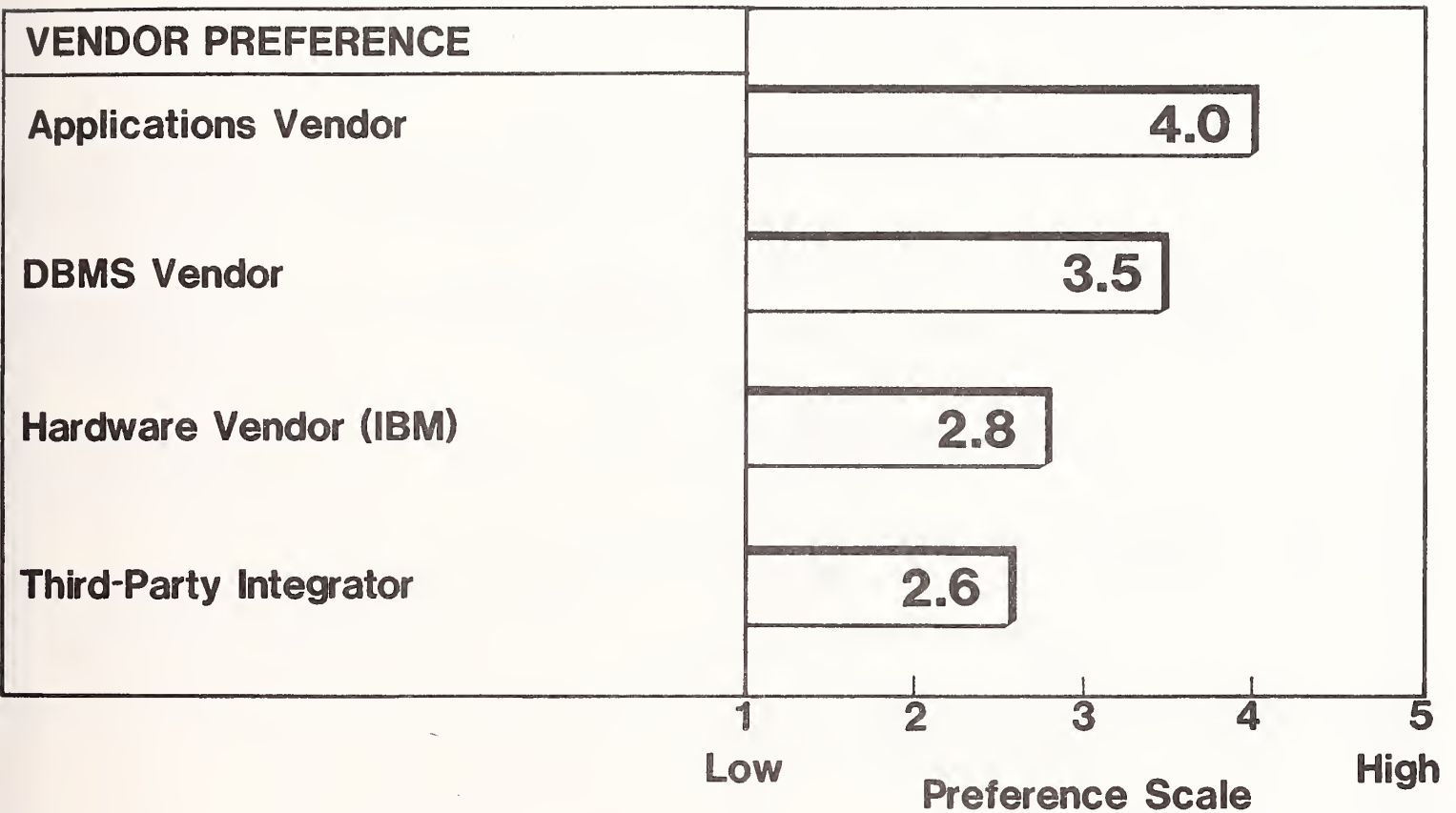
 - **Marketing/Sales**

 - **Finance/Accounting**

C. INTEGRATED APPLICATIONS VENDOR PREFERENCE

- About 71% of surveyed users developed their integrated applications in-house.
 - Discrete manufacturers use vendor packages and then integrate them almost as frequently as they develop integrated applications internally.
 - Banks utilize internal development to a lesser degree.
 - Applications development approaches for process manufacturers and insurance companies closely paralleled that for all users surveyed.
- Users rate applications vendors first in terms of preference for purchasing integrated DBMS-application software.
- DBMS vendors are rated second among all users, except:
 - They are rated top by discrete manufacturers and insurance companies.
 - They are the last choice of banks.
- IBM finishes third, although the banking industry indicates a higher preference level.
- Third-party integrators consistently receive the lowest ratings.

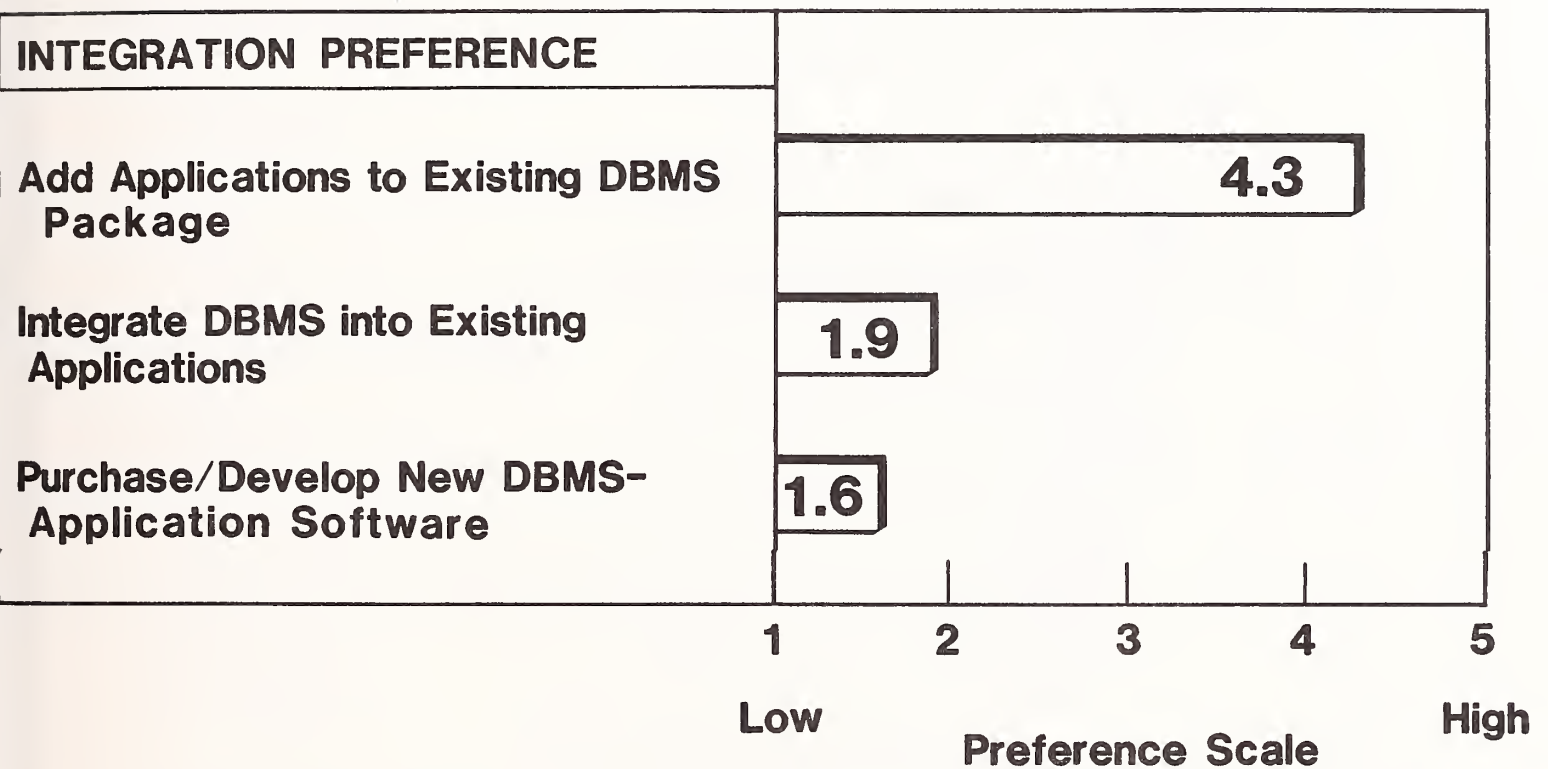
INTEGRATED APPLICATIONS VENDOR PREFERENCE



D. DBMS-APPLICATION SOFTWARE INTEGRATION PREFERENCES

- Respondents decisively prefer achieving integration by adding applications to existing DBMSs. Much less favored are "backward integration" (i.e., DBMSs into applications) or purchasing/developing new integrated software.
- Factors in this preference include:
 - Increased data management and control.
 - Greater data integrating and "comfort level."
 - Common file structures and languages.
 - Reduced financial and technical risk.
- Integration is also perceived as attainable through the use of:
 - Applications development tools.
 - Fourth-generation languages.
 - Report writers.

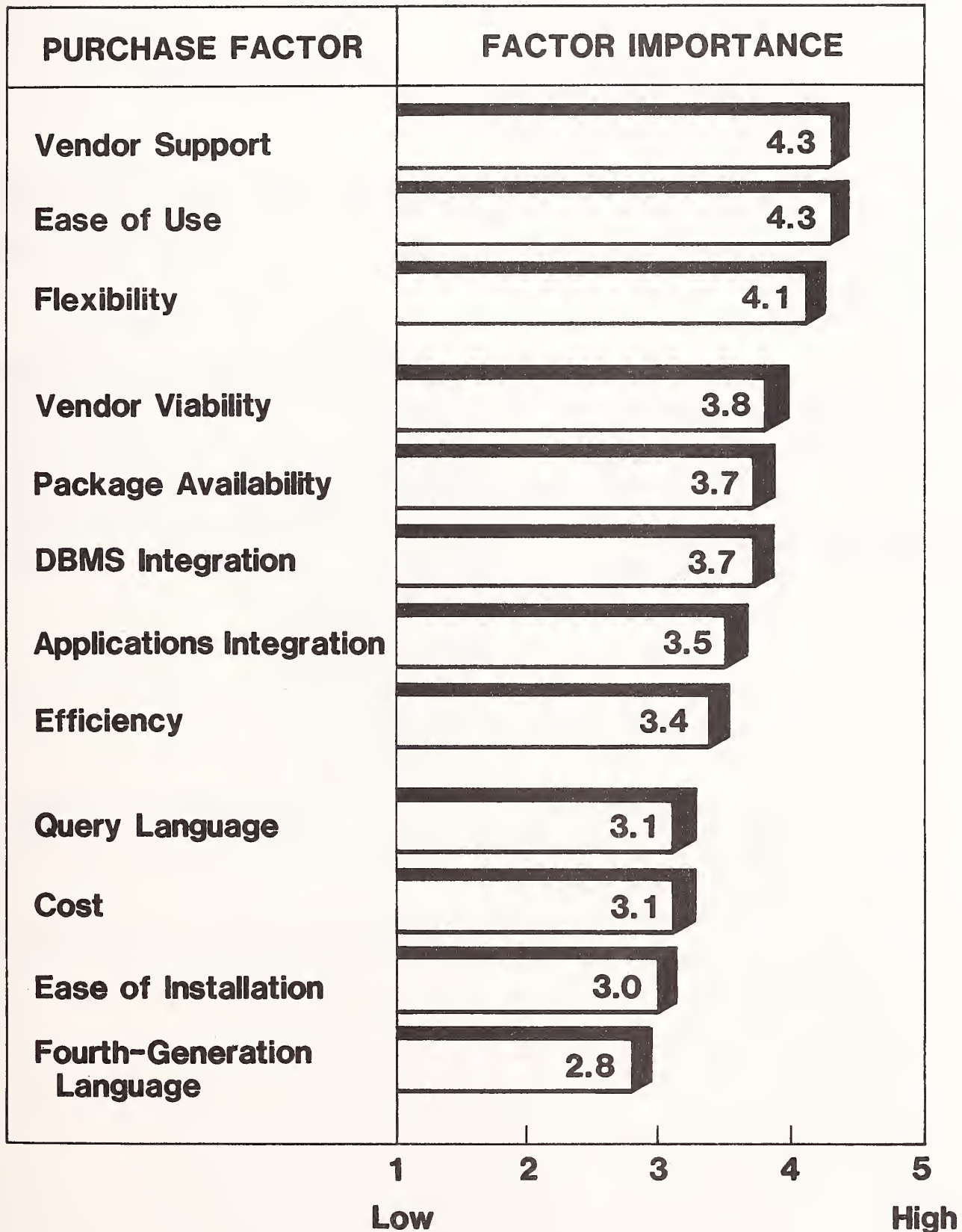
DBMS-APPLICATION SOFTWARE INTEGRATION PREFERENCES



E. INTEGRATED SOFTWARE PURCHASE PRIORITIES

- Vendor considerations (support and viability) are of higher importance in purchase decisions than application software characteristics.
- Integration characteristics (DBMS and applications) are of moderate importance.
- Applications features (query and fourth-generation languages) are relatively unimportant.
- Cost is relatively unimportant compared to other factors.
- Industry group differences are noted in Chapter IV.

INTEGRATED SOFTWARE PURCHASE PRIORITIES

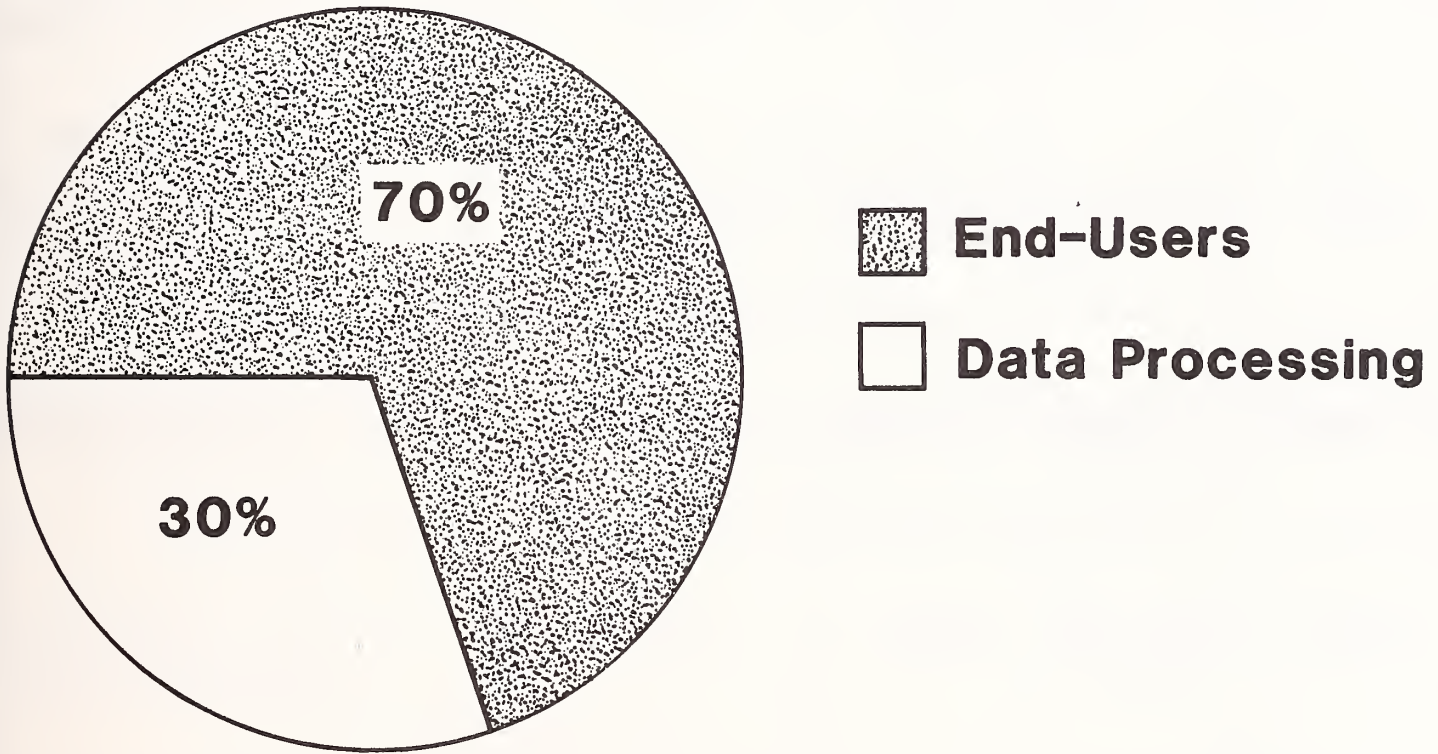


F. MARKETPLACE IMPACTS

- Vendors must consider two marketplace impacts:
 - Nature of the market.
 - Position within the market.
- For integrated software purchases, respondents indicated that end users contributed 70% and data processing 30% of the input in the decision-making process.
- End users and data processing decision makers generally have different purchasing criteria.
 - End users focus on business problems and applications considerations.
 - Data processing is more concerned with technical capabilities and DBMS considerations.
 - Acceptance of multiple vendors permits vendor coexistence and joint marketing/development arrangements.
 - While vendors historically have been classified as hardware, DBMS, or applications-oriented, some are introducing integrated DBMS-application software products.

MARKETPLACE IMPACTS

NATURE OF THE MARKET



Decision-Making Mix

G. IMPLEMENTATION ALTERNATIVES

- In selecting the appropriate alternatives for integrated DBMS-application software strategy implementation, a number of factors must be considered and the optimal mix selected.
 - Alternatives include internal development, third-party contracts, joint ventures, and development by customers.
 - Issues that enter into implementation decisions include control, risk, time, and cost.
- Integrated DBMS-application software will continue to grow in capability and acceptance. Identifying and quantifying vendor responses is a major on-going task. Systematic evaluation of individual and competitive strengths and vulnerabilities is critical for vendors desiring a share of this exploding market.
- In all aspects of strategy development, it is important to be pro-active and move rapidly. A \$7.5 billion market will be available--but only to those who capitalize upon the opportunity.

IMPLEMENTATION ALTERNATIVES

ALTERNATIVE	CONTROL	RISK	TIME	COST
Internal Development	High	Low	Medium	Medium
Third-Party Contract	Medium	Medium	Medium	High
Joint Venture	Medium	Medium	Medium	Medium
Customer Development	Low	High	Medium-High	Low

III MARKET ANALYSIS

III MARKET ANALYSIS

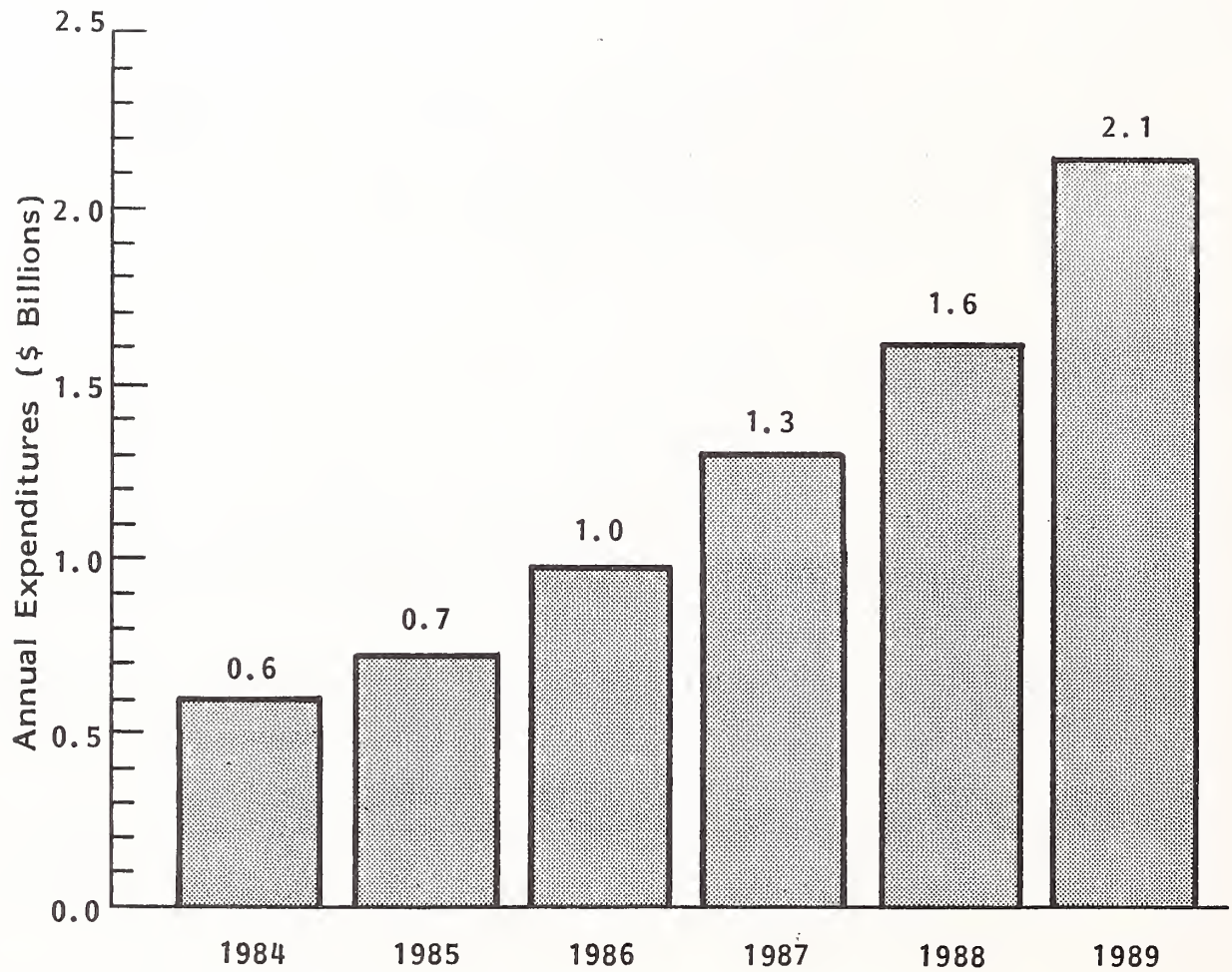
- This chapter presents INPUT's forecasts for DBMS, application, and integrated DBMS-application software expenditures for 1984 to 1989. Additional market observations are indicated as well as industry trends.

A. DBMS SOFTWARE

- Expenditures for "traditional" IBM mainframe DBMS software will increase over 3.5 times during the 1984 to 1989 period, as depicted in Exhibit III-1.
 - Expenditure levels shown do not include nonprocedural DBMS-based languages, for which expenditures will exceed \$100 million in 1984.
 - Minicomputer and microprocessor use of DBMSs will increase dramatically in the next five years, so expenditures for all computer systems will be 50% greater than the totals shown for 1988 and 1989.
 - IBM currently accounts for almost one-third of the total, with another third being captured by the next four largest DBMS vendors; the remaining third is divided among the smaller DBMS suppliers and other mainframe companies.

EXHIBIT III-1

IBM MAINFRAME DBMS SOFTWARE EXPENDITURES
(1984-1989)



Average Annual Growth Rate = 30%

- The DBMS market should experience an average annual growth rate (AAGR) of approximately 30%.
- IBM's growth will be about 25%.
- Products from independent vendors will maintain a rate closer to 35%.

B. APPLICATION SOFTWARE

- Application software expenditures for IBM mainframes will increase nearly 11 times over the 1984 to 1989 period, as indicated in Exhibit III-2.
- Although vendors currently emphasize cross-industry software, due to market saturation and competition, vertical market opportunities will become increasingly attractive.
- Of total software expenditures, industry-specific applications are expected to grow more than 50% faster than cross-industry applications.
- As opposed to its leading position in the DBMS sector, IBM commands a much smaller share of the application software market, with 1984 estimated revenues of \$250 million, representing less than 10% of the applications total.

C. INTEGRATED SOFTWARE

- Integrated software expenditures will increase thirty times during the 1984 to 1989 period, as shown in Exhibit III-3.
- In 1984 about one-fourth of all mainframe installations run packaged DBMSs.

EXHIBIT III-2

IBM AND PCM MAINFRAME
APPLICATION SOFTWARE EXPENDITURES BY
USERS RUNNING DBMS PACKAGES
(1984-1989)

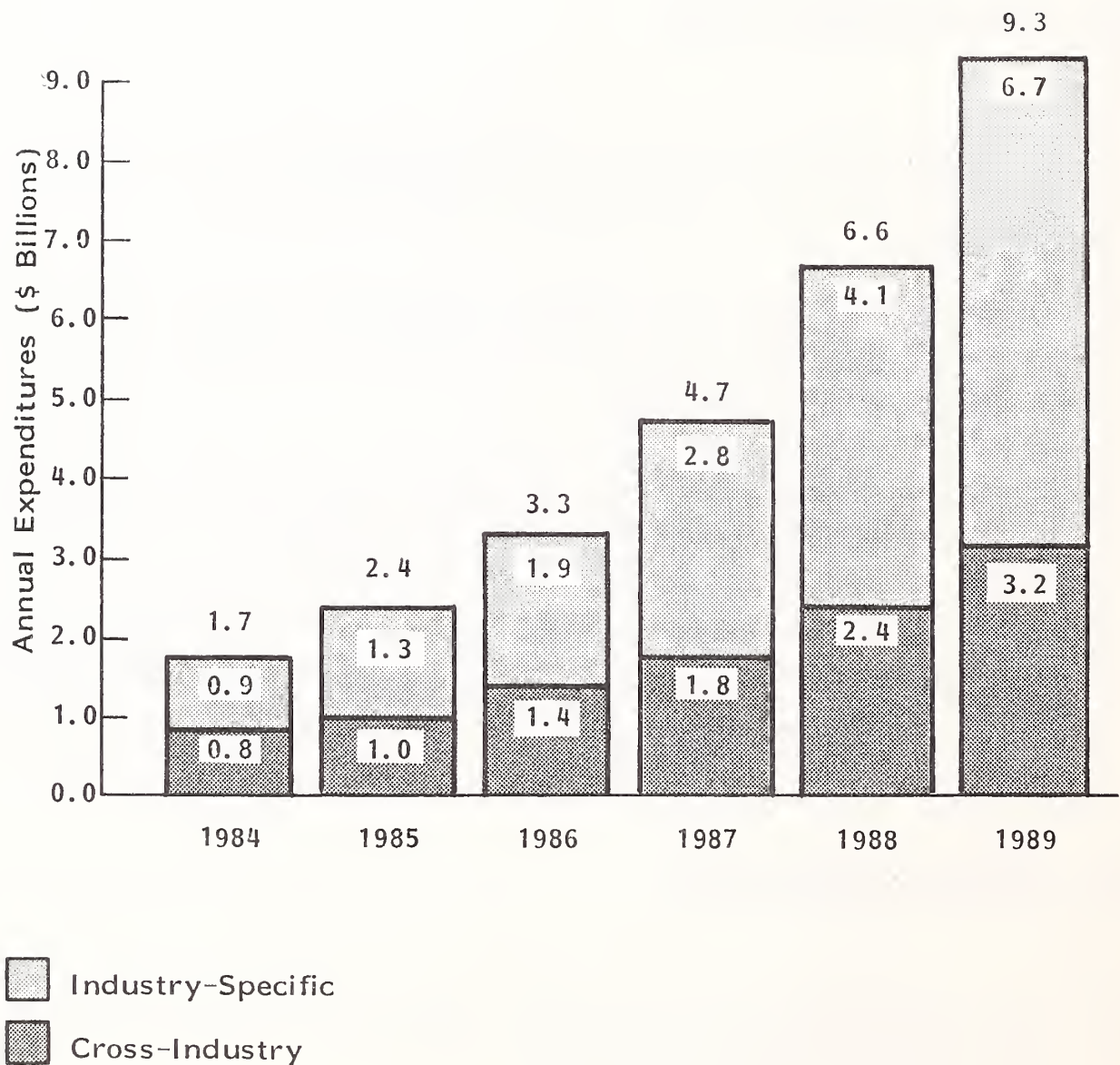
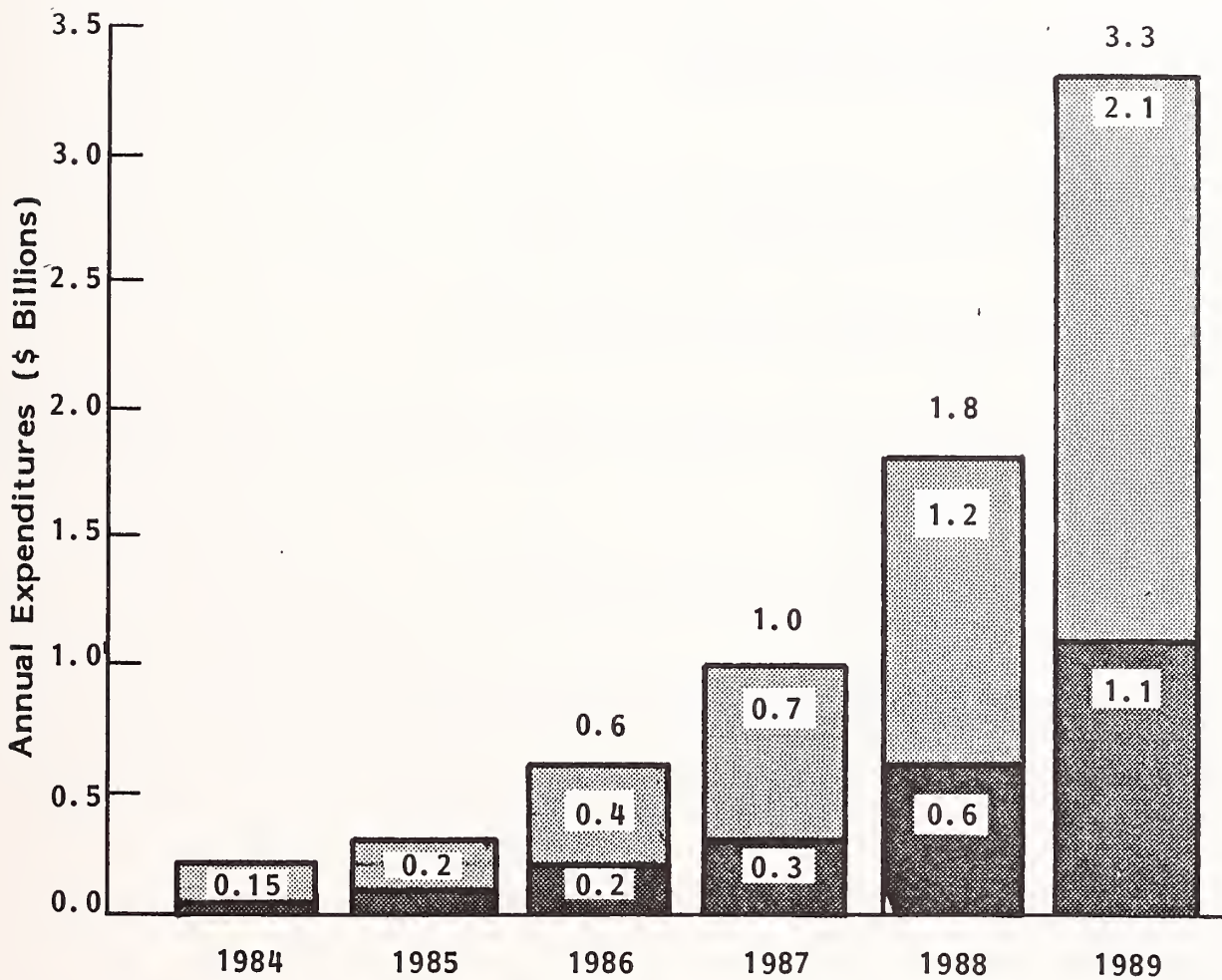




EXHIBIT III-3

IBM AND PCM MAINFRAME
INTEGRATED DBMS-APPLICATION SOFTWARE EXPENDITURES
(1984-1989)



 Industry-Specific
 Cross-Industry

- In 1987 approximately half will run packaged DBMS software, with the percentage increasing to 80% by 1990.
- The future mix of industry-specific and cross-industry integrated software is expected to be comparable to that of application software.

D. ADDITIONAL OBSERVATIONS

- Projected DBMS technology trends include:
 - Increasing use of distributed data bases.
 - Use of data dictionaries to manage and control information throughout the company.
 - Fault-tolerant, fail-safe architectures.
 - Greater reliance on relational data structures.
 - Integration with the "office of the future."
- Projected impacts on the user environment include:
 - Greater applications development by the end user, with fewer contributions by MIS.
 - Increased reliance on personal computers at individual workstations.
 - Incorporation of visual and voice communications capabilities for decision makers.

E. INDUSTRY TRENDS

- Of the four industry groups analyzed, discrete manufacturing and banking are the most receptive to integrated DBMS-application software.
- While discrete manufacturers and bankers will increase their expenditures for integrated software (to over 50% of the total by 1987), insurance companies and process manufacturers plan to increase their outlays even more during the same three-year period.

IV USER ANALYSIS



IV USER ANALYSIS

- This chapter describes the characteristics of integrated DBMS-application software reported by the sample of software users surveyed for this report. These characteristics include:
 - User satisfaction with integrated software.
 - Profile of installed integrated applications.
 - Willingness to change/add DBMSs.
 - DBMS-application software integration strategy.
 - Anticipated application software purchases for DBMS.
 - DBMS-application software vendor preferences.
 - Application package purchase considerations.
- These seven characteristics will be examined considering all users plus four industry sectors: discrete manufacturing, process manufacturing, banking, and insurance.
- Finally, comparisons will be made between the sample of DBMS users and users with installed integrated software.

A. USER SATISFACTION WITH INTEGRATED SOFTWARE

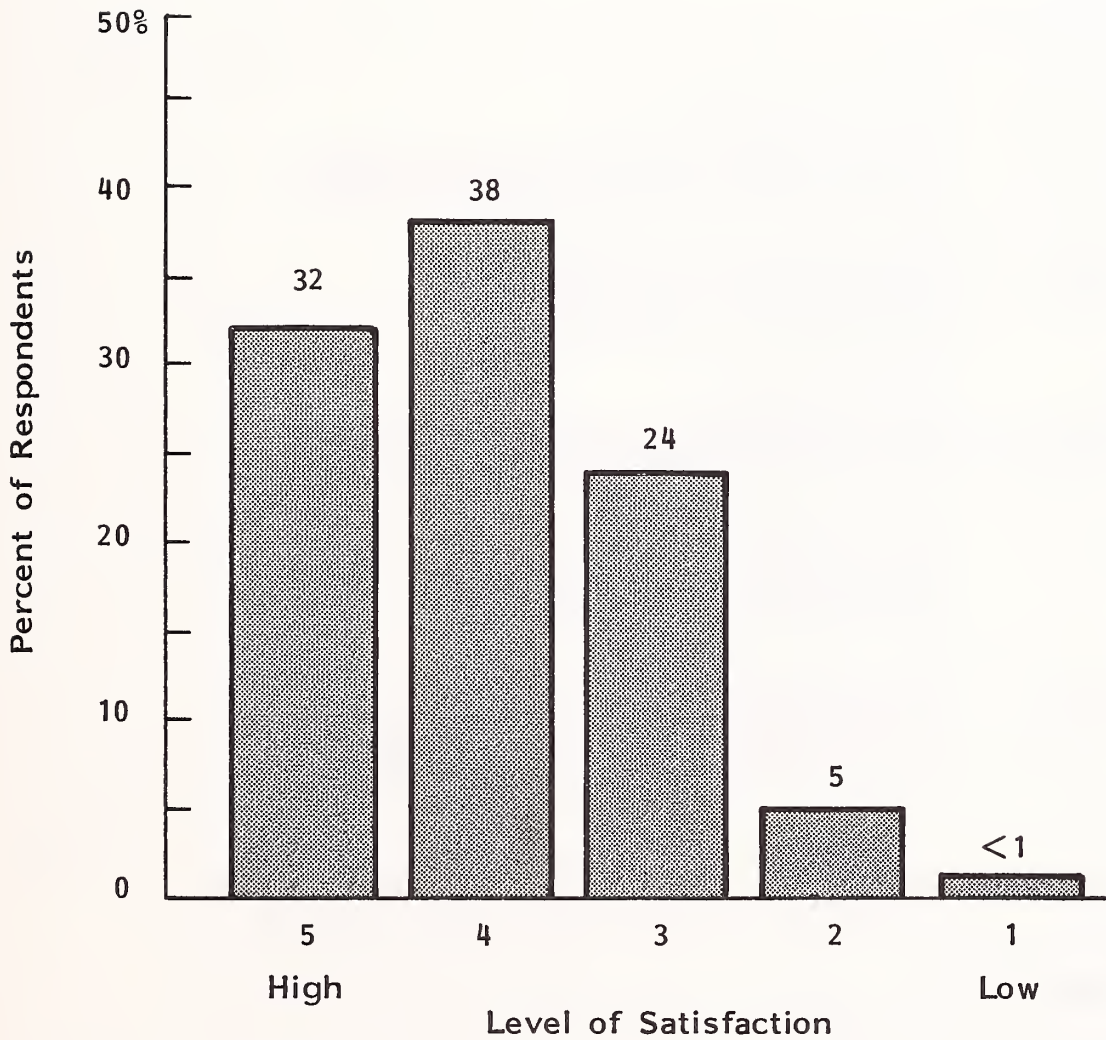
- As shown in Exhibit IV-1, overall user satisfaction with applications running on DBMSs, either purchased or developed internally, was quite high, averaging 3.7 on a 5-point scale.
 - Seventy percent of the respondents reported satisfaction levels of "5" or "4."
 - Only 5% reported below-average satisfaction. (i.e., "1" or "2").
- No significant differences in satisfaction levels were noted among the four major industry groups.

B. PROFILE OF INSTALLED INTEGRATED APPLICATIONS

- As shown in Exhibit IV-2, nearly 2.5 times as many integrated applications were reported to have been developed in-house than purchased as a package. Typically, the packaged applications had been designed by vendors for use with VSAM files and were extensively modified by users to run on IMS or IDMS; they were integrated before fully integrated packages were available.
- Applications currently running on DBMSs are almost equally divided between industry-specific and cross-industry orientations.
- The most common types of applications running on DBMSs are customer information files and customer information systems; these applications were found in banking and insurance companies.

EXHIBIT IV-1

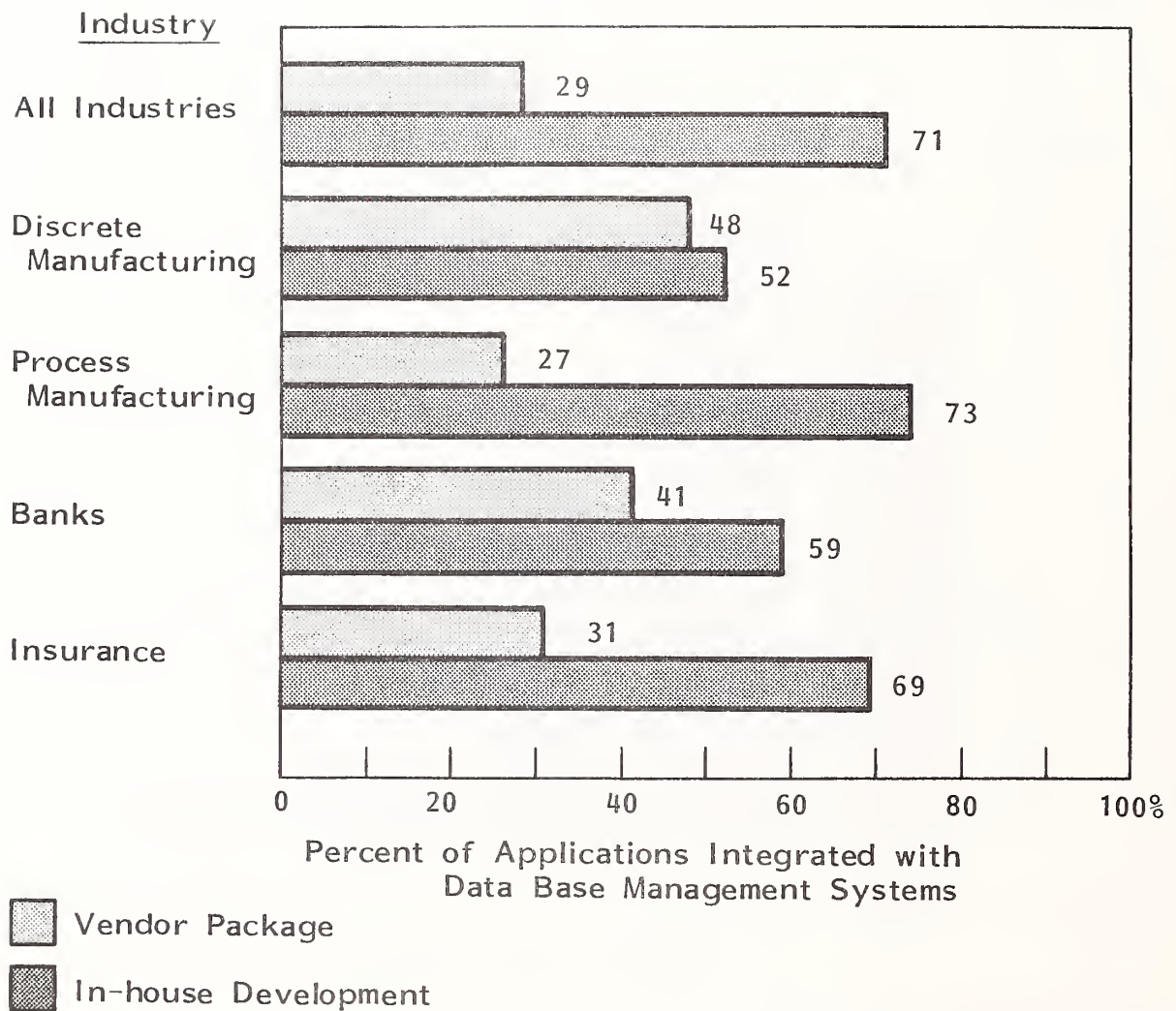
OVERALL USER SATISFACTION:
APPLICATIONS RUNNING ON DBMSs
(Purchased or Internally Developed)



Average Satisfaction Level = 3.7

EXHIBIT IV-2

INSTALLED INTEGRATED APPLICATIONS:
VENDOR PACKAGES VERSUS
IN-HOUSE DEVELOPMENT



- Manufacturing/production applications are the next most prevalent, followed by marketing and sales management applications. Financial applications (payroll, general ledger, accounts receivable, accounts payable), purchasing, and human resource applications are also common. One explanation for the low frequency of financial applications is that they were generally installed first and do not require as sophisticated DBMSs as do marketing and manufacturing applications.
- Discrete manufacturers rely on vendor packages nearly as much as on internal development.
 - One reason for the greater use of outside software is the homogeneity of information system needs for discrete manufacturers--at least relative to other, more diverse sectors, such as process manufacturers and transportation companies.
 - The magnitude of the discrete manufacturing marketplace has also undoubtedly been a big incentive, encouraging vendors to develop packages for these companies.
 - At the same time, most of the integrated applications now running are for cross-industry applications, such as accounts receivable, general ledger, purchasing, receiving, order entry, and customer reporting.
 - One industry-specific application frequently integrated is Manufacturing Resources Planning, often referred to as MRP II. Because of the complexity of such systems, the customizing of proven vendor software is generally more cost-effective than is developing the system internally.
 - Plans for new integrated applications are almost evenly divided between industry-specific and cross-industry orientations. MRP and accounting systems appear to be the top priority areas for future integration.

- Process manufacturers are actively developing integrated applications but find they must heavily modify packages because they have heterogeneous needs. Although the packaged software/in-house development mix closely parallels that for all users, this is misleading because the packaged applications are particularly heavily modified in this sector. Also, the packages are almost invariably of cross-industry applications.
 - This suggests that application software vendors focusing on the process manufacturing industry should provide packages that can be easily modified; they also should offer customizing services.
 - About half of all installed integrated applications are industry-specific; production planning and control applications are the most common.
 - Plans for developing or purchasing future integrated applications are quite diverse, but about half will be cross-industry.
- IBM's IMS and DL-1 are the dominant DBMSs in the discrete and process manufacturing sectors, having about two-thirds of the total installed base.
- Cullinet's greatest market penetration is in the manufacturing sector, where it has close to 10% of all existing DBMS installations and is catching up with IBM in terms of new installations. Software AG's ADABAS is in about 3% of the installations, and ADR's Datacom/DB is in 2%.
- Banking respondents are devoted users of integrated DBMS-application software systems. The industry is growing increasingly competitive due to deregulation and the diffusion of information systems technology. Many banks see aggressive development of integrated DBMS-application systems as a key to delivering sophisticated, efficient banking products to increasingly demanding customers while still maintaining control over their traditional banking operations. These systems are also expected to reduce costs and minimize errors.

- The homogeneity of the banking industry has led to a large component of packaged integrated applications among applications running on DBMSs.
- The vast majority of integrated applications are industry specific. Customer information files and customer information systems are especially prevalent.
- Integrated applications plans for the future continue to be concentrated on industry-specific applications.
- One banker lamented the paucity of applications designed to run on IDMS: "Those now available are only suitable for small banks or large manufacturing companies--not large banks." Several respondents are using Hogan Systems products that run on IMS files, which are effectively treated like flat files, with little advantage being taken of IMS's capabilities.
- IBM's IMS and DL-1 account for 67% of bank DBMS installations; Cullinet's share is 8%. Software AG's is 2%, and ADR's is 1%.
- While most insurance industry respondents are using integrated DBMS-application systems, they are not generally enthusiastic about the basic concept.
 - One explanation is that insurance information may not be as interrelated and "time critical" as information is in other industries such as banking.
 - Slightly less than one-third of the applications now running on DBMSs were purchased packages.

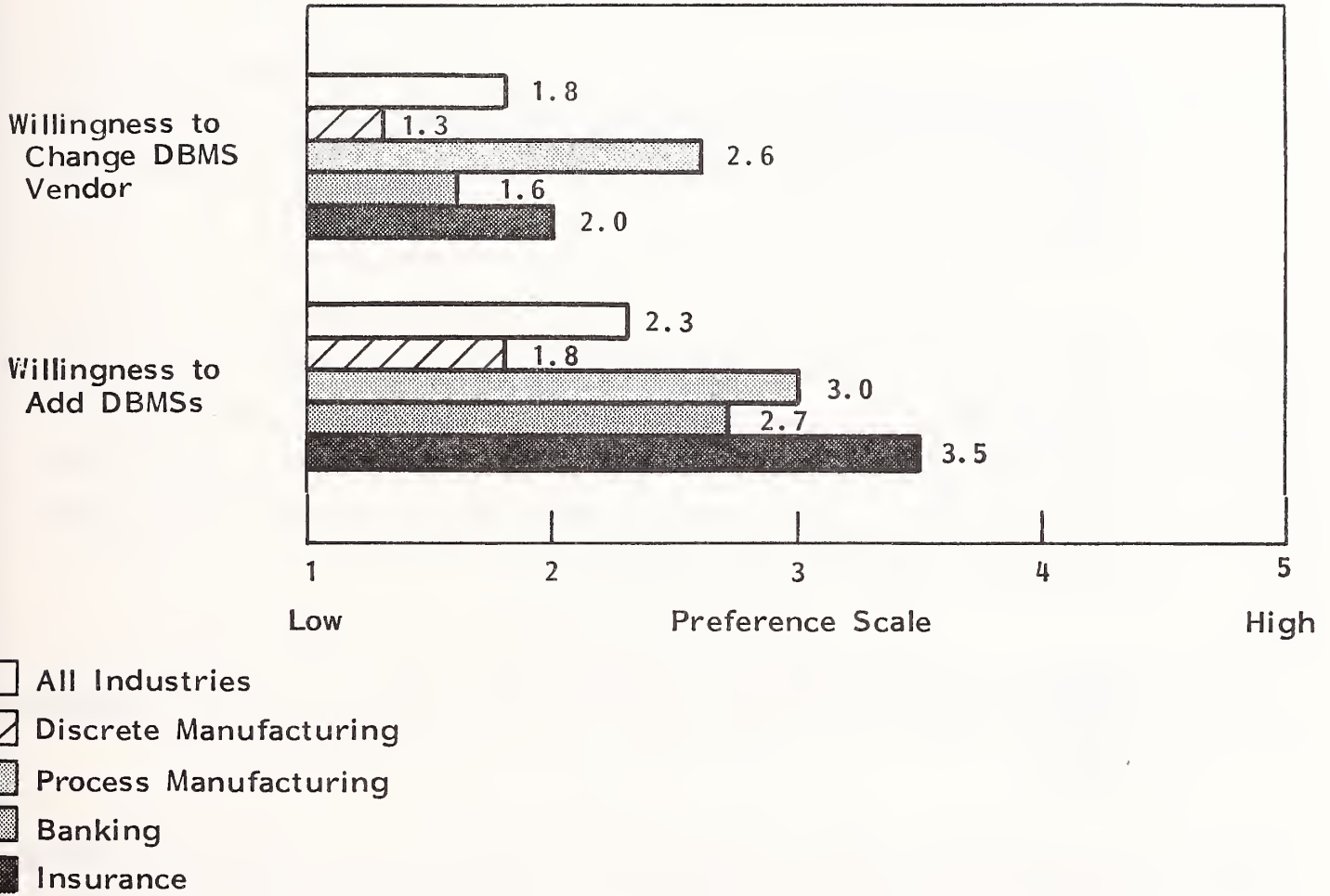
- These applications are usually industry-specific, e.g., policy systems, agency commission systems, and customer information files. This propensity toward industry-specific applications is one reason for the paucity of packages in use.
- New applications under consideration for integration are generally industry-specific and include policy systems and claims processing systems.
- Insurance companies are particularly interested in developing high-level applications for their professionals and senior-level managers.
- IBM's DBMSs (especially IMS) are more concentrated in this sector than in any other, having captured nearly 70% of the installed base. Culinet's IDMS has about 5%, Software AG's ADABAS, 3%, and ADR's Datacom/DB, 2%.

C. WILLINGNESS TO CHANGE/ADD DBMSs

- As shown in Exhibit IV-3, the prospect of adding new additional DBMSs or changing from existing DBMSs is not well received. While both options received below-average approval, the respondents indicated they would prefer adding a DBMS to their current system, rather than changing to a new DBMS. This suggests that greater computational overhead is less painful than changing to a different system and possibly to a new vendor.
- A particularly progressive regional bank pointed out that IDMS, while good at running business applications, is not well suited for information centers (this was spoken before the availability of IDMS/R); Computer Corporation of America's model 204 was preferred for this function. This regional bank thus preferred maintaining two vendors' DBMSs.

EXHIBIT IV-3

WILLINGNESS TO CHANGE OR ADD DBMSs



- Most other users, however, expressed resistance to adding new DBMSs --especially because of additional support costs.
- The ideal of a single data base controlling all the data in the firm has largely given way to an acceptance of multiple data bases—but generally of one DBMS type.
- Discrete manufacturers are the least receptive either to adding DBMSs or to changing DBMS vendors. This may be due to the complexity of their current systems (e.g., MRP) and/or to the potential risk associated with implementing changes.
- Process manufacturers were generally the most receptive of all users in changing DBMS vendors and in considering additional DBMS systems. This independence may be partially a result of process manufacturers' demand for efficient applications development. Process manufacturers' propensity toward custom internal applications development makes them particularly receptive to innovative approaches in this area.
- Bankers are less inclined to change DBMS vendors than are most users surveyed; they are somewhat more willing, however, to consider additional DBMSs.
- Insurance companies are surprisingly receptive toward adding new DBMSs; however, they are almost as reluctant to change DBMSs as are companies in other sectors.

D. DBMS-APPLICATION SOFTWARE INTEGRATION STRATEGY

- Most users express a very strong preference for adding applications onto existing DBMSs rather than attempting to integrate DBMSs into existing applications, as shown in Exhibit IV-4. Users are particularly reluctant to purchase or develop new DBMS-application software systems, preferring instead to build on existing installations.

- Users express a number of reasons for integrating applications with DBMSs; many of these reasons are associated with data management issues.
 - Data is seen as being easier to control in integrated systems.

 - Data integrity is believed greater.

 - Data managers have a better "feel" for the data available when applications run on DBMSs.

 - Data is better structured for audits.

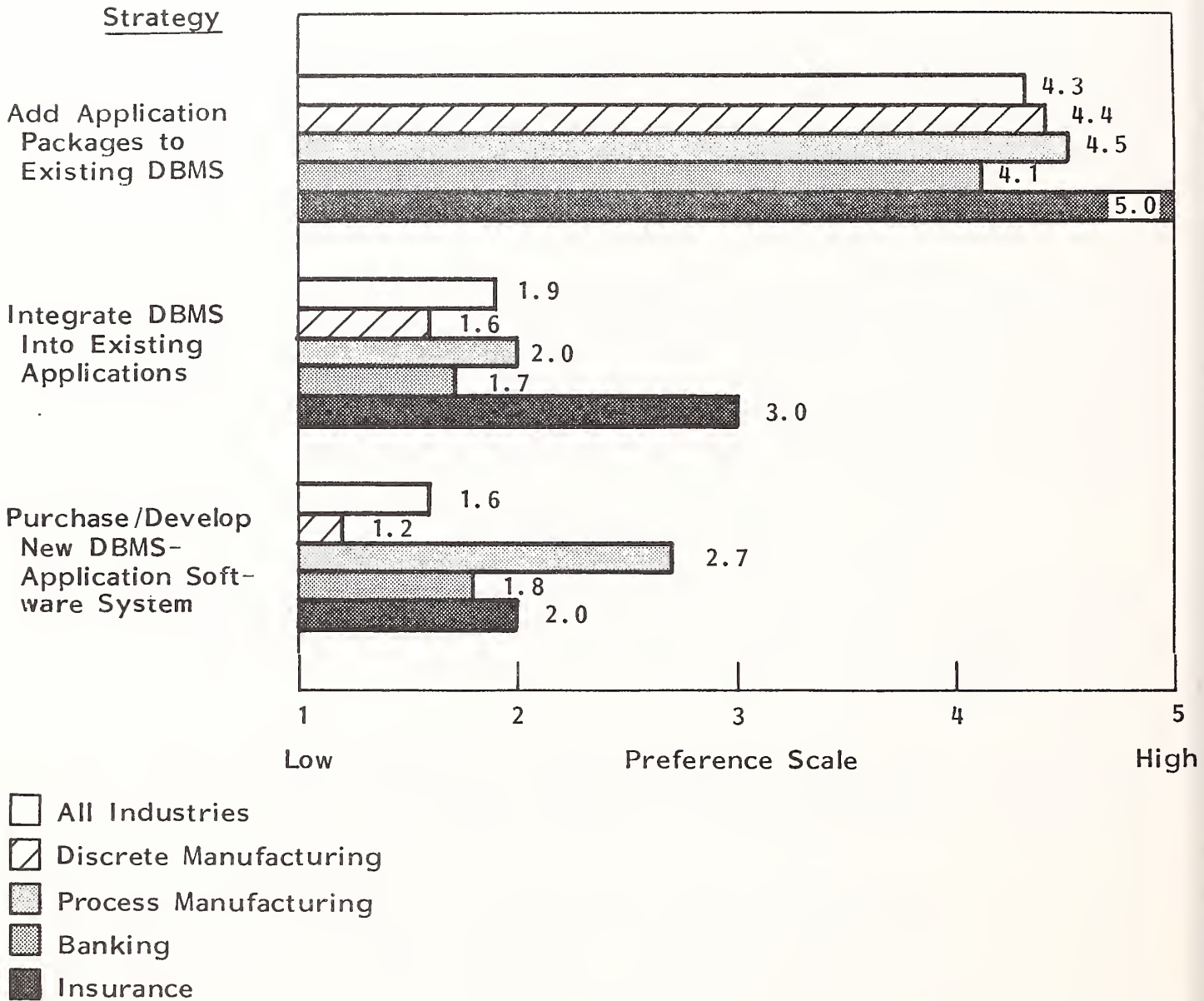
- In some cases, cost is cited as a factor in integrating applications with DBMSs.
 - Some users believe the expense of running multiple data bases can be reduced if integration is handled properly.

 - Several users express their desire to run applications on DBMSs, but also note their inability to integrate applications themselves due to limited personnel resources--hence their eagerness for packages.

 - Common languages and file structures can reduce redundancy.

EXHIBIT IV-4

DBMS-APPLICATION SOFTWARE INTEGRATION STRATEGY



- In the end-user arena, integration of applications with DBMSs is seen as especially powerful.
 - Integration enables the management of data as a corporate strategic resource, accessed by managers on a "need-to-know" basis.
 - Extraction of reports is viewed as much easier with integrated systems.
- Several users point out that their existing software systems are old and in need of replacement; if a radical upgrade is necessary, it is preferable to go "all the way" and upgrade to integrated DBMS-application packages.
- A few users contradict the conventional wisdom that integrated DBMS-application packages were a positive development.
 - Some believe they are better off purchasing applications designed to run on flat files and integrating the applications into DBMSs themselves. Several cite the "transparency" features of ADR's DBMS, offering DATACOM as being particularly suited to this sort of undertaking.
 - A complaint registered about integrated packages is that they are often so complex and unwieldy that internal integration ends up being much easier and equally effective.
 - Other users report that their needs are so specialized that no packages are available or likely to become available to satisfy them. This is particularly true of process manufacturers, transportation companies, and government organizations.
- Several respondents maintain that the most sophisticated report writers are so advanced that there is no need for application packages: required applications can be written directly onto a DBMS.

- A large retailer and a large insurer report that they maintain no DBMSs. They consider DBMSs not worth the price and trouble.
 - Benefits are unclear.
 - Incremental return on investment is too low.
 - Some issues addressed by DBMSs are being resolved by other products, such as fourth-generation languages.
 - Data redundancy is being managed without resorting to a DBMS.
 - The control gained with DBMSs is costly and adds to bureaucracy.
- Some companies are building integrated applications development tools. Some are saying this to abrogate the need for new packages; new applications are written so easily in-house that there is no need to go outside for them.
- The comments above (regarding report writers and fourth-generation languages being perceived as alternatives to DBMSs) suggest that users must be educated as to the capabilities and benefits of DBMSs, as distinguished from other software.
- Of all users surveyed, discrete manufacturers are the most reluctant in terms of trying either to integrate a DBMS into existing applications or in purchasing/developing new DBMS-application software.
- Process manufacturers are the most receptive of all users in terms of purchasing and developing new integrated systems.

- Bankers' DBMS strategies closely parallel those for all industries, with somewhat high resistance to purchasing new DBMSs and integrating DBMSs into existing applications, but with greater receptivity to adding application packages to existing DBMSs.
- While insurance respondents clearly prefer adding applications to existing DBMSs, they are not overly adverse to integrating DBMSs into existing applications.

E. ANTICIPATED APPLICATION SOFTWARE PURCHASES FOR DBMSs

- Twenty-two percent of the application packages respondents intend to purchase this year will be designed to run on DBMSs, as shown in Exhibit IV-5. This will more than double to 46% in 1987.
- Bankers and discrete manufacturers believe that over 50% of their 1987 application software purchases will be designed to run on DBMSs.
- The most dramatic increase in purchases of applications designed for use with DBMSs will be in the insurance industry (from 10% in 1984 to 42% in 1987).

F. DBMS-APPLICATION SOFTWARE VENDOR PREFERENCE

- Users express a preference for purchasing applications designed for use on DBMSs from traditional applications suppliers rather than from DBMS vendors, as indicated in Exhibit IV-6. IBM is not a favored supplier; third-party integrators fared even worse.

EXHIBIT IV-5

ANTICIPATED APPLICATION SOFTWARE PURCHASES FOR DBMSs

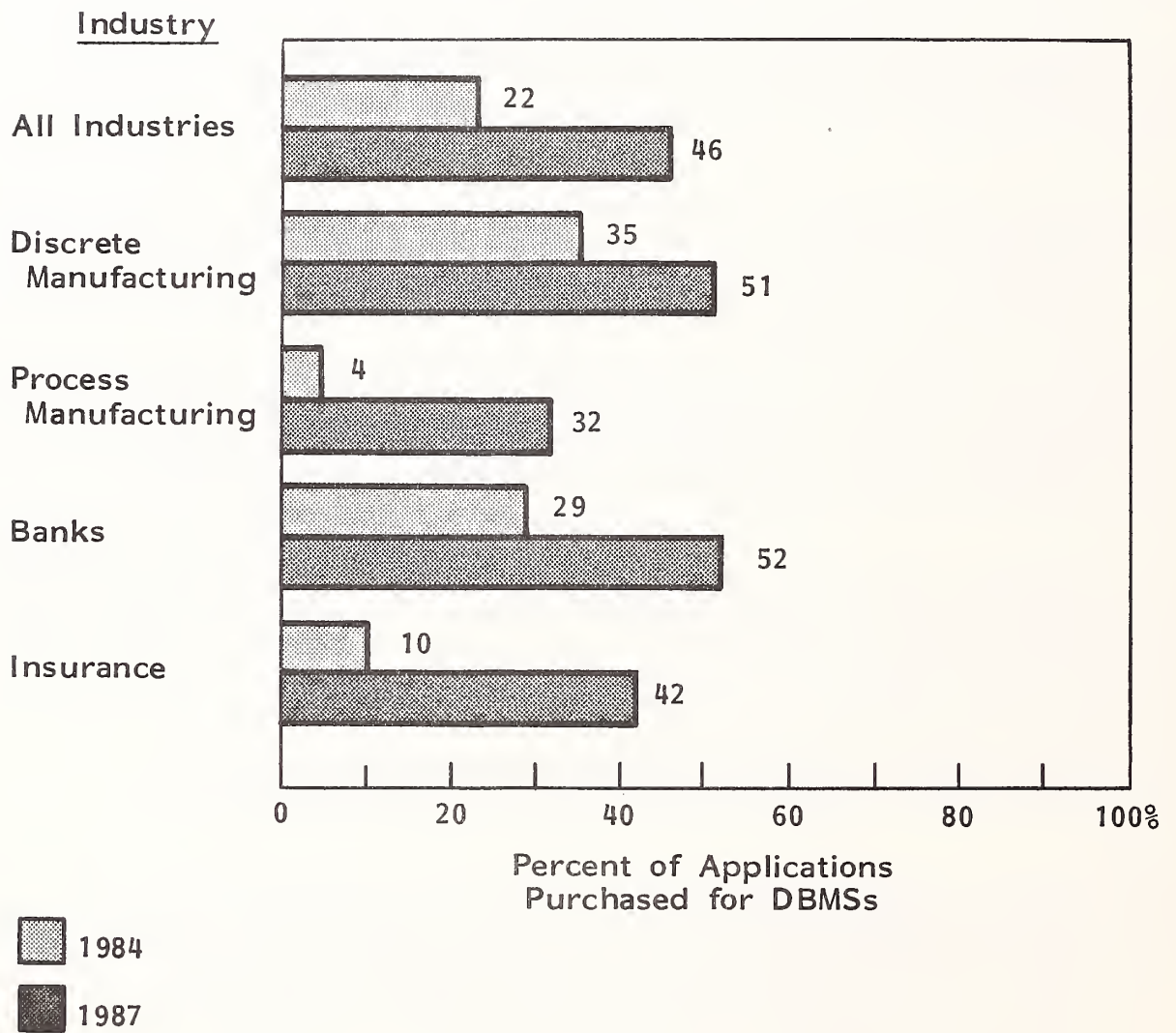
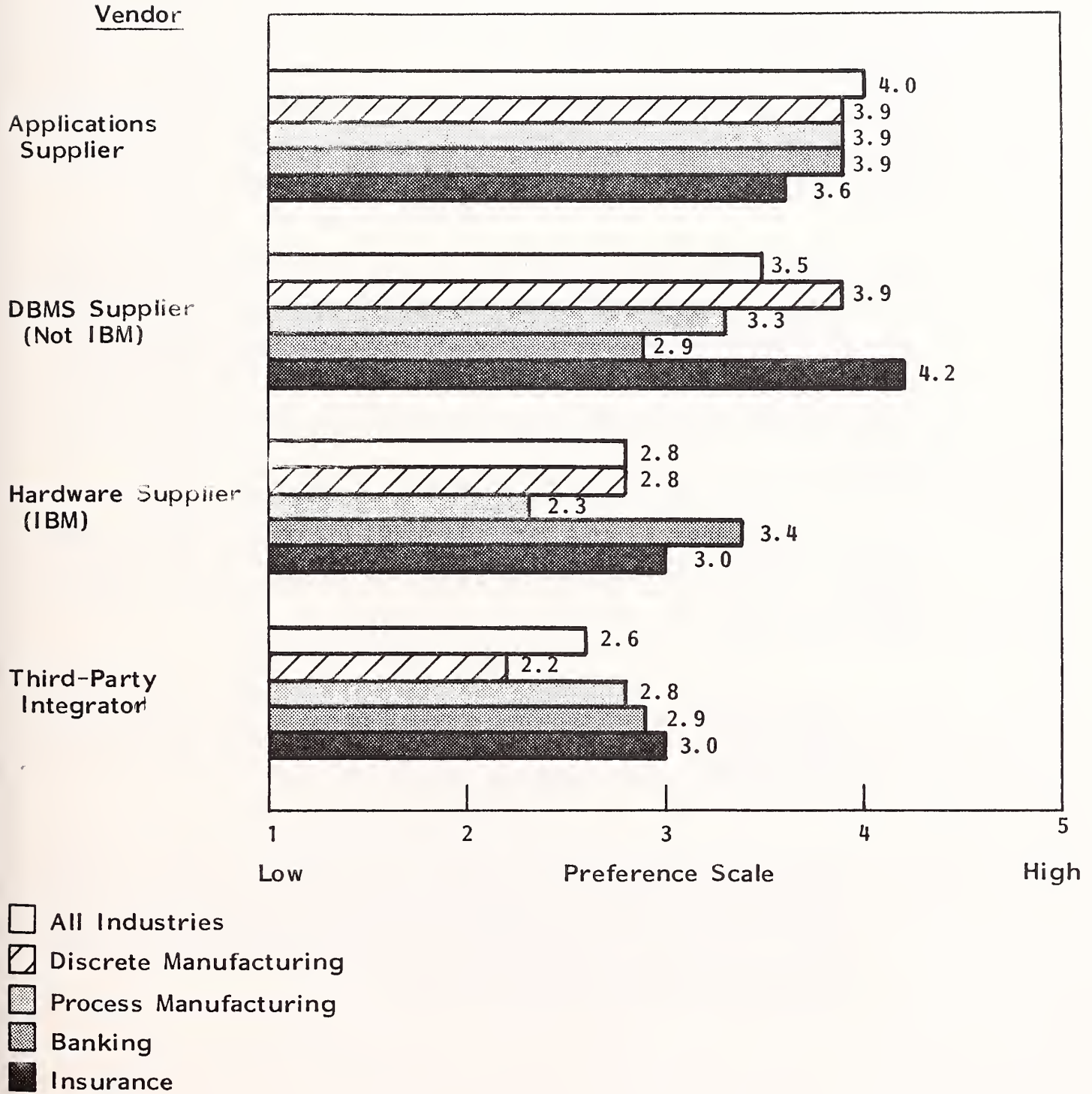


EXHIBIT IV-6

DBMS-APPLICATION SOFTWARE VENDOR PREFERENCE



- Prior INPUT studies have indicated that there is wide acceptance in the marketplace of using a second supplier in-house (i.e., different from the systems or hardware vendor) if that supplier is a vendor selling software. There is widespread reluctance to use a second supplier if that supplier is selling hardware.
- Some users indicate that they intend to purchase less rather than more application packages in the future. The reasons cited were the difficulties involved in mating application packages to advanced DBMSs--even when designed for these DBMSs--and the sophistication of newer application development systems. These users believe they can save time and effort by developing new applications internally.
- While "single-source purchasing" may be desirable, users accept the necessity for considering multiple vendors in obtaining the needed DBMS-application software. This acceptance may be due either to users' lack of acceptance of a "full-service" vendor (due to increased risk using a sole source) or to their not believing that a single supplier can, in fact, provide an integrated software product.
- Discrete manufacturers express preference for both application and DBMS suppliers. Third-party integrators are judged the least preferred among all industries surveyed.
 - The complexity of manufacturing information systems such as MRP could explain the extreme reluctance to use outside vendors that may be unfamiliar with the existing system.
 - Discrete manufacturers also single out Cullinet in their comments, expressing admiration for Cullinet's concepts but having reservations about the realism of its goals and apprehension about Cullinet's applications pricing and maintenance charges.

- Process manufacturers prefer applications suppliers; they rate IBM lower than do all other industry users.
- Bankers rate IBM second and give third-party integrators the second highest preference ratings of all users; DBMS suppliers, on the other hand, receive the lowest rating by bankers, this ranking reflecting the high degree of banking-industry dependence on IBM.
- Insurance companies are the only industry users expressing a greater preference for purchasing integrated application packages from their DBMS suppliers, rather than purchasing them from traditional applications suppliers. This preference indicates an opportunity for current and potential DBMS vendors in this vertical market.

G. APPLICATION PACKAGES PURCHASE CONSIDERATIONS

- Twelve factors were rated by the users in terms of importance in purchasing application software. The results for all respondents are displayed in Exhibit IV-7.
 - The most important factors in purchase decisions are vendor support and ease of use.
 - Vendor considerations (i.e., support and viability) generally are more important than the characteristics of application software itself (i.e., availability, efficiency, etc.).
 - Integration characteristics (i.e., DBMS and application) fall in the mid-range of all factors considered.

EXHIBIT IV-7

IMPORTANCE OF FACTORS IN
APPLICATION SOFTWARE PURCHASES
(User Viewpoint)

All Industries

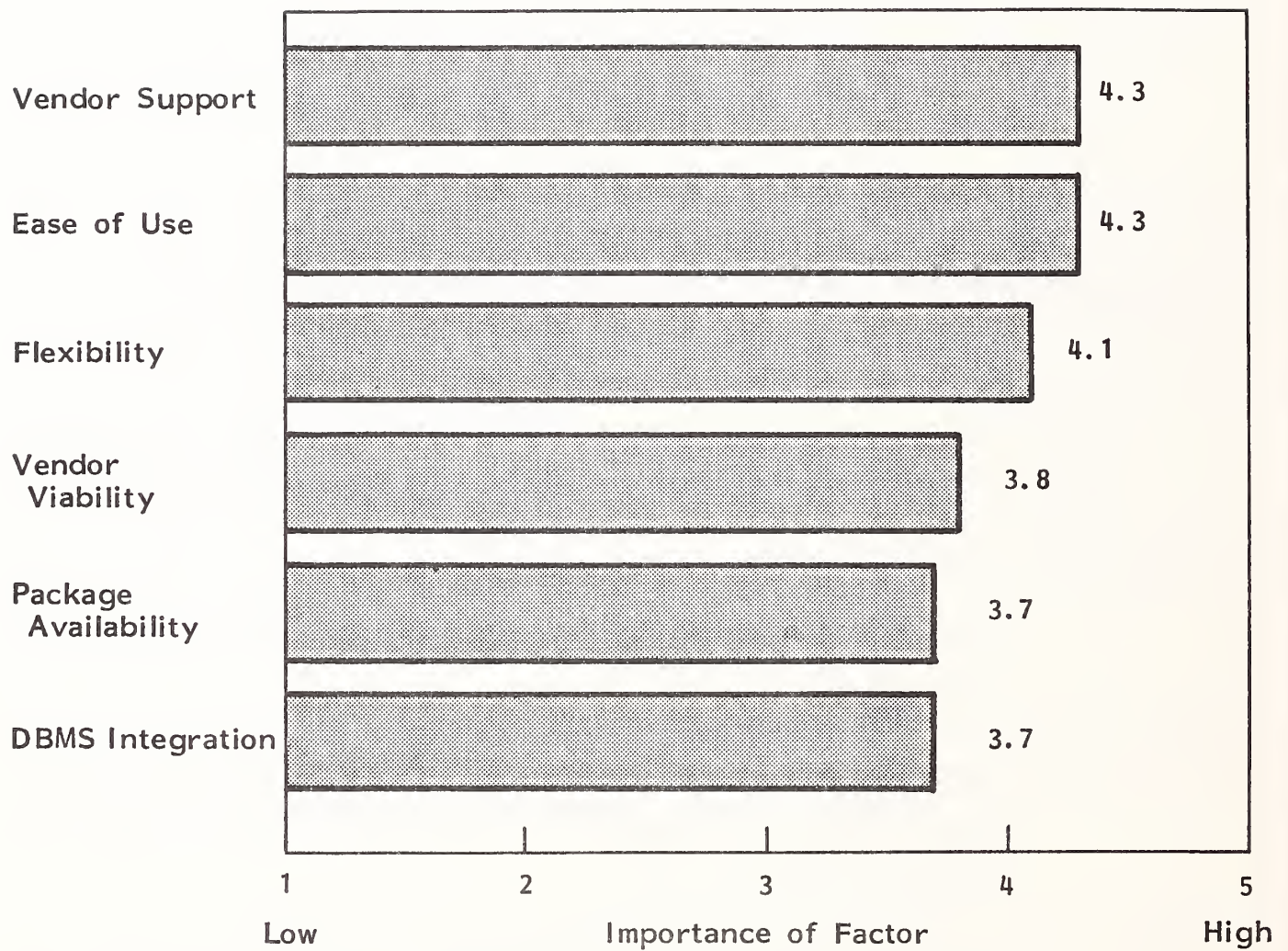
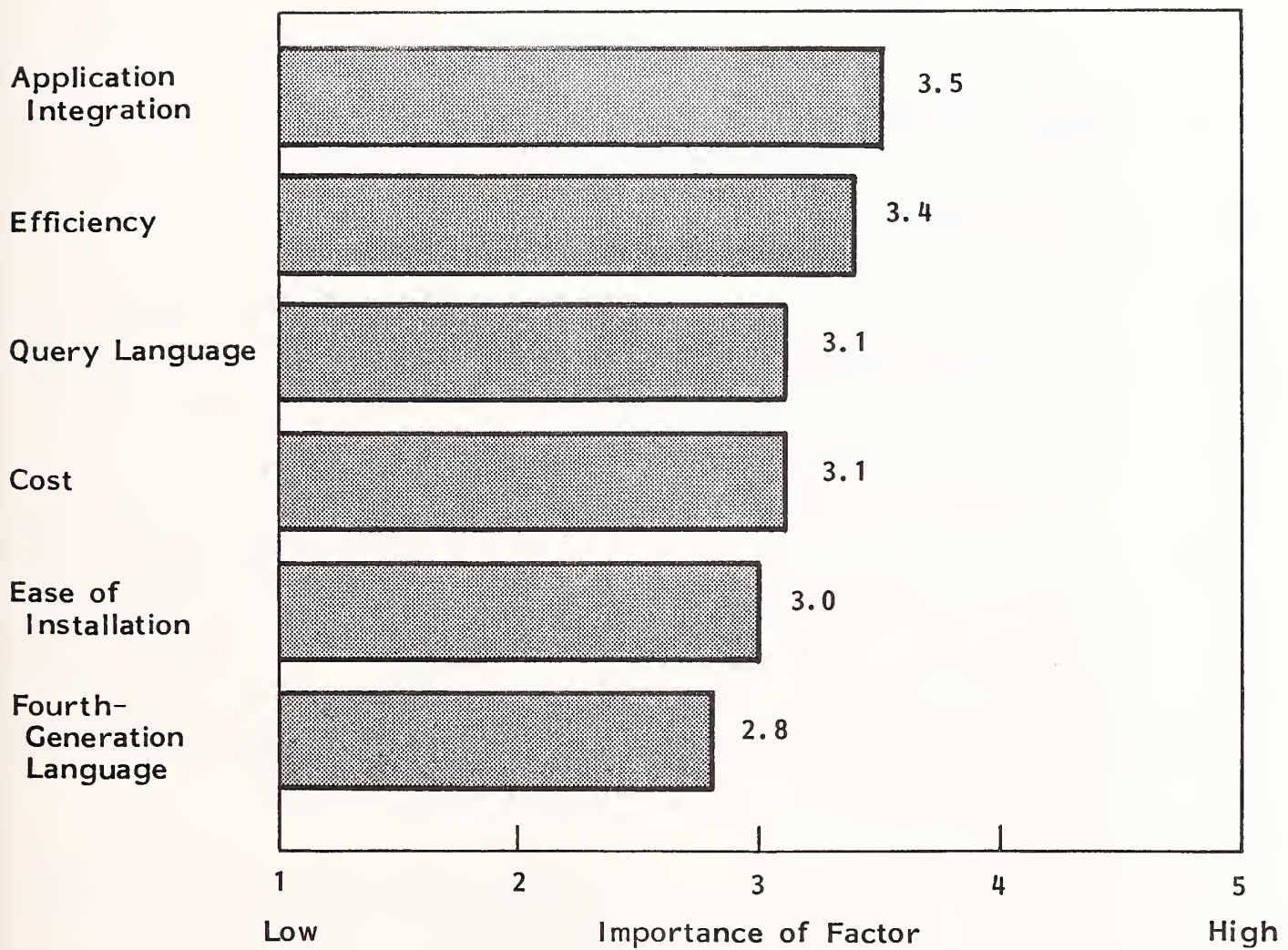


EXHIBIT IV-7 (Cont.)

IMPORTANCE OF FACTORS IN
APPLICATION SOFTWARE PURCHASES
(User Viewpoint)

All Industries



- Language offerings (i.e., query and fourth generation) are among the least important of all factors.
- Cost is rated relatively low in importance.
- Users express their commitment to purchasing DBMSs based on their merit but admit that many are bought because of the particular applications available for them. They consider the installed base of a DBMS a valid purchase factor--and a factor whose importance will increase as new applications become available on-line for the most dominant DBMSs.
- One user observes that vendor support is important for applications at the periphery of his business but an irritant in core applications because the applications are so heavily modified.
- Application software compatibility is not a factor in over 20% of DBMS purchases, which suggests that while the existing DBMS may largely determine the application software selected, a sizeable percentage of DBMS decisions are independent of existing applications.
- As shown in Exhibit IV-8, discrete manufacturers generally express greater concern about package availability than do other users. Discrete manufacturers also rate vendor viability high, which further substantiates the need for suppliers to emphasize their own financial performance and reference installations. DBMS integration is rated as more important than application integration.
- Process manufacturers are more sensitive than other users regarding package availability and query language issues, as shown in Exhibit IV-9. As in the case of discrete manufacturers, DBMS integration is more important than application integration.

EXHIBIT IV-8

IMPORTANCE OF FACTORS IN
APPLICATION SOFTWARE PURCHASES
(User Viewpoint)

Discrete Manufacturing

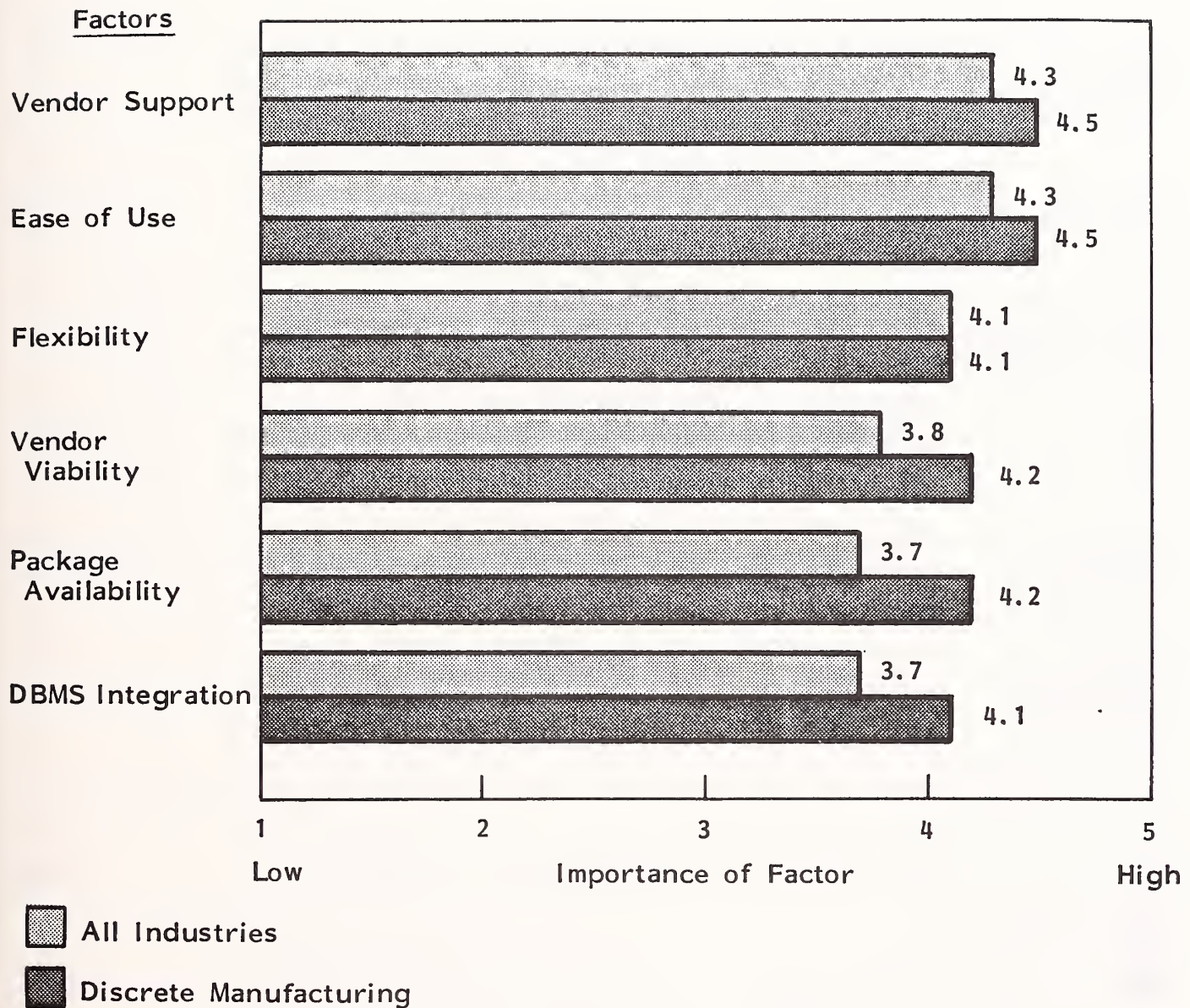


EXHIBIT IV-8 (Cont.)

IMPORTANCE OF FACTORS IN
APPLICATION SOFTWARE PURCHASES
(User Viewpoint)

Discrete Manufacturing

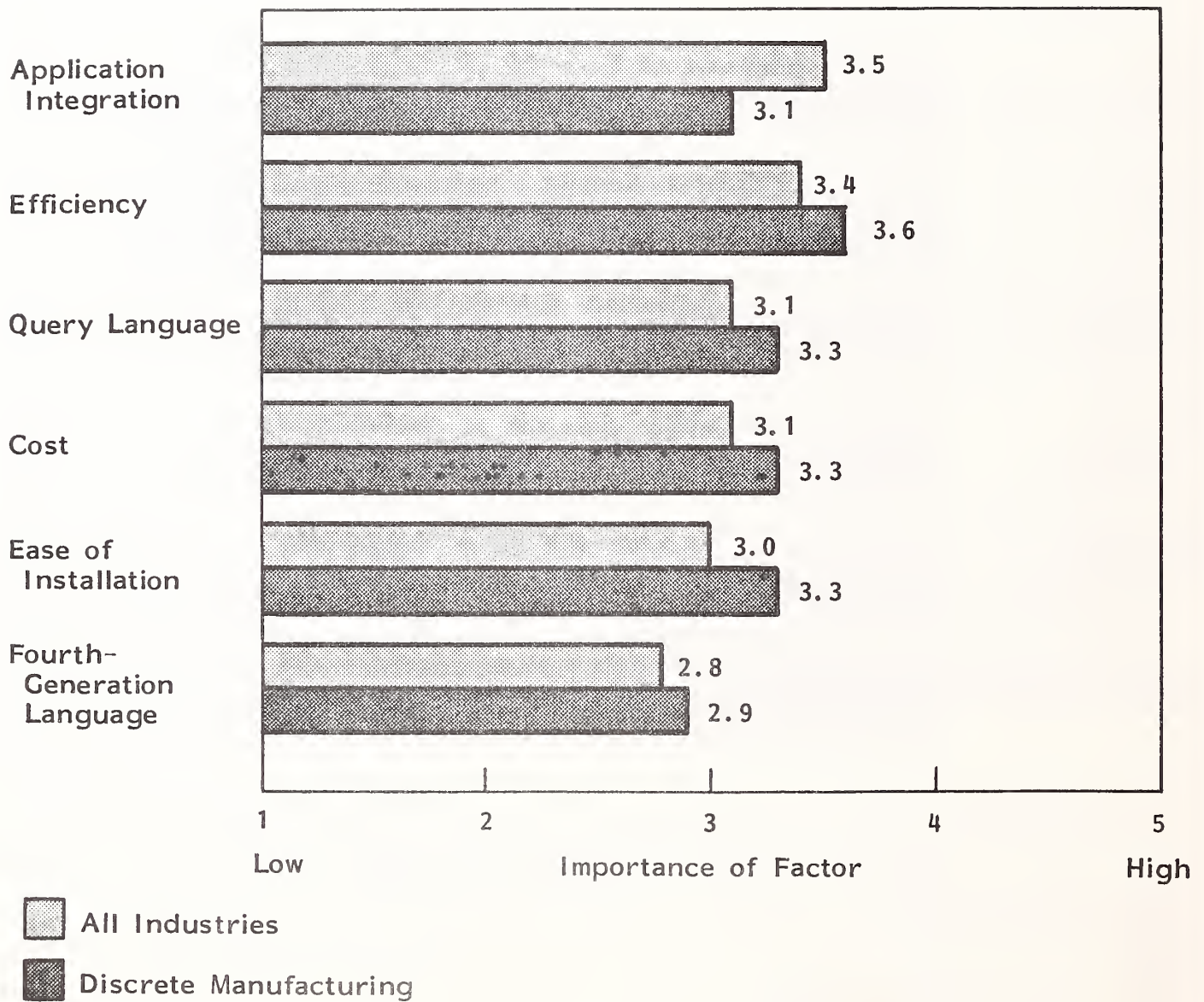


EXHIBIT IV-9

IMPORTANCE OF FACTORS IN
APPLICATION SOFTWARE PURCHASES
(User Viewpoint)

Process Manufacturing

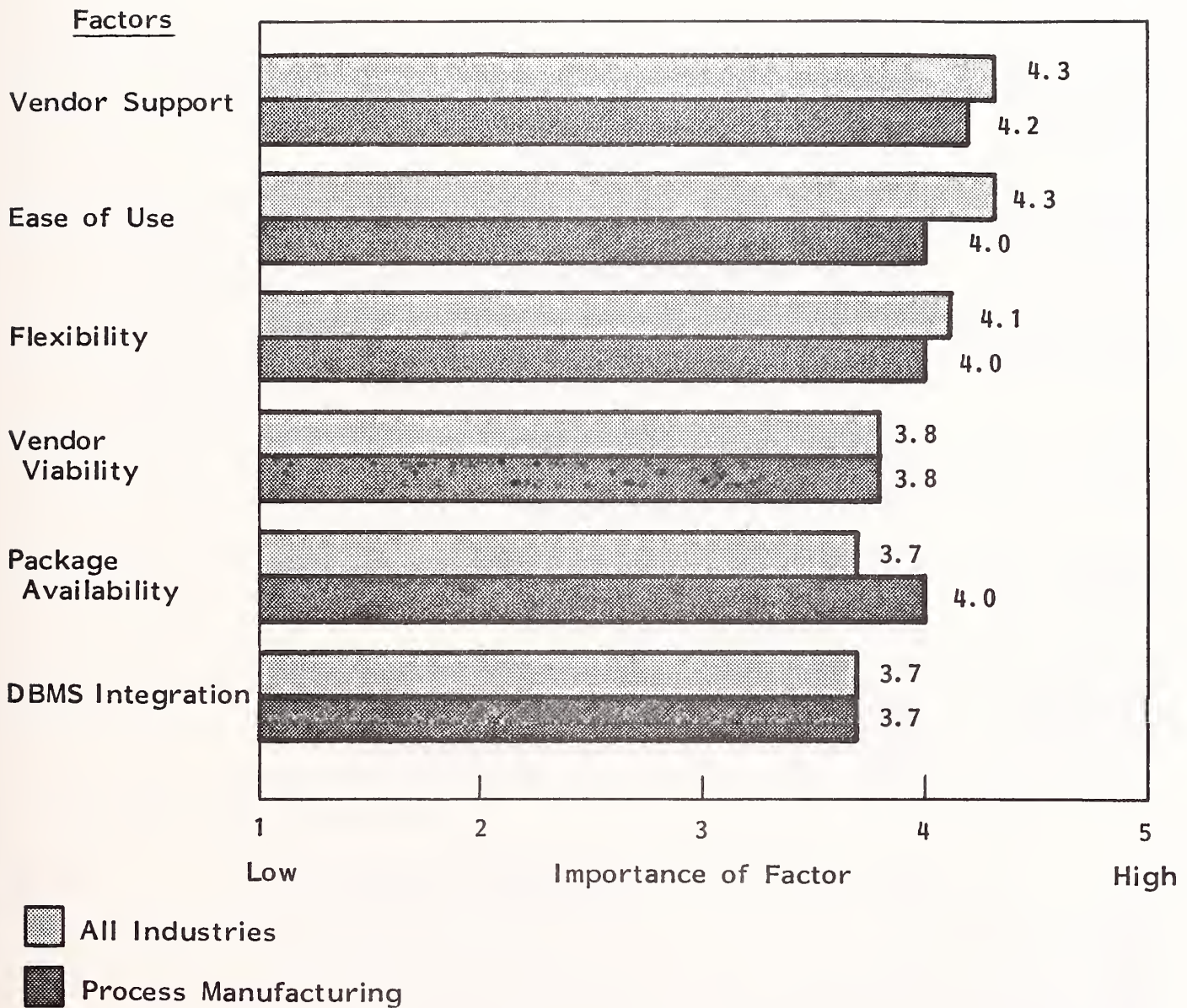
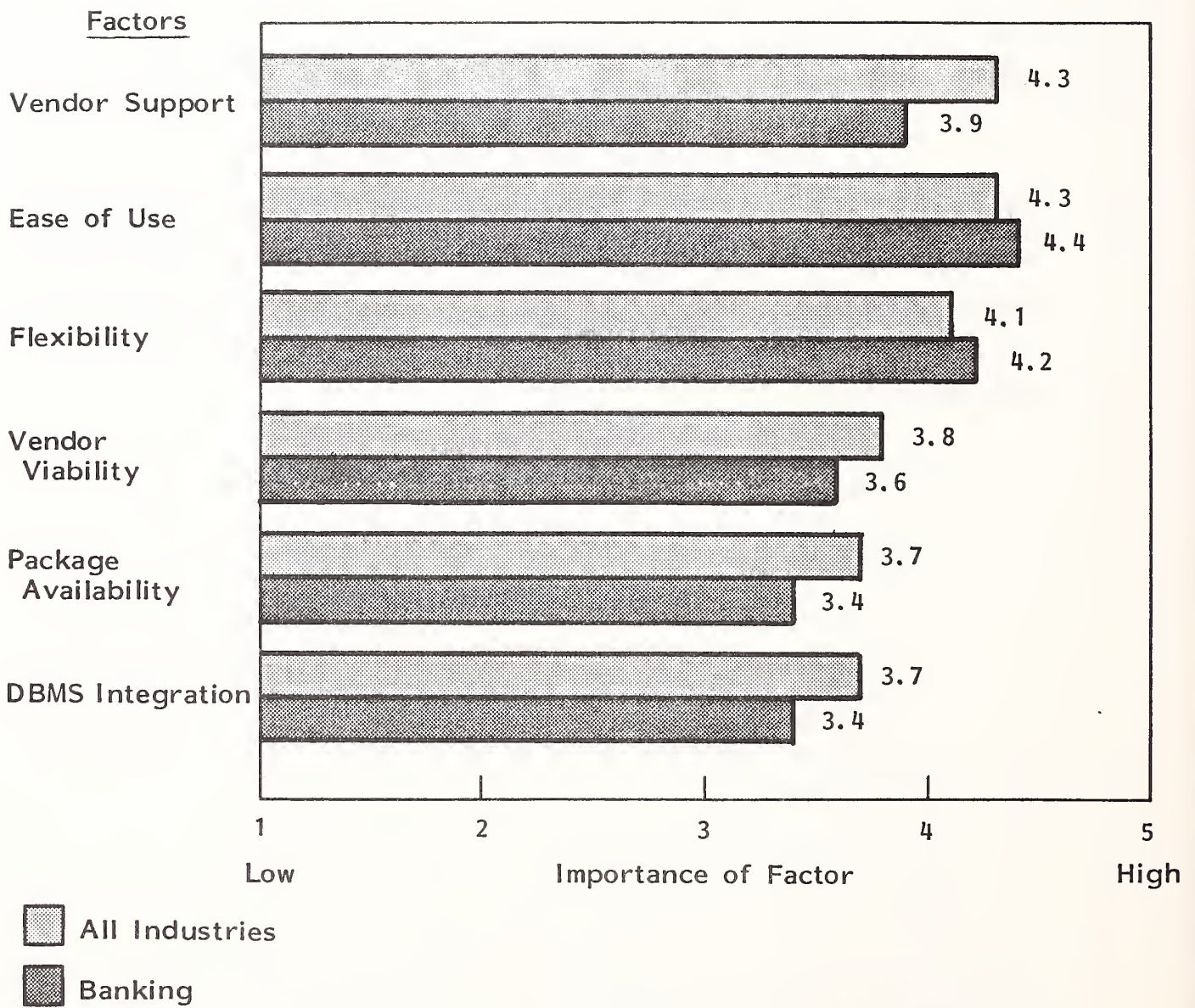


EXHIBIT IV-10

IMPORTANCE OF FACTORS IN
APPLICATION SOFTWARE PURCHASES
(User Viewpoint)

Banking



- As indicated in Exhibit IV-10, bankers tend to be more sensitive than other purchasers regarding efficiency and application integration. They are relatively insensitive to query and fourth-generation language issues.
- Insurance companies tend to be more concerned with vendor issues (i.e., support and viability) and fourth-generation languages than are firms in other sectors, as shown in Exhibit IV-11. Package availability is not of major importance, however. This reveals lack of importance receptivity toward codevelopment or beta-testing. Cost and efficiency are also rated as less significant.

H. COMPARISON WITH INSTALLED INTEGRATED-SOFTWARE USERS

- Characteristics for selected installations running purchased integrated software were compared to the characteristics analyzed above for the general sample of users. A summary of the preference ratings is shown in Exhibit IV-12. Compared to all general users, respondents running purchased integrated software indicate:
 - Greater reluctance to change or add DBMSs to their existing systems.
 - Greater preference for adding applications to existing DMBSs.
 - Greater concern for application integration than for DBMS integration.
 - Language features (query and fourth generation) are also considered more important.
 - Software cost, on the other hand, is of less importance.
- The general sample of users reported that 22% of applications purchased were for DBMSs; for the purchased integrated software users this proportion was

EXHIBIT IV-10

IMPORTANCE OF FACTORS IN
APPLICATION SOFTWARE PURCHASES
(User Viewpoint)

Banking

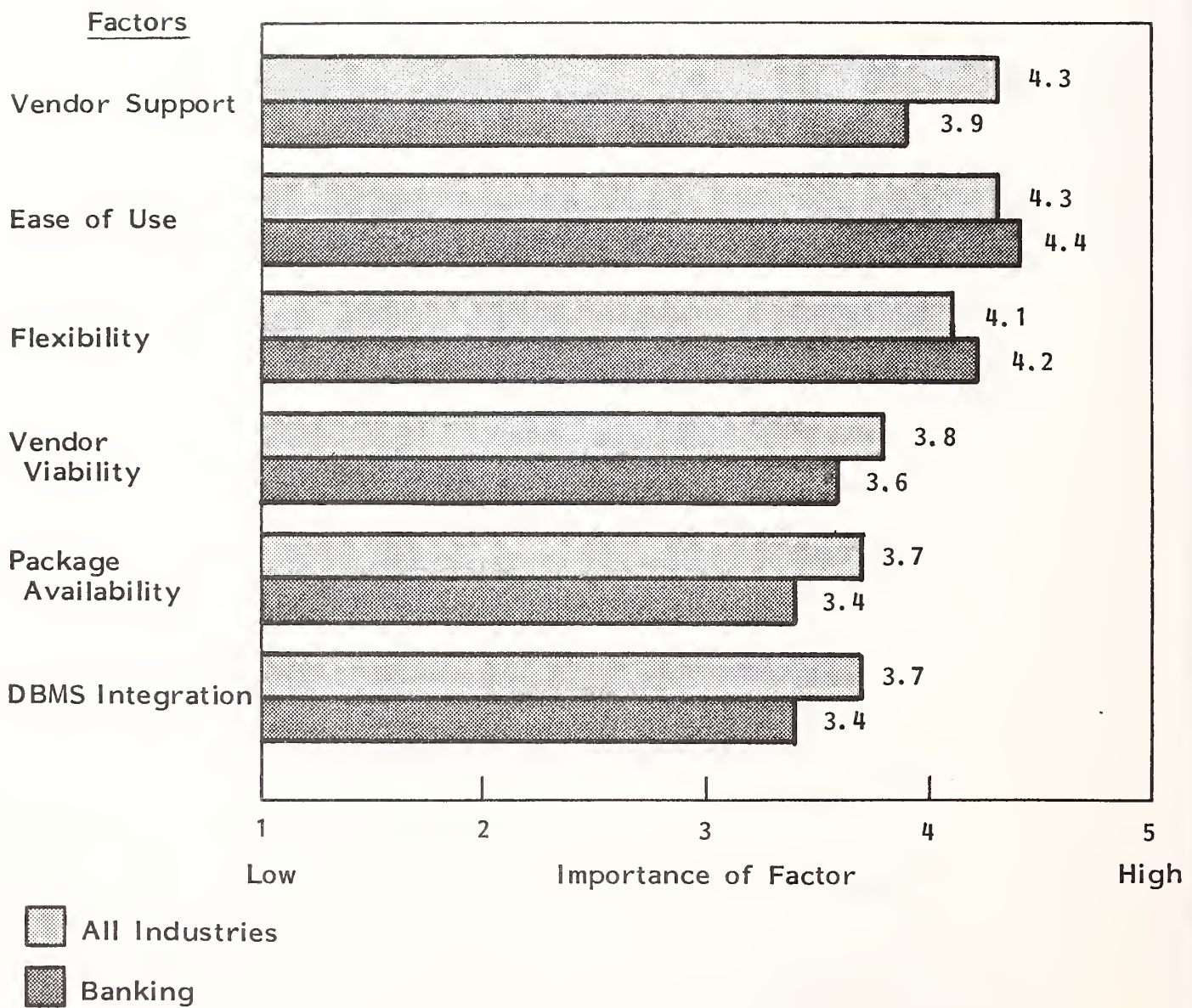


EXHIBIT IV-10 (Cont.)

IMPORTANCE OF FACTORS IN
APPLICATION SOFTWARE PURCHASES
(User Viewpoint)

Banking

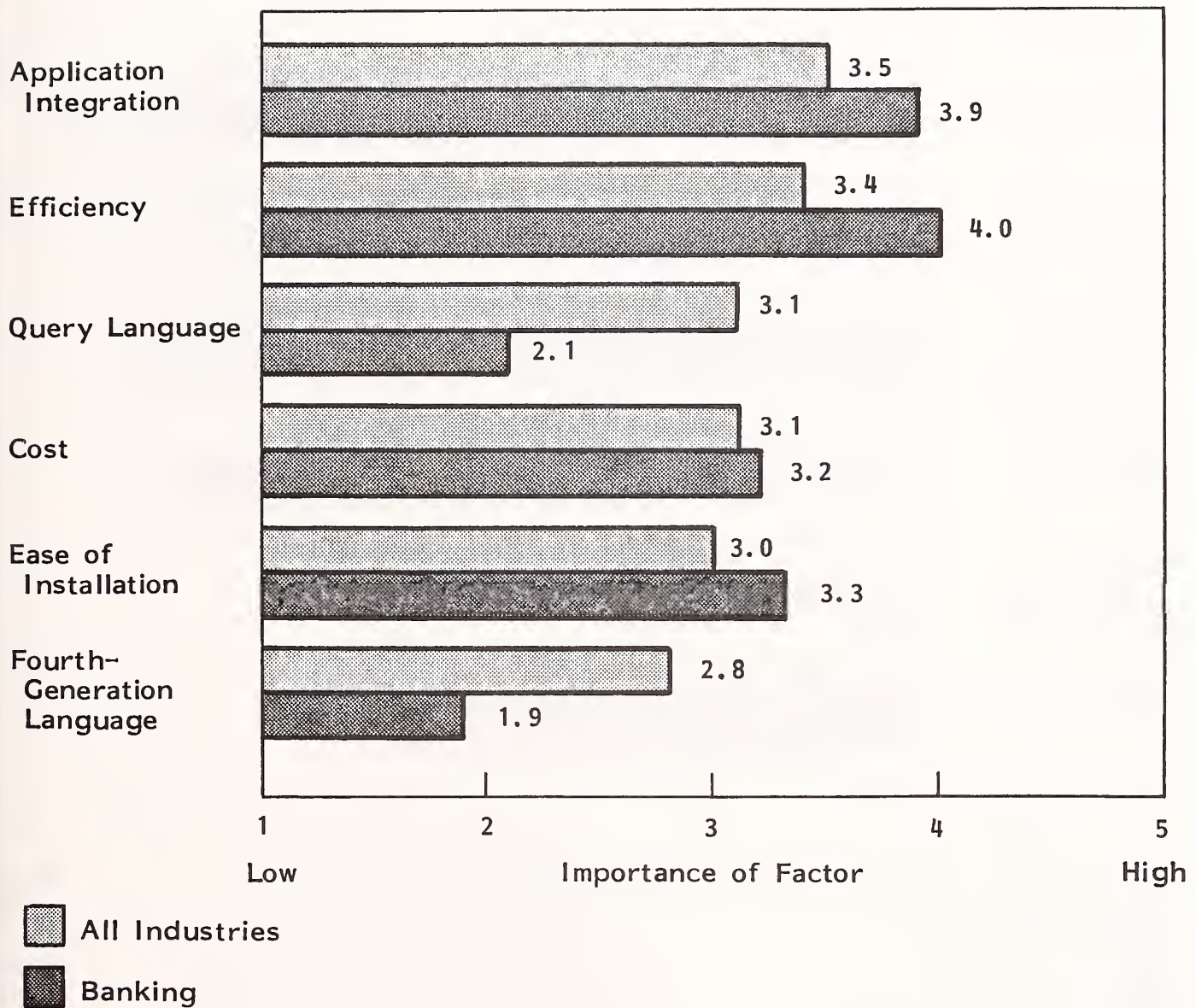


EXHIBIT IV-11

IMPORTANCE OF FACTORS IN
APPLICATION SOFTWARE PURCHASES
(User Viewpoint)

Insurance

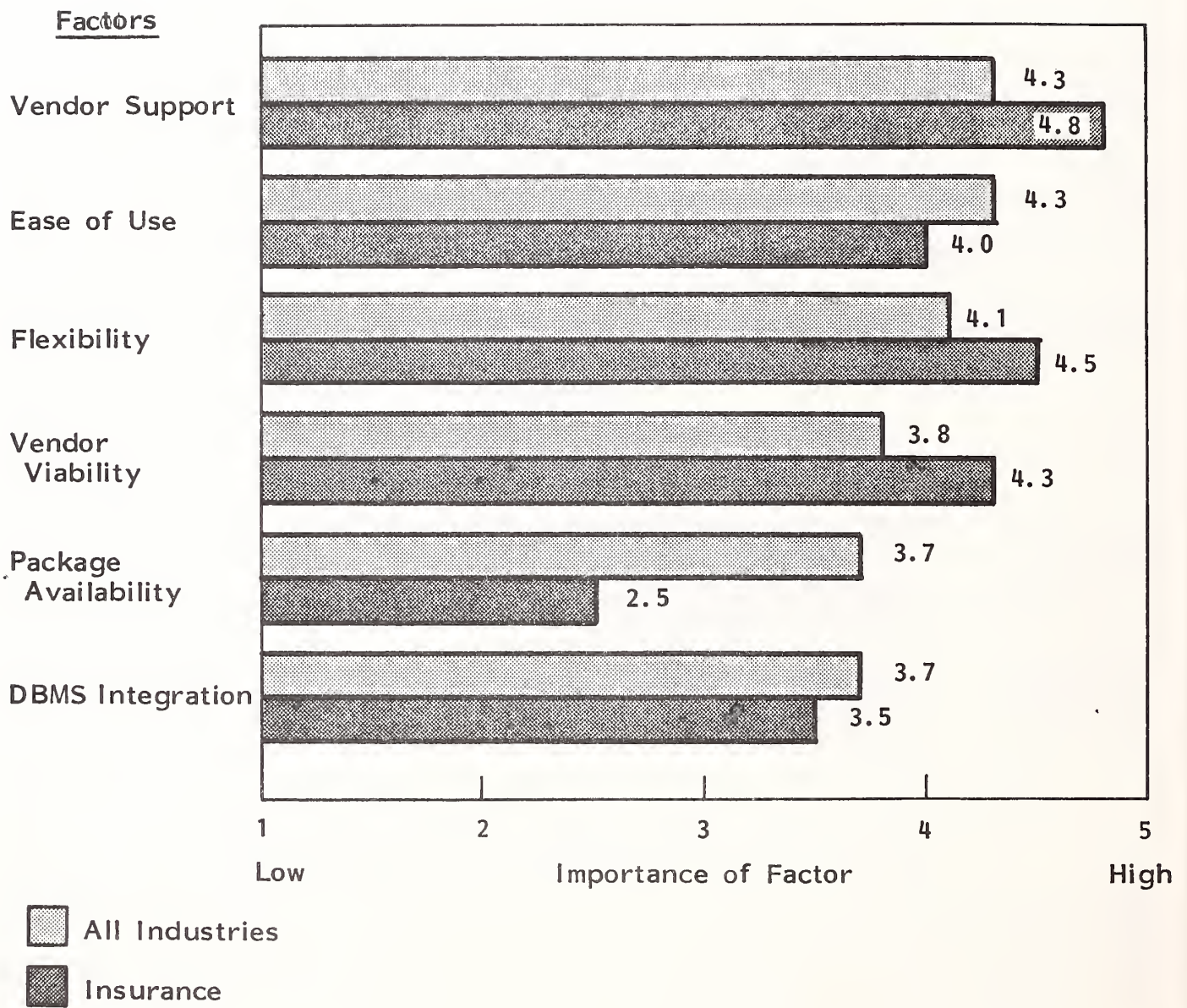


EXHIBIT IV-11 (Cont.)

IMPORTANCE OF FACTORS IN
APPLICATION SOFTWARE PURCHASES
(User Viewpoint)

Insurance

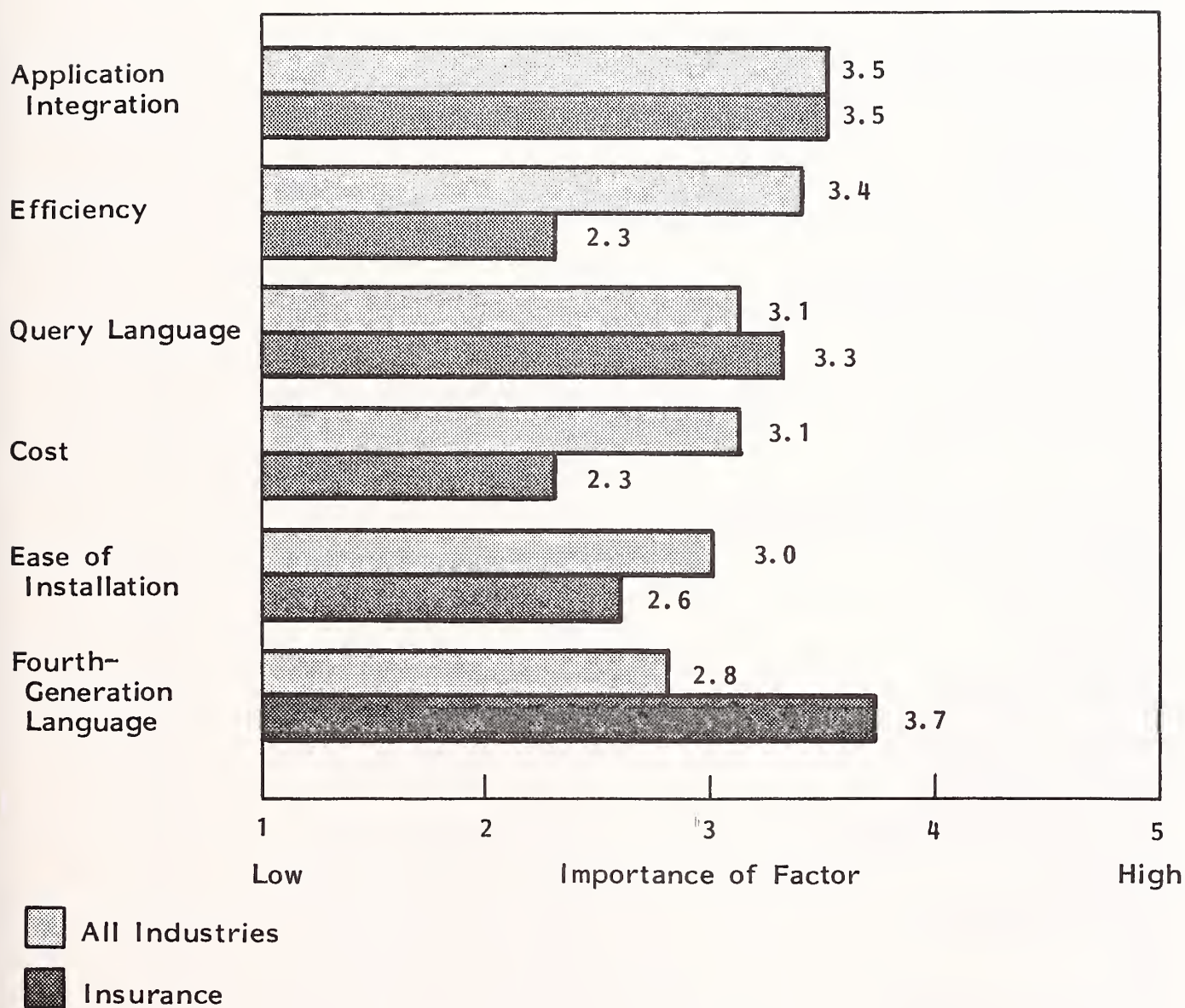


EXHIBIT IV-12
 COMPARISON: ALL RESPONDENTS AND
 RESPONDENTS WITH PURCHASED INTEGRATED PACKAGES

CHARACTERISTICS	PREFERENCE (1 = Low, 5 = High)	
	DBMS USERS	RESPONDENTS WITH PURCHASED INTEGRATED PACKAGES
<u>Change/Add DBMS Willingness</u>		
Willingness to Change DBMS Vendor	1.8	1.4
Willingness to Add DBMS	2.3	1.4
<u>Integration Strategy</u>		
Add Applications to Existing DBMS	4.3	4.9
Integrate DBMS with Existing Applications	1.9	1.7
Purchase/Develop New Software System	1.6	1.7
<u>Software Vendor Preferences</u>		
Applications Supplier	4.0	4.0
DBMS Supplier	3.5	3.5
Hardware Supplier	2.8	1.5
Third-Party Integrator	2.6	2.1
<u>Software Purchase Considerations</u>		
Vendor Support	4.3	4.8
Ease of Use	4.3	3.8
Flexibility	4.1	3.8
Vendor Viability	3.8	4.1
Package Availability	3.7	3.8
DBMS Integration	3.7	3.6
Application Integration	3.5	4.3
Efficiency	3.4	3.8
Query Language	3.1	3.4
Cost	3.1	2.4
Ease of Installation	3.0	3.3
Fourth-Generation Language	2.8	3.4

51%. Projected percentages for 1987 will be 46% for the general sample and 71% for the purchased-integrated-software users.

V COMPETITIVE ANALYSIS

V COMPETITIVE ANALYSIS

- This chapter discusses the DBMS-application software environment from the vendor's standpoint. Three sections are included:
 - Market impact on DBMS-application software integration.
 - Vendor response to market impacts.
 - Profile of DBMS-application software.

A. MARKET IMPACTS ON INTEGRATION

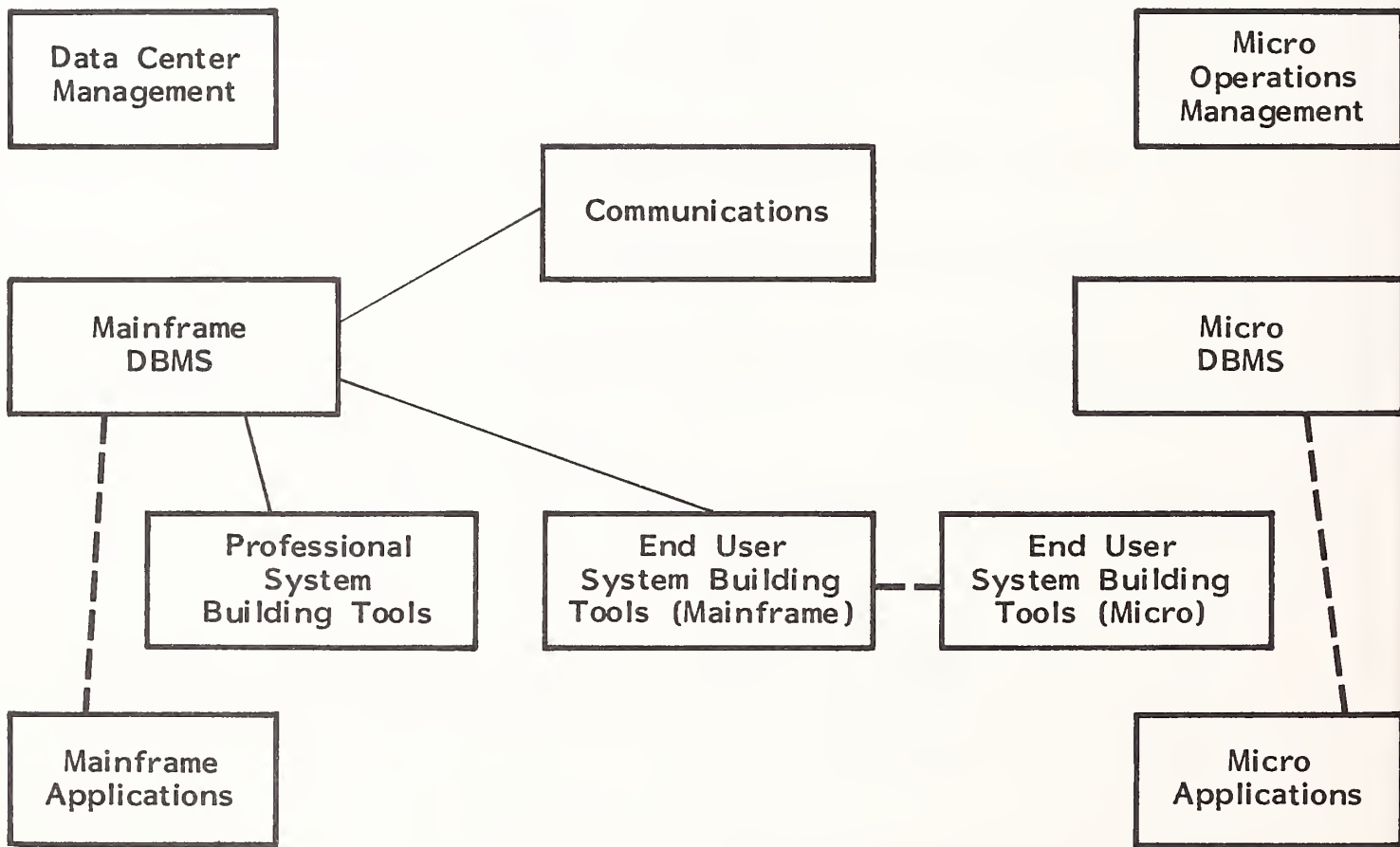
- Two factors impact the development and marketing of integrated DBMS-application software: the nature of the marketplace and the vendor's position within the industry.

I. NATURE OF THE MARKETPLACE

- The software user marketplace is generally fragmented. Differing kinds of relationships exist between end-user needs and the products to satisfy these needs, as indicated in Exhibit V-1.

EXHIBIT V-1

SYSTEMS SOFTWARE MARKET STRUCTURE



Key:

Weak Linkage - - - - -

Strong Linkage ————

Software Product Area

- Some users prefer working with multiple vendors, expressing a fear of being tied to a single supplier. Since users do not demand "one-stop shopping," vendors can pursue coexistence strategies, as demonstrated by the MSA/ADR arrangement.
- Application modularity is desired so that purchases can be made sequentially; thus, it is critical that future applications interface, with little or no modifications, with existing software.
- Two buyers contribute to the software purchase decision. For application software, the primary decision maker is typically the end user; for systems software, it is the data processing department.
- For integrated DBMS-application software, the end users are the dominant contributors to the decision process.
 - Survey results indicate that the weight of end users in final applications purchase decisions is about 70%.
 - While the remaining 30% of the decision-making influence rests with data processing, its role frequently involves advising and/or exercising veto power.
 - Thus, the decision-making influence of the end user is even greater than the 70% figure indicates for traditional applications purchases.
 - However, the integration and DBMS aspects of integrated applications purchases can be expected to increase the importance of the role of the data processing department.
- The selected sample of previously installed integrated software users (Chapter IV) reported a reversed decision-making mix between end users and data processing, i.e., 36% and 64%, respectively. This suggests that end users have

assumed an increasingly important role in recent years in the decision-making process.

- Exhibit V-2 highlights the differing purchase criteria within for these two buyers.
- There are a number of barriers to entering the market for integrated DBMS-application software.
 - Buyers are hesitant about the established reputation of current DBMS and applications vendors. Users report that vendor viability is a very important factor in user purchase decisions.
 - The already lengthy cycle for developing proven software should increase with the need for integrating application and DBMS software.
 - Vendors need to establish "critical mass" in terms of:
 - Annual revenue.
 - DBMS revenue/installation base.
 - Applications revenue/installation base.
 - Research and development budget.
 - Personnel resources.
 - There is a need for sales forces that can address the requirements of end users and data processing. This challenge is more severe for DBMS vendors (e.g., Cullinet) than for applications vendors (e.g., MSA).

EXHIBIT V-2

END-USER AND DATA PROCESSING PURCHASING CRITERIA

<u>CRITERIA</u>	<u>END USER</u>	<u>DATA PROCESSING</u>
Software Orientation	Application	DBMS
Hardware Orientation	Mini /Micro /Personal	Mainframe
Primary Focus	Business Problems	Technical Capability
Organizational Focus	Decentralized	Centralized
Budget Constraints	Variable	Fixed
Sales Cycle	Short	Long
Purchasing Role	Decision Maker	Advisor with Veto Power

- The DBMS market has already experienced a substantial degree of penetration--perhaps 50% or more; thus, developing a market presence becomes increasingly difficult for late entries. (However, depending on the degree to which integrated DBMS-application software systems are perceived as "new products," this new market may represent significant new opportunities for vendors with low traditional DBMS market penetration (e.g., ADR).

2. VENDOR POSITION

- Traditionally, suppliers could be classified into three types: hardware, DBMS, and application software, as shown in Exhibit V-3.
- Integrated software historically had been developed for finance and accounting applications, and for limited vertical markets such as manufacturing and banking.
- Several major vendors have taken steps to introduce DBMS-application software products:
 - Cullinet, Cincom, and Computer Associates from the DBMS segment.
 - MSA and McCormack & Dodge from the applications segment.

B. VENDOR RESPONSE

- In light of the marketing effects, a marketing strategy and integrated software development plan are needed.

EXHIBIT V-3

VENDOR CLASSIFICATIONS

HARDWARE

IBM

BUNCH

Minicomputer

- DEC
- DG
- HP

DBMS

Cullinet

Cincom

ADR

Software AG

APPLICATIONS

MSA

McCormack & Dodge

Walker Interactive Products

Software International

I. MARKETING STRATEGY

- To address user needs at several organizational levels, integrated software products should include the following features:
 - Data dictionary.
 - Application development tools (e.g., fourth-generation languages and screen painters).
 - Report writer.
 - Query language.
 - Maintenance and control utilities.
 - Telecommunications interface.
 - Micro-mainframe link.
- Cullinet and Cincom have achieved greater prominence among the DBMS vendors, while MSA is the leader among application software vendors.
- Distribution from vendor to customer should capitalize on the importance of the end user in the decision-making process.
 - Applications vendors, accustomed to dealing with end users, should have an inherent edge over hardware and DBMS vendors, who are more data processing oriented.
 - As integrated products are downloaded onto micro- and personal computers, the need increases for end-user distribution and marketing.

- Promotion and advertising should incorporate users' preferences for:
 - Applications that can be added to DBMSs (rather than vice versa).
 - The ability to add to/interface with existing DBMSs.
 - Adequate vendor support, ease of use, and flexibility.
 - Cost-effectiveness compared to competitive offerings.
 - Cost-effectiveness compared to in-house development.
 - Reference installations.
- As noted by several users, "premature" announcements and "unrealistic" product descriptions should be avoided, since they could hamper established vendor credibility.
- Applications-oriented vendors, such as MSA and McCormack & Dodge, should have the advantage over DBMS vendors in several of these areas.
- As noted in the user survey, cost is not one of the key issues for most respondents. Clarity of pricing structure is important, however, and premium purchase and maintenance pricing requires sufficient description of attendant benefits.

2. PRODUCT DEVELOPMENT STRATEGY

- Integrated DBMS-application software systems can be developed by hardware vendors, by software vendors, or by a hybrid of the two.
 - Hardware vendors like IBM and BUNCH—plus AT&T and in the future the Japanese—will increasingly offer value-added features and soft-

ware. Although IBM's DB2 is scheduled for release in the fall of 1984, it is not clear how it will be integrated with existing application software.

- DBMS vendors will offer application software in addition to systems software. The larger companies, such as Cullinet, have already developed a series of DBMS-based application products.
- Relationships between established systems software and application software vendors will be structured such that they theoretically will combine the best of both worlds (e.g., the MSA/ADR marketing and development agreement).
- Product development alternatives include:
 - Internal development.
 - Third-party contracting.
 - Joint ventures.
 - Customer development.
- Internal development provides the greatest control over product content and quality; internal development may not be practical, however, due to:
 - Software that is already largely developed by other supplier(s).
 - Limited resources (financial, personnel, time).
 - The need to get into the marketplace quickly.

- Contracting with third parties can provide a satisfactory alternative, provided the contractor has:
 - Sufficient expertise.
 - Adequate resources.
 - A commitment to product development.
 - An established track record.
- Joint ventures offer the potential for sharing development costs and reducing development cycle time. Additional marketing presence can also be realized through a combined effort. Profits must be shared also, however, and the health of the relationship is dependent upon continued positive contributions by all parties.
- Customer development offers the least financial exposure--at least in the short term. It is important that the customer have (or add) personnel with sufficient DBMS experience since unsuccessful development is frequently traced back to the vendor. Thus, long-term consequences can be disastrous, both in terms of retaining existing customers and in securing new business.
- Among the DBMS vendors, Cincom has generally relied on internal development, while Cullinet has pursued a mix of internal development, software purchase (McCormack & Dodge, Rath and Strong, and Information Sciences), and acquisition (Bob White Computing). Software AG also relies on internal development, while ADR has structured a joint marketing/sales arrangement with MSA in order to offer integrated packages.
- IBM and other mainframe and microcomputer manufacturers also utilize third parties and customers to develop integrated systems.

- Key characteristics of each of the four product development alternatives are indicated in Exhibit V-4.

C. VENDOR PROFILE

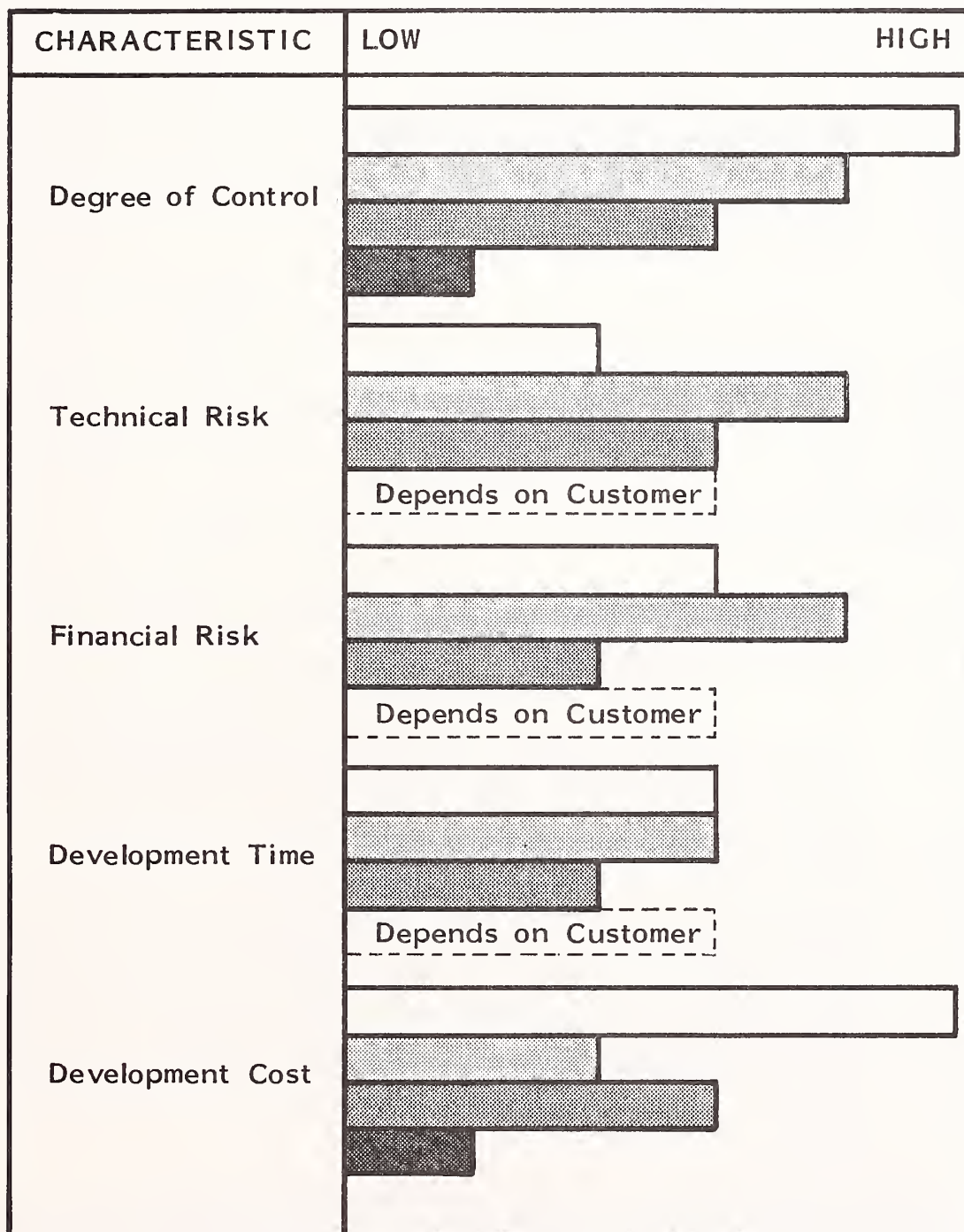
- The vendors can be grouped into three categories: hardware, DBMS, and applications.

I. HARDWARE VENDORS

- IBM is the primary company in this category, although BUNCH and other mainframe manufacturers also play a role.
- IBM currently has almost 75% of the hardware market and 50% of the DBMS market.
- IBM's DBMS market share, which represents almost 5% of IBM's total software sales, has been declining due to the systems marketing efforts of other suppliers.
- Current hierarchical DBMSs (IMS and DL/I) are intended for day-to-day production environments.
- IBM's relational data base, DB2, is scheduled for release in the third quarter of 1984. DB2 is targeted for a more ad hoc, flexible environment, where productivity is required.
- Although DB2 is reportedly not as advanced as competitive DBMS offerings, it is still an attractive, low-risk alternative because a large proportion of companies are committed to IBM mainframes.

EXHIBIT V-4

CHARACTERISTICS OF PRODUCT DEVELOPMENT ALTERNATIVES



- Internal Development
- ▨ Third-Party Contract
- ▩ Joint Venture
- Customer Development

- Of the installed DBMS base, manufacturing is predominant (over 40% of DL/I sites). Banking and insurance are also significant (over 10% of IMS sites).
- IBM offers a number of strengths:
 - Over fifty years of industry experience.
 - Established service/support reputation.
 - Largest customer base.
 - Corporate strategy supported throughout company.
 - Understanding of data processing environment.
- Weaknesses are generally the mirror image of strengths:
 - Reputation as outstanding hardware vendor is offset by lesser image as a software developer.
 - There is less understanding of the needs of the end-user, applications-oriented marketplace. (Improvement may be realized by having one sales force selling the entire product line.)
 - In maintaining its vast customer base, IBM must be "all things to all people," thereby making it difficult for IBM to develop specific solutions and to react to individual customer changes in segments of its overall base. Thus, competitive niches are created for specific applications and vertical markets.
- Overall, IBM's strategy is geared to protecting the existing customer base and to maintaining account control, while reducing competitive pressure from DBMS vendors. By maintaining a dominant position in the mainframe and PC

markets, sufficient control can be achieved without asserting a strong DBMS-application software presence.

- IBM could also pursue purchase of an existing application development company; this action would affect the application software companies to a greater degree than it would the DBMS vendors.
- While IBM's actions will potentially reposition it as the leading DBMS vendor, most integrated software suppliers should benefit as the overall market expands and users become more comfortable with integrated systems.

2. DBMS VENDORS

- The six largest vendors will be described, followed by a listing of other suppliers.

a. Cullinet

- Founded in 1968, Cullinet in calendar 1984 should have sales of over \$150 million, sustaining its annual growth rate of 50%.
- DBMS revenues account for about a third of total sales.
- Application software revenue growth should increase from 4% of sales in 1983 to three to four times that amount in 1984; application software is projected to account for half of all revenues by 1987.
- Some application software is developed in-house; the rest is purchased and modified:
 - Manufacturing software purchased from Rath and Strong.
 - Financial applications purchased from McCormack & Dodge.

- Human Resources software purchased from Information Sciences.
- The banking field is being reentered via the recent acquisition of Bob White Computing and Software.
- Although prior arrangements with Apple have been canceled, Cullinet recognizes the need for incorporating personal computers into its overall strategy.
- About 40% of all Cullinet installations are in the manufacturing sector, with banking and insurance each less than 10%.
- Cullinet's strengths include:
 - Recognition as the most comprehensive vendor of DBMS-application software.
 - Extensive customer base.
 - An established position in the manufacturing sector, which represents up to 40% of the computer hardware/software market.
 - Consistent financial performance.
 - Strong organization, emphasizing customer support.
 - Excellent application development tools.
- Cullinet's primary weakness is in being IBM's major DBMS competitor; other disadvantages include:
 - The systems design approach is quite sophisticated, resulting in a lengthy user learning curve.

- The integrated systems approach forces users to convert DBMSs to IDMSs or IDMS/Rs.
 - The software purchase and maintenance costs are viewed as excessive compared to the competition's.
 - Cullinet was set back by several aborted entries into the banking industry.
- Strategies continue to reflect Cullinet's market position:
 - Cullinet desires to surpass IBM in product capability.
 - Cullinet offers management, marketing, and product support that is superior compared to that of other independent vendors.
 - Cullinet's goal is to be the leading source of integrated software, with applications implemented through superb development tools.
 - In summary, despite its solid track record, Cullinet's plans may be overly ambitious in view of reported problems with IDMS/R installations. Even though Cullinet is a leader in the DBMS market, its understanding of the end-user applications market can be bolstered. Finally, a 50% annual growth rate becomes increasingly difficult to sustain as revenues climb. Accordingly, Cullinet will be a strong, but not necessarily dominant, force in the integrated products marketplace.

b. Cincom

- Cincom's 1984 annual sales should approach \$100 million, with half of all revenues generated outside the U.S.; the annual growth rate is close to 35%.

- Reported to have the largest user base among all independents, it includes about three-quarters of the Fortune 100 companies.
- TIS was introduced as a relational DBMS to complement existing TOTAL hierarchical software.
- Manufacturing and finance applications are to be supplemented with human resources software (payroll/personnel).
- Strengths include:
 - Large IBM and non-IBM user base.
 - DBMSs compatible with select DEC and WANG mainframes, as well as with IBM.
 - There is no need to switch to a proprietary data base for integrated applications, as is the case with Cullinet.
- Weaknesses include:
 - TOTAL software is relatively inflexible and needs upgrade.
 - Application software is not well recognized outside the customer base.
 - Cincom's support of competitive DBMSs (e.g., IDMS) is potentially self-defeating.
- Cincom's strategic direction is to make applications independent of the underlying data base foundation:
 - Cincom considers DBMSs a process.

- This strategy allows for greater diversification into additional product areas.

- In summary, while well accepted by its own customers, Cincom lacks recognition throughout its target market and needs to add to its "critical mass," especially in the management ranks; wider dissemination of information regarding its accomplishments would serve to improve the company's position.

c. ADR (Applied Data Research)

- Although the oldest of the independent software companies (founded in the 1950s), ADR did not enter the DBMS marketplace until its acquisition of Datacom software in 1978.
- Revenues in 1984 are projected to be \$115 million, with growth at a 30% annual rate.
- Datacom sales growth is among the fastest in the industry.
- While government contracts contribute a significant portion of total revenues, nearly all Fortune 100 companies are also customers.
- ADR is similar and possibly superior to Cullinet in scope and power of DBMS products.
- While the manufacturing sector leads with about 30% of the installed sites, wholesale/retail has over 15%. Banking and insurance are both minor industries, each representing less than 5% of the installed base.
- Strengths include:
 - DBMS technology is well recognized and accepted.

- ADR has a number of applications development tools.
 - Datacom's "transparency" feature is superior in interfacing with IMS and VSAM files.
 - With its arrangement with MSA, ADR can offer numerous features, especially in the finance and manufacturing environments.
- Areas needing additional attention are:
 - Increased emphasis is needed in marketing and customer support.
 - IDEAL, introduced last fall and upgraded in January 1984, needs to be proven.
 - The breadth of the product line is limited.
 - The installed base of integrated products is small.
- Strategy consists of:
 - Maintaining technological position.
 - Strengthening applications development tools.
 - Increasing alliances with application software vendors (MSA, McCormack & Dodge, Information Sciences, Comserve).
- In summary, the company's technological focus is potentially misaligned when one considers the high degree of end-user involvement in purchasing integrated systems; the lack of seasoned marketing/sales leadership may further hamper efforts to sustain company growth rates. A continued positive alliance with MSA, however, will strengthen ADR's position.

d. Software AG

- Company 1984 revenues are projected to be \$40 million, with annual sales growth about 30%.
- ADABAS is positioned as both a data processing and an end-user-oriented DBMS.
- Software AG's applications development approach features speed, flexibility, and ease of modification.
- Applications products are structured around NATURAL, the first commercial fourth-generation language tied to a DBMS.
- Substantial software development is provided through software AG's German affiliate, Software AG of Darmstadt.
- Government is the leading sector, with one-fourth of all installations; manufacturing represents about 20%, while banking and insurance are each about 5%.
- Leading strengths are:
 - Name recognition.
 - Solid worldwide user base.
 - Technologically proven DBMSs.
- Weaknesses noted:
 - Recent management changes.

- Irregular financial and sales performance.
 - Need for increased support of customers and applications development.
 - A limited installed base of integrated products.
- Strategic directions include:
 - Offering ADABAS at substantial discount to encourage applications vendors to develop packages.
 - Maintaining its technological position (similar to ADR).
 - Emphasizing distributed processing systems software, including DBMSs for DEC's VAX.
 - In summary, ADABAS's established image is offset by a lack of financial and management continuity and by uncertainty regarding the relationship with the German affiliate. A marketing redirection targeting software AG's products at the end user would improve software AG's long-term position.

e. Computer Associates International

- Company revenues exceed \$80 million and maintain a 35% annual growth rate.
- CA-universe, a relational data base, runs on IBM, Data General, and DEC mainframes.
- There are two integrated product families:
 - Financial management.

- Distribution management.
- Strengths are:
 - Sustained growth rate.
 - Sound financial position.
 - Extensive international distribution network.
- Weaknesses include:
 - Limited customer base.
 - Limited DBMS marketing/sales experience.
- Strategy emphasizes an integrated product line aimed at end users.
- In summary, limited financial resources, late market entry, and a resulting lack of both reputation and established customer base will preclude major market penetration, even though company strategy is sound.

f. Computer Corporation of America

- This is the developer of Model 204 DBMS, which is:
 - Well regarded.
 - Designed for distributed and communications environments.
 - Limited in terms of installation base.

g. Other DBMS Vendors

- The following vendors also market DBMSs:
 - Intel (System 2000).
 - Relational Technology (Ingres).
 - Oracle (Oracle).
 - Seed Software (Seed).

3. APPLICATIONS VENDORS

- Descriptions will be provided for the major applications vendors, with a listing of other suppliers.

a. MSA

- MSA is the largest independent supplier of application software, with 1984 annual revenues approaching \$200 million and a growth rate of over 35% per year.
- MSA offers (or will introduce this year) application software compatible with one or more of the major DBMSs (i.e., IMS, IDMS, ADABAS, and DATACOM). Applications include:
 - General ledger.
 - Accounts payable.
 - Fixed assets.

- Order processing.
 - Human resources (payroll/personnel).
 - Manufacturing.
 - Accounts receivable.
- MSA recently entered into a development and marketing arrangement with ADR in which all MSA software will be compatible with ADR's Datacom. This action should bolster the technological and features attractiveness of MSA products when sold as an integrated DBMS-application software solution.
 - Strengths include:
 - A reputation as the largest application software vendor.
 - An established company and management team.
 - An established presence in selected vertical markets such as banking and insurance, health care, government, and education.
 - A comprehensive portfolio of proven features-rich software.
 - A commitment to customer support/ user satisfaction.
 - Potential weaknesses noted are:
 - Manufacturing software acquired from Xerox has taken much longer than expected to prepare for the office and to integrate with other offerings.

- Should ADR falter (and Cullinet and IBM exceed their expected performance), MSA could be associated with the "wrong" vendor; a similar situation could occur if the two sales forces cannot effectively integrate their marketing efforts.
- Strategy:
 - MSA must review opportunities for additional DBMS vendor agreements to strengthen its market potential without endangering existing relationships.
- In summary, MSA will fare well, with or without incremental revenues from its ADR arrangement. If the arrangement succeeds, the resulting technical/end-user combination will position MSA as the leading force in integrated products.
- b. McCormack & Dodge
- The Millennium application software series is based on advanced financial systems design architecture, and includes:
 - System Development Tools (SDT).
 - Fourth-generation languages.
 - Screen/forms generator.
 - Query language.
- Financial packages, running on IBM and plug-compatible mainframes, include:
 - General ledger.

- Accounts payable.
- Accounts receivable.
- Purchase orders.
- Fixed assets.
- Human resources.
- Capital project analysis.
- Systems expected to be released soon include:
 - Order entry.
 - Inventory control.
- Strengths and weaknesses as well as future strategies are difficult to quantify since information on company operations and installed-software users is not made available.

c. Walker Interactive Systems

- Walker is a privately held company with venture capital backing.
- It is pursuing a "strategic software" approach, directed at:
 - Providing a long-term solution to automating business functions.
 - Developing real-time systems that are:
 - Integrated.

- . User adaptable.
- . Transportable to a variety of computer environments.
- Shifting the focus of data processing from the user to the optimization of computer technology and control.

d. Hogan Systems

- Hogan specializes in the banking industry.
- The target market consists of 350 institutions.
- Hogan supports IMS and VSAM.
- The emphasis is on applications development tools, followed in emphasis by applications.

e. Summary

- Exhibits V-5 through V-7 summarize the comparative characteristics of the hardware, DBMS, and applications vendors discussed above:
 - Exhibit V-5 summarizes software purchase preferences expected during the next year for selected vendors.
 - Exhibit V-6 positions the vendors in terms of their orientation (DBMS or application software) and level of integrated product offerings.
 - Exhibit V-7 contains detailed profiles for the major DBMS vendors discussed above.

EXHIBIT V-5

1984/1985 DBMS SOFTWARE SALES -
BY VENDOR

----- EXPECTED LEVEL OF SALES -----		
<u>INCREASE</u>	<u>RELATIVELY UNCHANGED</u>	<u>DECREASE</u>
Cullinet	Software AG	IBM
ADR	Others	Cincom

EXHIBIT V-6

DEGREE OF INTEGRATED DBMS -
APPLICATION SOFTWARE IMPLEMENTATION

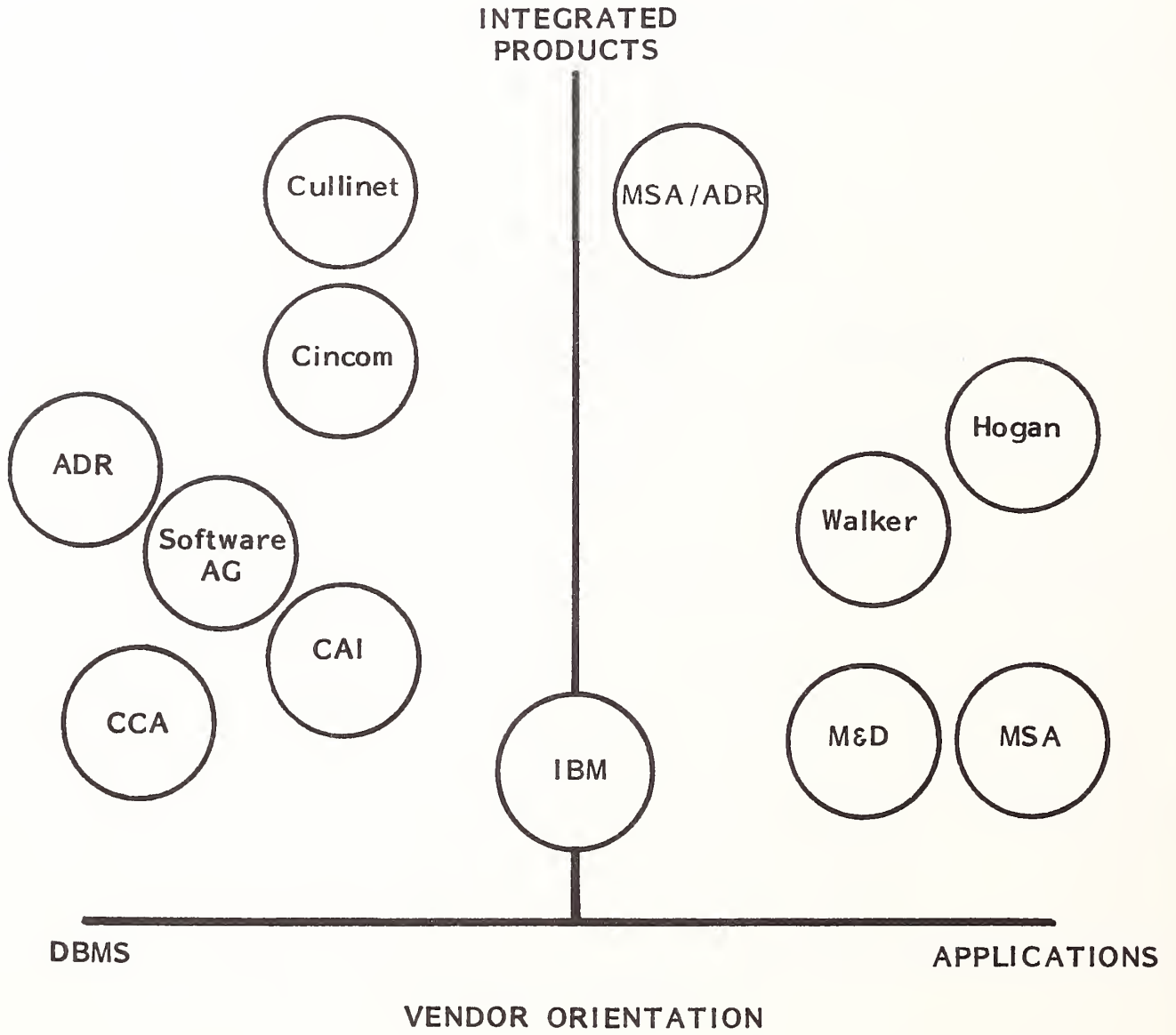


EXHIBIT V-7

LEADING DBMS VENDOR PROFILES

COMPANY CHARACTERISTICS	CULLINET	CINCOM	ADR	SOFTWARE AG	IBM
1984 Projected Revenues (\$ Million)	\$120	\$100	\$115	\$40	\$31,520
Annual Growth Rate (Percent)	50	35	30	30	16
<u>DBMS CHARACTERISTICS</u>					
Name	IDMS, IDMS/R	Total, TIS	DATAKOM	ADABAS	IMS, DLM, DB2,N,H,R,
Type*	H,R	H,R	R	R	
Fourth-Generation Language	ADS/O	MANTIS	IDEAL	NATURAL	SQL
Percent of Company * * Revenues (Percent)	80%	50%	20%	-	1%
Customer Sites * *	1,800	2,000	500	1,300	5,000

* N = Network
H = Hierarchical
R = Relational

* * Source: INPUT Estimates

VI A METHODOLOGY FOR DEVELOPMENT OF AN
INTEGRATED SOFTWARE STRATEGY

VI A METHODOLOGY FOR DEVELOPMENT OF AN INTEGRATED SOFTWARE STRATEGY

- This chapter outlines an approach for vendors to follow in developing an effective strategy for the integrated DBMS-application software market.

A. INTRODUCTION

- Corporate expenditures are about evenly divided between DBMS and application software.
- DBMS decisions, however, are second in importance only to mainframe decisions, with the number of different applications being implemented generally serving to "spread the risk" for any single package.
- Nevertheless, an integrated DBMS-application software strategy reflects the need for all software components to function satisfactorily.

B. MARKETPLACE CHARACTERISTICS

- DBMSs are now running on about 50% of all mainframe installations. By 1989, 80% will be running DBMSs. The DBMS industry will grow from less than \$1 billion in 1984 to nearly \$7.5 billion by 1989.

- Within the overall applications market:
 - Industry-specific software expenditure--currently comparable to that of cross-industry--is expected to be twice that of cross-industry by 1989.
 - Differential needs for integrated software exist among major industry groups. (E.g., discrete manufacturing and banking are more receptive to integrated software than are process manufacturers and insurance companies.)
- For companies purchasing integrated software:
 - There is an increasing desire to interface specific activities within a given business function (e.g., within finance, general ledger, accounts receivable, accounts payable, etc.).
 - The current desire is to interrelate functions within the company overall (e.g., finance, marketing, manufacturing, etc.).
 - There is a growing need to have applications transportable between multiple company locations--domestic and international.
- For individual purchases of integrated software:
 - End users are assuming an increasing role in software purchasing decisions.
 - A shift is under way from the current high level of in-house development to reliance on vendors to implement integrated systems.

- There is a preference for adding applications to existing DBMSs as opposed to introducing new DBMSs.
- Users currently accept the need to support multiple DBMSs for high-demand applications.
- Users prefer applications vendors to DBMS or hardware vendors.
- There is a corresponding lack of insistence on "one-stop shopping," permitting coexistence between multiple DBMS and application software vendors.
- Pricing is of secondary importance when compared to concern for vendor viability, customer support, and software capability.

C. VENDOR CHARACTERISTICS

- Based on the market analyses and interviews with both users and vendors, a number of company, technical, and marketing characteristics surface as representative of the "ideal" integrated DBMS-application software vendor. These characteristics are summarized in Exhibit VI-1.
- To allow marketplace positioning and competitive comparisons, a number of issues should be examined.

I. COMPANY POSITION

- What is our "track record" with respect to:
 - Financial strength (revenues, profits, earnings per share, etc.)?

EXHIBIT VI-1

"IDEAL" INTEGRATED SOFTWARE VENDOR CHARACTERISTICS

1. Established Reputation (Company/Products/Services)
2. Established Customer Base
3. Sufficient Management/Technical Resources
4. Relational DBMS
5. Application Development Tools
6. Higher Level (Fourth-Generation) Language
7. Mini/Micro Computer Linkage
8. Interface with Other Vendors' DBMSs/Applications
9. Cross-Industry Applications
10. Vertical Market Applications
11. End-User Orientation

- Product reputation?
- Sales/service support?
- Overall image?
- Have we achieved a "critical mass" for supporting current/future operations in the areas of:
 - Finance?
 - Personnel?
- Are our integrated software goals consistent with objectives of the:
 - Overall company?
 - Parent company?
- What is the nature of the installed customer base in terms of:
 - Size?
 - Loyalty?
- The form shown in Exhibit VI-2 is provided to assist in developing the company position profile.

2. TECHNOLOGY

- How fully relational should the DBMS be?
- How much functionality should be provided with:

EXHIBIT VI-2

VENDOR COMPANY POSITION PROFILE

CHARACTERISTIC	VENDOR POSITION	
	POOR /LOW	GOOD /HIGH
● Track Record		
- Financial	▶	◀
- Product	▶	◀
- Sales/Service	▶	◀
- Overall Image	▶	◀
● Critical Mass		
- Financial	▶	◀
- Personnel	▶	◀
● Consistency of Goals		
- Company	▶	◀
- Parent	▶	◀
● Installed Base		
- Size	▶	◀
- Loyalty	▶	◀

- Applications development tools?
- High-level languages?
- How much "distributed processing" capability should be provided?
- What should the interfaces be for mini/micro/personal computers?
- How compatible should our present and future DBMSs be?
- How will we develop integrated systems for:
 - In-house?
 - Purchase outside?
- To assist the vendor in developing a technological profile, INPUT provides the form shown in Exhibit VI-3.

3. MARKETING MIX

- How is our marketing philosophy directed toward:
 - End users?
 - Data processing?
- Are our products oriented toward:
 - Cross-industry applications?
 - Vertical markets?

- Should our products be compatible with other vendors':
 - DBMSs?
 - Application software?
- How will we sell integrated systems? By means of:
 - A dedicated sales force?
 - Joint agreements?
- How does our pricing compare with the competition's for:
 - Software?
 - Modifications?
 - Maintenance?
 - Training, documentation, etc.?
- What steps can we take to:
 - Minimize competitive entry/reaction?
 - Exploit unique market/product opportunities?
- What promotional/advertising methods should be used?
- Exhibit VI-4 is a form to assist in developing a marketing mix profile.

EXHIBIT VI-4

VENDOR MARKETING MIX PROFILE

CHARACTERISTIC	VENDOR POSITION	
	POOR /LOW	GOOD /HIGH
<ul style="list-style-type: none"> ● Marketing Philosophy <ul style="list-style-type: none"> - End-User - Data Processing ● Product Orientation <ul style="list-style-type: none"> - Cross-Industry - Vertical Markets ● Other Vendor Compatibility <ul style="list-style-type: none"> - DBMS - Applications ● Selling Approach <ul style="list-style-type: none"> - Own Sales Force - Joint Agreements ● Pricing vs. Competition <ul style="list-style-type: none"> - Software - Modifications - Maintenance - Training, Documentation, etc. 		
<p>ADDITIONAL CONSIDERATIONS</p> <ul style="list-style-type: none"> ● Competitive Reductions: _____ ● Niche Opportunities: _____ ● Promotion /Advertising: _____ 		

D. STRATEGY DEVELOPMENT

- Based on the profiles described above, a current vendor market position can be established.

I. TACTICS

- Tactically all of a vendor's characteristics should be reexamined to determine the relative priority of each in achieving the vendor's short- and long-term objectives.
- For each characteristic actions should be specific to implement the strategy.
- Areas of competitive advantage should be identified and exploited:
 - Sales and service should emphasize superior products.
 - New products should be developed with complementary characteristics.
 - Product enhancements should be offered to extend existing revenue flows.
 - Future technological innovations should be anticipated and contingency plans developed to capitalize on these impacts.
- Vulnerable products should be analyzed to determine if they should be strengthened or de-emphasized.
 - Salvageable products should be bolstered by:
 - Interfacing with existing stronger products.

- Focusing on market niches offering continued contributions.
 - Products not salvageable should be treated as cash cows, with:
 - Minimum maintenance investment.
 - Passive sales/marketing efforts.
- Exhibit VI-5 can be used to assist in developing vendor "grand tactics" for integrated DBMS-application software products.
 - For cases in which current positions support future objectives, specified actions should be pursued.
 - In the event that misalignments occur between current positions and future goals, one or more of the following should be considered:
 - Immediate action to modify current position.
 - Reevaluation of priorities.
 - Readjustment of desired short-/long-term positions.
- Following the above guidelines, a formal plan can be structured and corresponding actions determined.

2. STRATEGY

- In a more global sense, software vendors must also plan for long-term (5 to 10 year) positioning in a changing marketplace. There are two major related forces that will change the software marketplace.
 - Integrated DBMS-application packages.

EXHIBIT VI-5

INTEGRATED SOFTWARE TACTICS DEVELOPMENT FORM

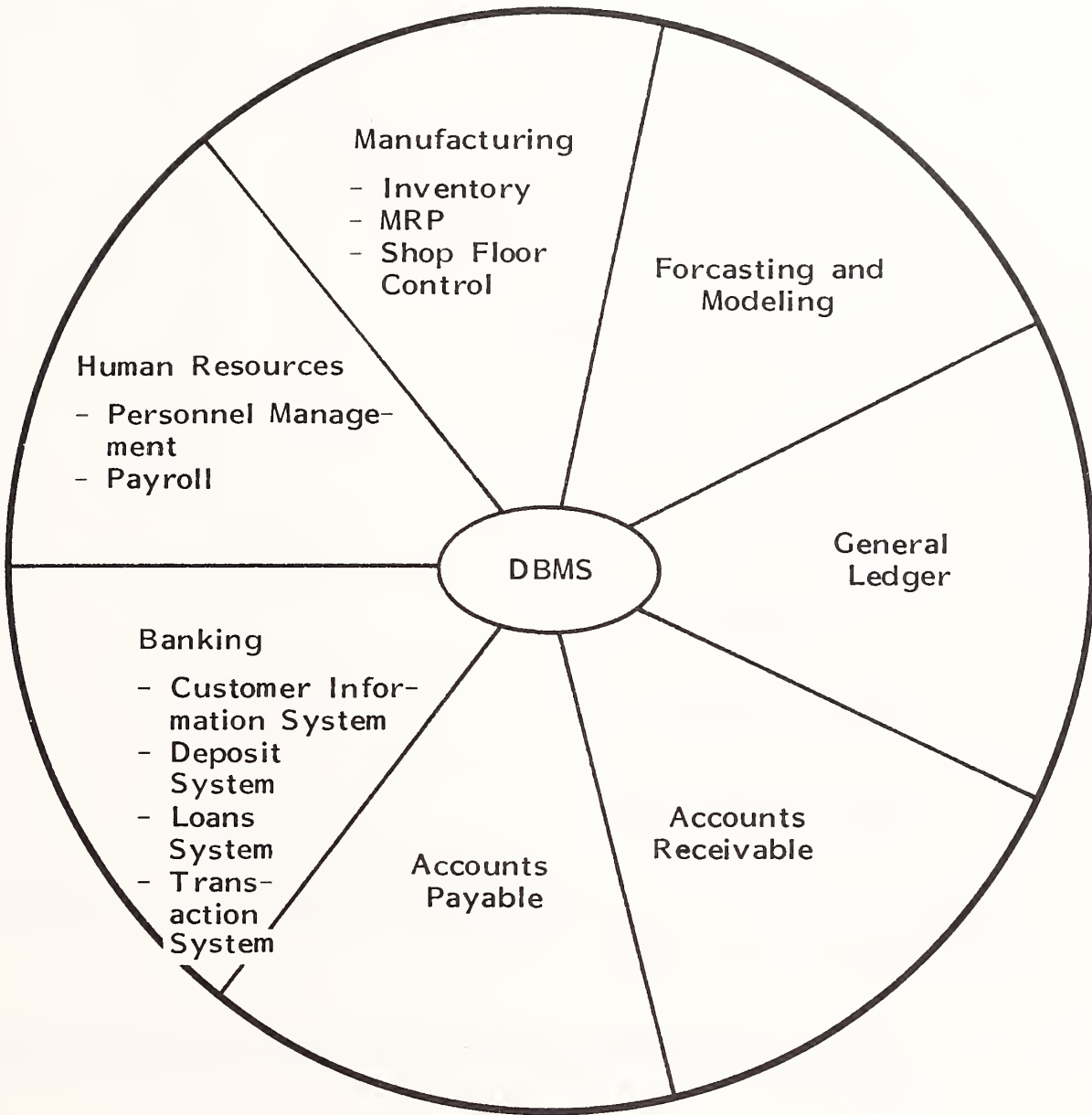
CHARACTERISTIC	CURRENT POSITION*	DESIRED POSITION			PRIORITY*	ACTIONS
		1 Yr	2 Yrs	5 Yrs		
Track Record						
Critical Mass						
Consistency of Goals						
Installed Base						
DBMS Relationality						
Functionality						
Distributed Processing						
Mini/Micro/PC Interfaces						
DBMSs Compatibility						
Systems Development						
Marketing Philosophy						
Product Orientation						
Vendor Compatibility						
Selling Approach						
Pricing Policy						
Competitive Reductions						
Niche Opportunities						
Promotion/Advertising						

* Scale: H = High
M = Medium
L = Low

- Distributed micro-mainframe applications.
- Large software vendors (or those who wish to become large) will have to face the realities of the need for integration.
 - Not only will these have to be technical DBMS-application integration, but also there will be a concomitant need to offer a wide variety of applications, as shown in Exhibit VI-6.
 - Vendors not offering this variety from themselves or associated vendors will slowly be squeezed out.
- This will put great pressure on vendors to seek out relationships with each other. These are, in order of closeness:
 - Internal development.
 - Acquisition/merger.
 - Exclusive licenses (i.e., some vendors become "development boutiques").
 - Joint development.
 - Joing marketing.
 - Non-exclusive licenses.
 - Referrals.
 - Unprotected product targeting (e.g., targeting an application to IMS without any assurance from IBM on future product characteristics or even existence).

EXHIBIT VI-6

INTEGRATED APPLICATIONS



- Each of these alternatives will have different impacts on business factors such as:
 - Control over:
 - Company strategy.
 - Product/marketing strategy.
 - Product development.
 - Expenses:
 - Initial.
 - Ongoing.
 - Company flexibility.
 - Revenue opportunities.
- As shown in Exhibit VI-7, intern acquisition/merger and exclusive license are the most desirable strategies.
 - Merger and internal development have limitations imposed by financial resources.
 - Exclusive license is limited by product availability.
- Nonexclusive licenses are somewhat less desirable than exclusive licensing overall.

	CONTROL OVER			EXPENSE		REVENUE
	Company Strategy	Product/Marketing Strategy	Product Development	Initial	Ongoing	
Internal Development	A	A	A	B	D	A
Acquisition Merger	A	A	A	C	C	A
Exclusive License	A	A	B	C	C	B
Nonexclusive License	B	B	B	B	C	C
Joint Development	B	C	C	A	B	C
Joint Marketing	B	C	A	A	B	C
Referral	C	C	C	A	A	D
Product Targeting	B	D	D	C	D	C

A = High, D = Low

- Joint development and marketing arrangements suffer from a loss of control and flexibility, although they are attractive from a cost standpoint.

- Referrals and product targeting are the strategies of last resort.
 - Referrals give over control and revenue opportunities, although they offer customers at least a solution to their needs. To the referrer, this is a very flexible arrangement.

- Product targeting, while perhaps unavoidable for some application software companies, is an extremely uncomfortable long-term strategy, leaving the vendor at the mercy of a third party.

APPENDIX A: DEFINITIONS



APPENDIX A: DEFINITIONS

- Data base management system (DBMS). A software system intended to centralize the creation, control, and maintenance of data files, so that multiple application programs can access the data without having to create duplicate file systems.

- DBMS terminology:
 - Hierarchical structure--a file in which some records are subordinate to others in a tree structure.

 - Network--a relationship between records or other groupings in which a child record can have more than one parent record.

 - Relation--consists of the following:
 - A flat file.

 - Two-dimensional array of data elements.

 - A file in normalized form.

 - Relational Data Model--a data base made up of relations. Its data base management system has the capability of recombining the data elements to form different relations, thus giving great flexibility in the use of data.

- Sequential--where data records are arranged in a serial manner on the storage device.
 - Indexed Sequential--where data records are partitioned into smaller groups. Each group location is identified by an index, and records in a particular group are sequentially arranged.
 - Inverted structure--refers to the way keys (searchable data elements) are maintained. They are like indexed sequential data records except that the index is the keyed data element.
-
- Application software. Software designed to operate as a system for specific applications.
 - Application package. A set of programs specifically designed to perform a particular application.
 - Application programs. Computer programs devised for a specific task.
 - Integrated software. For the purposes of this report, integrated software refers to the combination of DBMSs and application software. It does not encompass integration between multiple applications software and does not include packaging with hardware (which is normally referred to as an "integrated system").
 - PCM. Abbreviation for Plug-Compatible Manufacturers. These are producers of mainframe computers compatible with IBM systems.

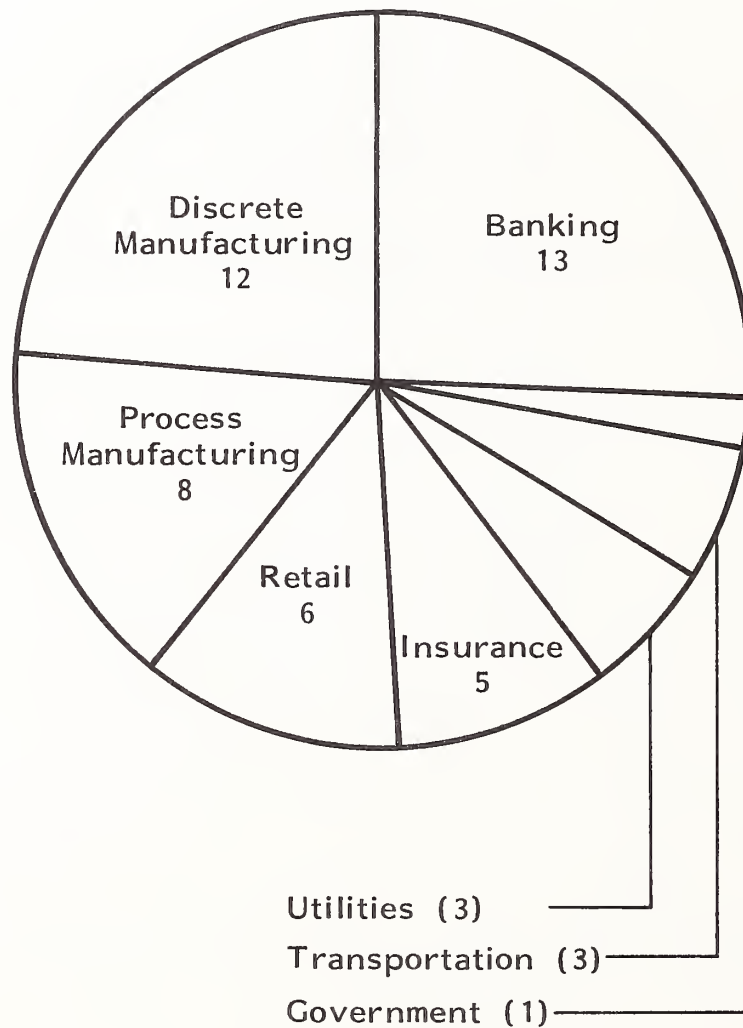
APPENDIX B: USER PROFILE

APPENDIX B: USER PROFILE

- INPUT specifically aimed the interviews for this report at users in large U.S. corporations that use integrated DBMS-application software.
- The industry composition of the sample is depicted in Exhibit B-1.

EXHIBIT B-1

DISTRIBUTION OF RESPONDENTS BY INDUSTRY



Total Respondents = 51

APPENDIX C: USER QUESTIONNAIRE

APPENDIX C
USER QUESTIONNAIRE
INTEGRATED DBMS-APPLICATION SOFTWARE

INPUT is a market research firm specializing in the information services industry. The reason I've called you is that we'd like to find out what your views are on integrated DBMS-application software. I'm preparing a report on this topic for our vendor market research program.

If you agree to participate in this survey - it should take about 20 to 30 minutes - I'll send you a summary of the report. Other people I've talked to have found answering the questions I'm asking helpful in defining what their own needs are and in finding out what other MIS departments are planning. Would you like to participate?

As I'm sure you realize, several DBMS and application software vendors are beginning to sell packaged applications that use the DBMSs instead of traditional files to store data. This allows sharing of data between different applications programs without transferring data between application-dependent files.

1. Can you tell me what your reaction is to this development in a general way? (Perhaps you have some positive or negative impressions about cost, conversion, efficiency, flexibility, user interface, maintenance, or other considerations.)

What are the top three reasons why you would like to buy applications packages integrated with DBMSs?

2. Are you running any integrated DBMS-application software already? (If Yes, continue. If No, proceed to Question 3.)

a. What are the applications? _____

b. Did you develop them internally or purchase them? (If purchased, find name of package and vendor.) How much did they cost?

2. (Cont.)

- c. Please tell me which of the following statements concerning the extent of your DBMS integration you agree with.
1. The data in the DBMS is independent of the applications which use it.
 2. The DBMS is embedded in the application. It is just a new file system; data is dependent on the application.
 3. The DBMS is embedded in the application, but the application itself is integrated with other applications. That is to say, data cannot be accessed directly from the DBMS; it must be accessed through the application.
 4. The application uses partly a DBMS and partly a traditional file system.

Was the application designed to run on a DBMS or modified by users to run on a DBMS?

- d. What alternative vendors or methods of acquiring the software did you investigate, and why did you choose the source you used?

- e. Why did you integrate these applications and not others? What made them lend themselves to integration?

- f. How would you rate your satisfaction with this software overall (1-5)? Why? What problems have you had with it?

3. What are your three most important applications (by resource use or criticality to the company or purchase price)?

Are there any other integrated DBMS-application software systems you are planning to acquire? What? When? Why?

4. In choosing an integrated DBMS-application system, how would you rate the following factors (1-5)?

- a. Packages available
- b. Cost considerations
- c. Vendor support
- d. Vendor viability
- e. Integration with other applications
- f. Integration with existing DBMS
- g. Flexibility
- h. Ease of use
- i. Efficiency
- j. Ease of installation
- k. Query language
- l. Fourth-generation language
- m. High-order language interface
- n. Other (please specify) _____

5. What is the likelihood you would change DBMS vendors if one offered a good integrated DBMS-application software system, rated from one to five?

6. What is the likelihood you would buy an integrated system requiring you to maintain a DBMS in addition to your existing one, rated from one to five?

7. What is the process your company goes through in acquiring application software packages? That is,

What process is used to identify software needs? _____

Who does it? _____

Who makes the recommendation to acquire particular software packages?

Who makes the final decision? _____

How long does the process take? _____

How would the process be different in acquiring applications packages integrated with an IDMS?

8. Which system would you be most likely to acquire, rated from one to five.
- a. An integrated applications package to attach to your existing DBMS.
 - b. A DBMS that can be tied into your existing applications packages.
 - c. An integrated DBMS-application software system unrelated to your current systems.

9. Please rate from one to five the vendors from whom you would most likely buy integrated DBMS-application packages: Why?

- a. _____ A hardware supplier
- b. _____ An applications supplier
- c. _____ A DBMS supplier
- d. _____ A third-party integrator

10. What percent of your 1984 application software purchases do you expect will be of applications designed to use DBMSs?

1984 _____ %

1987 _____ %

What would be the percentage of applications designed to use DBMSs if appropriate packages were available?

1984 _____ %

1987 _____ %

11. What percent of your 1984 application software purchases do you expect will be designed to use DBMSs and PCs?

1984 _____ %

1987 _____ %

12. Do you know of any other departments or organizations now using integrated DBMS-application software systems or planning to acquire them?

Company _____	Company _____
Person _____	Person _____
Title _____	Title _____
Phone # (____) _____	Phone # (____) _____

Are there any comments you would like to make concerning your experience or ideas on integrated DBMS-application software systems we haven't discussed?

Confirm company, name, address for report summary forwarding.

Thank you for your time.

APPENDIX D: VENDOR QUESTIONNAIRE

APPENDIX D
VENDOR QUESTIONNAIRE
INTEGRATED DBMS-APPLICATION SOFTWARE

INPUT is a market research firm specializing in the information services industry. The reason I've called you is that we'd like to find out what your views are on integrated DBMS-application software. I'm preparing a report on this topic for our vendor market research program.

If you agree to participate in this survey - it should take about 20 to 30 minutes - I'll send you a summary of the report. Other people I've talked to have found answering the questions I'm asking helpful in defining what their own needs are and in finding out what other MIS departments are planning. Would you like to participate?

As I'm sure you realize, several DBMS and application software vendors are beginning to sell packaged applications that use the vendors' DBMSs instead of traditional files to store data.

1. Can you tell me what your reaction is to this development in a general way? What is your experience (or impression) about cost, conversion, efficiency, flexibility, user interface, maintenance, or other considerations?

2. What are the top three reasons why your customers would like to buy applications packages integrated with DBMS?

What are the technical considerations which are encouraging - and holding back - DBMS-application integration?

3. Which applications areas do you believe offer the most opportunities in this area? Why?

4. Do you offer any integrated DBMS-application packages already - or do you have plans to offer any? What are they?

- a. Please tell me which of the following statements concerning the extent of your DBMS integration you agree with.

1. The data in the DBMS is independent of the applications which use it.
2. The DBMS is embedded in the application. It is just a new file system; data is dependent on the application.
3. The DBMS is embedded in the application, but the application itself is integrated with other applications. That is to say, data cannot be accessed directly from the DBMS; it must be accessed through the application.
4. The application uses partly a DBMS and partly a traditional file system.

5. In choosing an integrated DBMS-application system, how would you think your customers would rate the following factors (1-5)?
- a. Packages available
 - b. Cost considerations
 - c. Vendor support
 - d. Vendor viability
 - e. Integration with other applications
 - f. Integration with existing DBMS
 - g. Flexibility
 - h. Ease of use
 - i. Efficiency
 - j. Ease of installation
 - k. Query language
 - l. Fourth-generation language
 - m. High-order language interface
 - n. Other (please specify)

6. How likely are customers to change DBMS vendors because of a particularly good integrated DBMS-application software system, rated (1-5)?

7. How likely are customers to buy an integrated system requiring them to maintain a DBMS in addition to their existing one, rated from (1-5)?

8. What percent of DBMS sales do you expect will be tied to sales of integrated DBMS-application systems in the next three years? Why?

9. What percent of sales do you expect from the following product approaches in the next three years?
- _____ % DBMS and existing (modified) packages
- _____ % DBMS and newly constructed packages
10. Which system do you think users are most likely to acquire, rated (1-5)?
- An integrated applications package to attach to their existing DBMS.
 - A DBMS that can be tied into their existing applications packages.
 - An integrated DBMS-application software system unrelated to their current systems.
11. What percent of the market do you expect the following types of vendors will have (for applications designed to run on DBMSs) in 1987?
- A hardware supplier? _____ %
 - An applications supplier? _____ %
 - A DBMS supplier? _____ %
 - A third-party integrator _____ %
12. What percent of 1984 application software purchases do you expect will be of applications designed to use DBMSs?
- 1984 _____ %
 - 1987 _____ %
13. What percent of 1984 application software purchases do you expect will be designed to use DBMSs and PCs?
- 1984 _____ %
 - 1987 _____ %

14. What premium do you expect customers to pay, if any, for integrated applications compared to software applications?

15. What other vendors do you see becoming active in offering integrated DBMS-application packages?

16. Are there any comments you would like to make concerning your experience or ideas on integrated DBMS-application software systems we haven't discussed?

Confirm company, name, address for report summary forwarding.

Thank you for your time.

APPENDIX E: RELATED INPUT REPORTS

APPENDIX E: RELATED INPUT REPORTS

- U.S. Information Services, 1983-1988, Volume 2, Cross-Industry Markets, December 1983.
- Marketing Methods That Boost Sales, December 1983.
- Relational Data Base Developments, August 1983.
- The Opportunities of Fourth-Generation Languages, September 1983.

