EUROPEAN OPPORTUNITIES FOR

INTEGRATED DBMS - APPLICATION SOFTWARE

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EUROPEAN OPPORTUNITIES FOR
INTEGRATED DBMS-APPLICATION SOFTWARE

EXHIBITS

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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?

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- 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?

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.

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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 36 interviews with software users--25 in the U.K., 6 in West Germany, and 5 in France. The questionnaire used is included as Appendix B.

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- Vendor activities and plans were ascertained from several sources:

    - Twelve in-depth personal interviews with ten vendors (see Vendor Questionnaire in Appendix C).

    - Review of trade publications and vendor literature.

    - Discussions with industry leaders, observers, and INPUT staff members.

- Previous INPUT studies, including U.S. research on this subject, were also reviewed and relevant information extracted.

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 1985 to 1990.

    - 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.

    - The Appendixes contain definitions and sample questionnaires.

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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.

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A.   MARKET PROJECTIONS: IBM AND PCM MAINFRAME SOFTWARE

- Expenditures on DBMS software for running on IBM and PCM mainframes in France, Italy, the U.K., and West Germany will grow at an average annual rate of 27%, increasing from around $150 million in 1985 to over $500 million in 1990.

- In these four major European country markets, IBM and PCM mainframe application software expenditures are expected to increase from $300 million for 1985 to over $1.7 billion by 1990.

    - These expenditures are for both integrated and non-integrated applications.

    - Expected annual average growth rate is 41%.

- Integrated DBMS-application software expenditures are anticipated to represent over one quarter of this total ($474 million) by 1990.

- 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.

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EXHIBIT II-1

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MARKET PROJECTIONS:
IBM AND PCM MAINFRAME SOFTWARE

($ Millions)

DBMS Software Expenditures

$516
$155

**Application Software
(Integrated and Non-
Integrated) Expenditures**

$1,717
$306

**Integrated DBMS – Application
Software (1990 Potential)**

$474

1990
1985

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B.   INTEGRATED APPLICATIONS CHARACTERISTICS

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- Less than half of the survey users were already using a DBMS.

- Of those users with DBMS installations, 44% had purchased an integrated DBMS-application package.

- Sixty-five percent of the users reported above average satisfaction with their integrated software; only 6% indicated below average satisfaction.

- Finance and accounting were the most frequently mentioned applications, followed by manufacturing/production and marketing/sales.

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EXHIBIT II-2

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INTEGRATED APPLICATIONS CHARACTERISTICS

- **65% Indicate Above-Average Satisfaction**

- **Most Common Applications:**

  - **Finance/Accounting**

  - **Manufacturing/Production**

  - **Marketing/Sales**

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C.   INTEGRATED APPLICATIONS VENDOR PREFERENCE

- Users rate DBMS vendors first in terms of preference for purchasing integrated DBMS-application software.

- Application vendors and hardware vendors are seen as a second level choice.

- Third-party integrators were clearly given the lowest rating as a potential source of integrated DBMS-application software.

- There exists a tendency for users to seek second-source software requirements from vendors who are solely selling software rather than a mix of products including hardware.

- There will be a reluctance to buy packaged integrated DBMS software unless the vendor can demonstrate applications knowledge and experience. Applications complexities must be thoroughly understood.

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EXHIBIT II-3

INTEGRATED APPLICATIONS
VENDOR PREFERENCE

Vendor Preference	Preference Scale
DBMS Vendor	3.7
Applications Vendor	3.2
Hardware Vendor	3.1
Third-Party Integrator	2.1

	1 Low	2	3	4	5 High

D.   DBMS-APPLICATION SOFTWARE INTEGRATION PREFERENCES

- 12 -
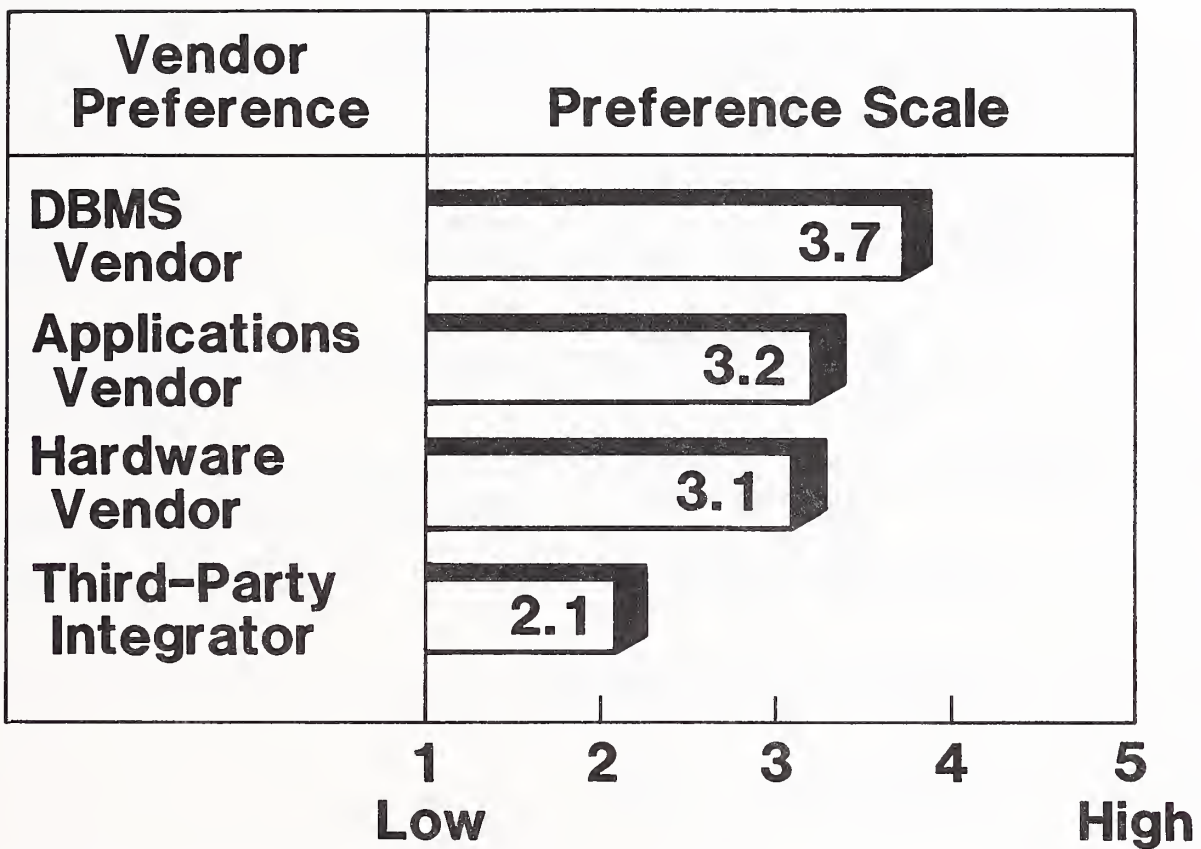
- Respondents prefer achieving integration by adding applications to existing DBMSs. Much less favored are "backward integration" (i.e., DBMSs into applications) or purchasing/developing new integrated software.

- Factors in this preference include:

    - Increased data management and control.

    - Greater data integration 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.

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EXHIBIT II-4

DBMS-APPLICATION SOFTWARE
INTEGRATION PREFERENCES

INTEGRATION PREFERENCE	PREFERENCE SCALE
Add Applications to Existing DBMS Package	3.5
Integrate DBMS into Existing Applications	2.6
Purchase/Develop New DBMS-Application Software	2.3

1   2   3   4   5

Low   High
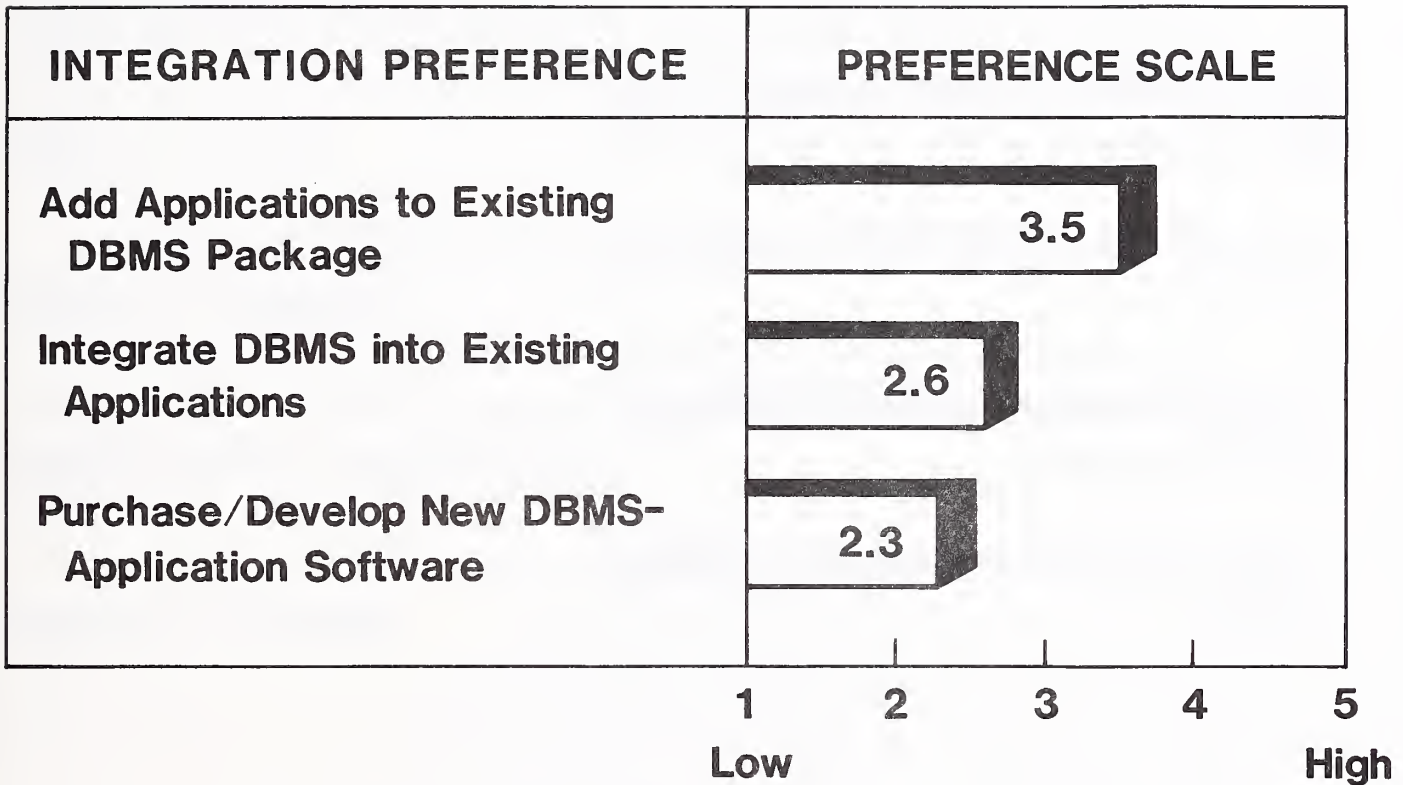
E. INTEGRATED SOFTWARE PURCHASE PRIORITIES

- Ease of use was rated as the most important purchase factor, closely followed by vendor support, application integration, and the viability of the vendor.

- Vendor considerations are thus considered to be of high importance in user decision processes.

- Flexibility (4.1) and DBMS integration (4.0) were the next most highly-rated factors. These were followed, in order of importance, by the availability of the package (3.9) and its efficiency (3.8).

- It can thus be seen that all of these factors were rated relatively highly.

- Very few purchase factors rated relatively lower in importance; only fourth generation languages (3.6), cost (3.3), and ease of installation (3.3) fell into this category.

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EXHIBIT II-5

INTEGRATED SOFTWARE PURCHASE PRIORITIES

PURCHASE FACTOR	IMPORTANCE
Ease of Use	4.4
Vendor Support	4.3
Application Integration	4.3
Vendor Viability	4.3

1   2   3   4   5

Low   High

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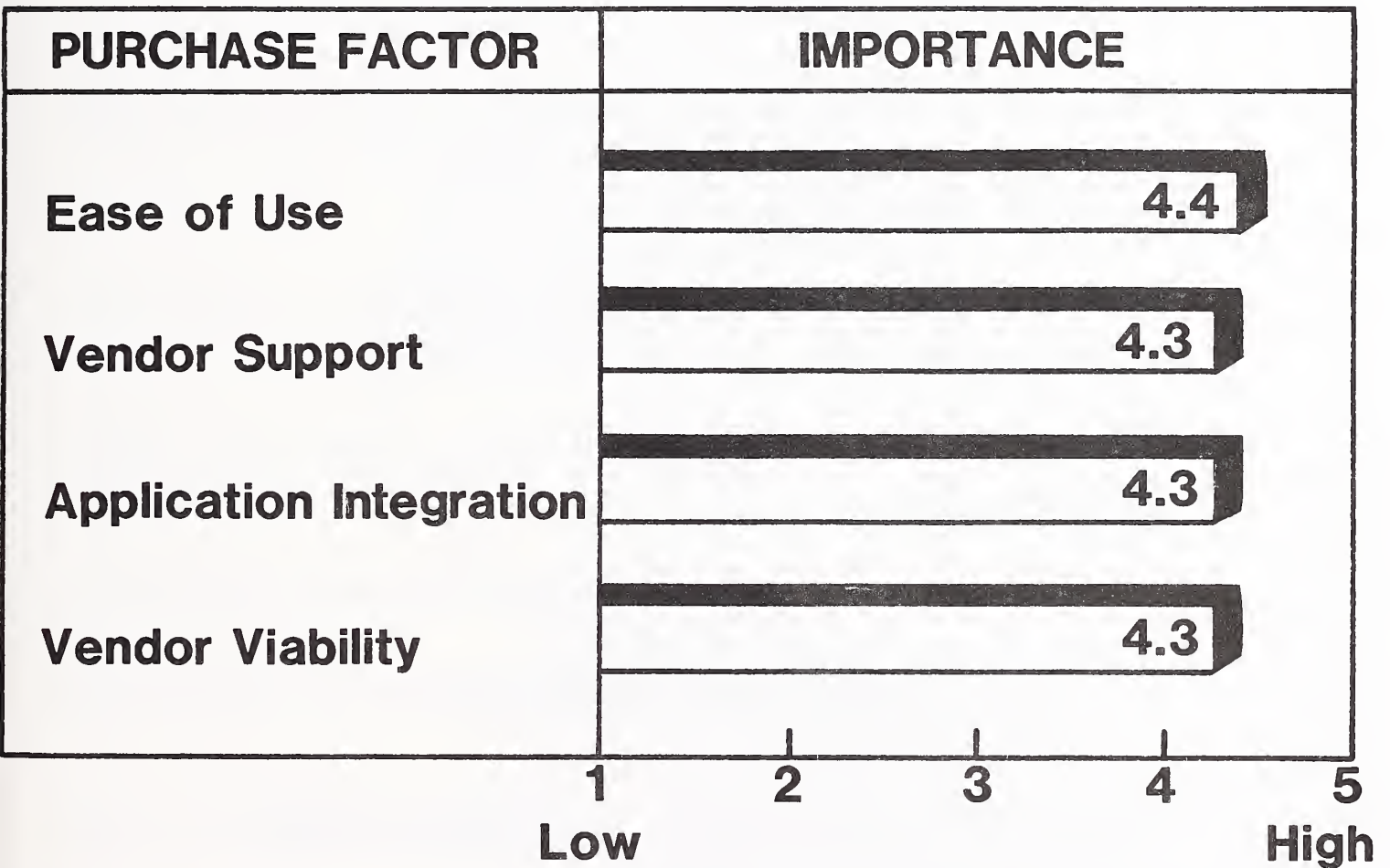
F. MARKETPLACE IMPACTS

- Vendors must consider two marketplace impacts:

    - Nature of the market.

    - Position within the market.

- For integrated software purchases, respondents indicated that on the average, end users contributed about 44% and data processing about 56% of the input in the decision-making process.

- This is in contrast to INPUT's U.S. research, where end-user involvement was rated much higher at 70%.

- 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.

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EXHIBIT II-6

MARKETPLACE IMPACTS
NATURE OF THE MARKET

44%

56%
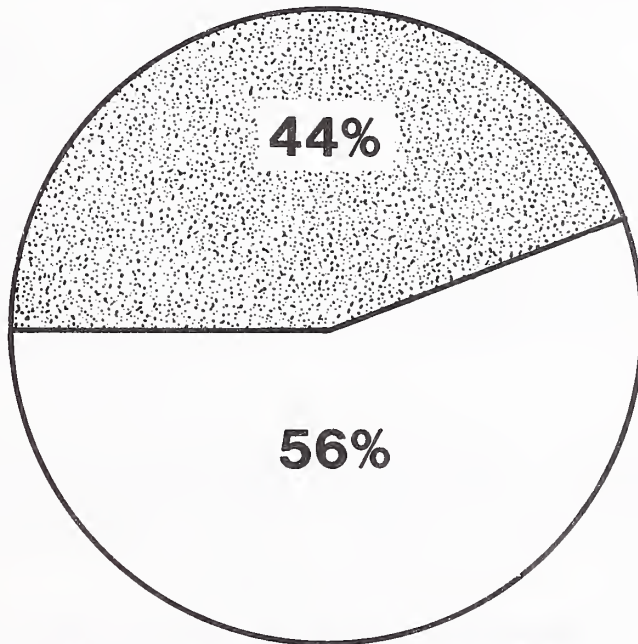
Decision-Making Mix

▨ **End Users**   ☐ **Data Processing**

G.   IMPLEMENTATION ALTERNATIVES

- In selecting the appropriate alternatives for integrated DBMS-application software strategy implementation, a number of factors must be considered for the optimal mix to be selected.

    - Options 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 market.

- In all aspects of strategy development, it is important to be pro-active and move rapidly.

- A rapidly growing market opportunity will become available ($400 million in the three major European country markets), but only to those who capitalize upon the opportunity.

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EXHIBIT II-7

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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

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III MARKET ANALYSIS

III   MARKET ANALYSIS

- In this chapter INPUT presents forecasts for DBMS and application software package sales for DBMS users in the four major Western European country markets--France, Italy, the U.K., and West Germany. Software package expenditures are examined for the period 1985 to 1990.

- Since the market for mainframe DBMS systems is largely dominated by IBM and IBM-compatible software, it is this area which is examined for market size and forecast purposes in this report.

- Additionally, general market observations and industry trends are discussed.

A.   DBMS SOFTWARE

- The expected growth in expenditures on IBM and PCM mainframe DBMS software is shown in Exhibit III-1. Annual average growth is within the range of 27% to 30% for the country markets studied, leading to an increase of well over three times the current market size by 1990.

- Growth is likely to be at a higher rate in Italy as the marketplace strives to catch up from a relatively lower base position.

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EXHIBIT III-1

IBM AND PCM MAINFRAME DBMS SOFTWARE EXPENDITURES
1985-1990

		1985	AAGR	1990
France	MFF Conversion Rate* $ Millions	360 9.4 38	29%	1,300 11.4 114
Italy	B£ Conversion Rate* $ Millions	63 1,950 32	30%	235 2,446 96
United Kingdom	£M Conversion Rate* $ Millions	26 0.8 33	28%	90 0.8 114
West Germany	MDM Conversion Rate* $ Millions	150 2.9 52	27%	500 2.6 192

* Conversion rate is estimated on basis of prevailing exchange rates. It is used simply as an index to eradicate distortions that would arise as a result of the use of different inflation assumptions for different countries.

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- These expenditure levels do not include estimates for non-procedural DBMS-based languages, the market for which will probably exceed $35 million for the four major European country markets in 1985.

- Additionally, minicomputer and personal computer user of DBMSs will increase dramatically over the next five years with growth rates of around 50% per annum to be expected.

- Consequently, the expenditures for DMBS software for all computer systems will be considerably in excess of the estimates shown in Exhibit III-1, probably by as much as 50%.

- Within the overall expected market growth of 27% to 30% per annum, INPUT anticipates an increasing proportion to be claimed by independent vendors.

- Thus, while it is anticipated that IBM will achieve around 25% annual average growth for DBMS systems, the independents' rate of growth will be nearer 30%.

- This higher growth among independent vendors will be driven by:

    - The rapid pace of product innovation among independent vendors as a group.

    - Increasing confidence among users in independent software vendors and their support capabilities as this group develops commercial maturity.

B. APPLICATIONS SOFTWARE

- Exhibit III-2 shows estimates of the predicted growth in application software for IBM and PCM mainframes for the period 1985 to 1990.

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EXHIBIT III-2

IBM AND PCM MAINFRAME APPLICATION SOFTWARE
EXPENDITURE BY USERS RUNNING DBMS SYSTEMS
1985-1990

		1985	AAGR	1990
France	MFF Conversion Rate* $ Millions	700 9.4 74	45%	4,500 11.4 395
Italy	B£ Conversion Rate* $ Millions	108 1,950 55	42%	623 2,446 255
United Kingdom	£ M Conversion Rate* $ Millions	56 0.8 70	40%	300 0.8 375
West Germany	MDM Conversion Rate* $ Millions	310 2.9 107	42%	1,800 2.6 692

* See Note to Exhibit III-1.

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- INPUT is predicting high growth rates in the range of 40% to 45% for the four country markets studied, leading to a market in 1990 over six times greater than that to be achieved in 1985.

- Currently, much packaged software is aimed at cross-industry markets. There will be increasing emphasis on industry-specific applications in the future due to market pressures and the need to establish product differentiation.

- In comparison to its strong position in systems software, IBM's sales of applications software have been relatively much weaker. This is likely to remain the case, given IBM's need to identify markets of large interest and to avoid specialized niche markets.

- Industry-specific applications, therefore, offer attractive growth opportunities to independent vendors.

C.   INTEGRATED SOFTWARE

- INPUT forecasts a rapidly growing market for integrated software that could potentially achieve a market size by 1990 of:

    - 1,250 MFF ($110 million) in France.

    - 170 billion Lira ($70 million) in Italy.

    - 90 million pounds ($114 million) in the U.K.

    - 470 MDM ($180 million) in West Germany.

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- It is likely that the future mix of industry-specific and cross-industry integrated software will be similar to that for applications software.

D.   ADDITIONAL OBSERVATIONS

- Projected DBMS technology trends that will be of significance to the development of the market include:

    - Increasing use of distributed data bases.

    - Use of data dictionaries to manage and control information throughout an organization.

    - The increasing use of fault-tolerant, fail-safe architectures, particularly with IBM's entry to this marketplace following its agreement with Stratus Computers Inc.

    - Greater reliance on relational data structures.

    - The development of specialized "back-end" data base processors that provide a dedicated hardware/software data base management system. Impetus to this area may arise from the entry of Teradata Corporation into the high-end IBM market.

    - Integration with the "office of the future."

- Projected impacts on the user environment include:

    - Increased end-user application development and a corresponding lower emphasis on centralized MIS department development.

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-   More emphasis on the use of personal computers and departmental systems.

-   The incorporation of visual and voice communications capabilities within systems aimed for use by middle and senior management.

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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.

    - DBMS-application software vendor preferences.

    - Application package purchase considerations.

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.

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EXHIBIT IV-1

OVERALL USER SATISFACTION:
APPLICATIONS RUNNING ON DBMSs
(Purchased or Internally Developed)
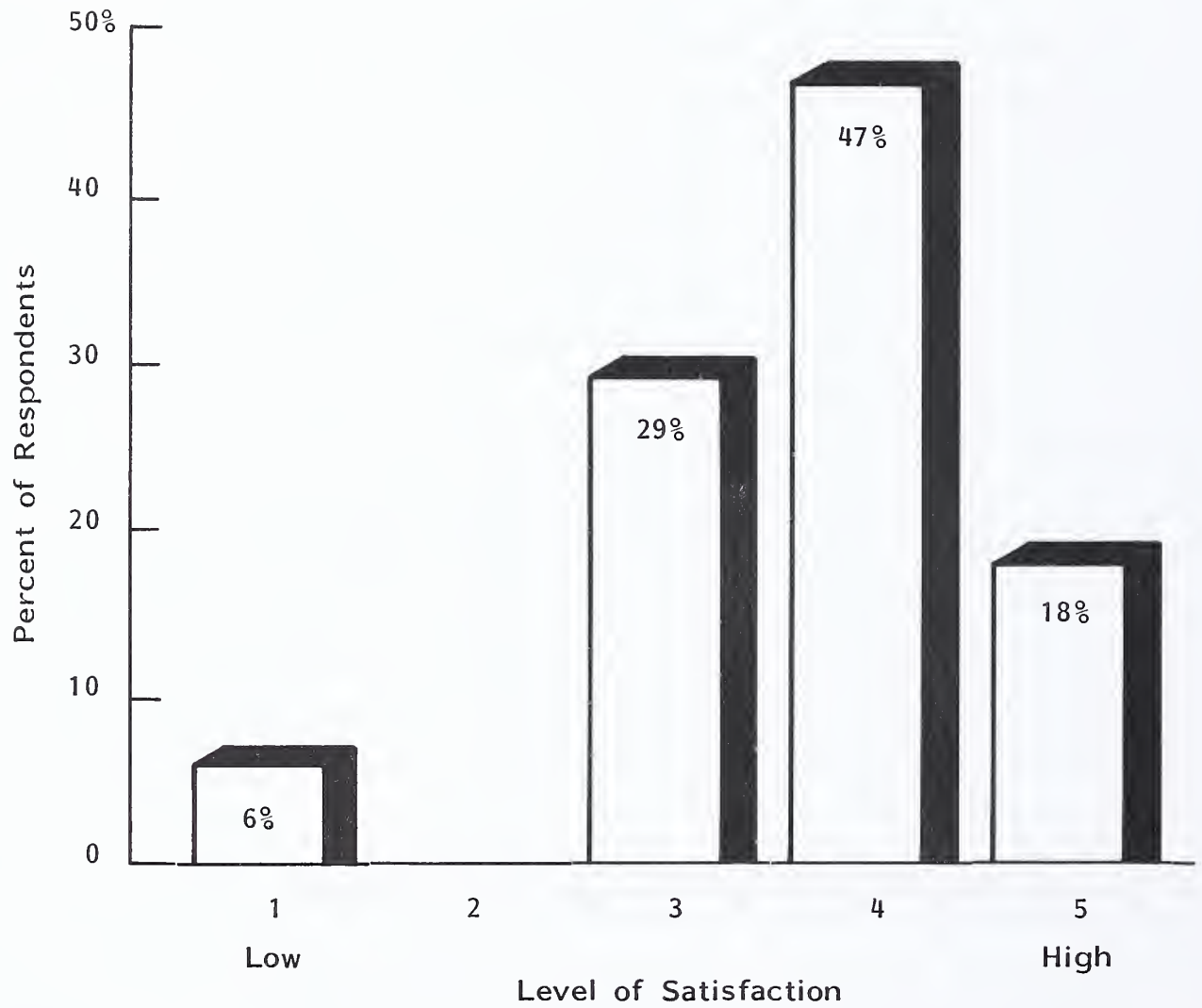
Average Satisfaction Level = 3.7

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- Sixty-five percent of the respondents reported satisfaction levels of "5" or "4."

- Only 6% reported below-average satisfaction. (i.e., "1" or "2").

B. PROFILE OF INSTALLED INTEGRATED APPLICATIONS

1. EUROPEAN USERS

- Among the users interviewed, around 57% had no installed integrated applications, 24% had developed them in-house, and only 19% had purchased an integrated DBMS product.

- Finance and accounting were the most frequently mentioned applications, with manufacturing/production and marketing/sales applications close behind.

- The area of purchased integrated applications packages was almost completely dominated by the manufacturing/production area. Some respondents reported the use of an integrated DBMS financial package.

- One corporate respondent in West Germany reported the joint development of an integrated software package with a major software vendor.

2. U.S. RESEARCH

- The research conducted into this topic in the U.S. gives some insight into factors that may be relevant to European development. The following commentary on the U.S.-based research is, therefore, included here.

- The research indicated that the most common types of applications running on DBMSs were customer information files and customer information systems.

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- Manufacturing/production applications were 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 were also common.

- Discrete manufacturers relied on vendor packages nearly as much as they did 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.

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- 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.

- IBM's IMS and DL-I are the dominant DBMSs in the discrete and process manufacturing sectors, consisting of 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 where it 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%.

- In the U.S., banking respondents were found to be 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.

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- 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-I 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 were 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.

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- 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. Cullinet's IDMS has about 5%, Software AG's ADABAS has 3%, and ADR's Datacom/DB has 2%.

C.   WILLINGNESS TO CHANGE/ADD DBMSs

- Exhibit IV-2 shows users preference for the alternative strategies of changing DBMS vendor or adding new DBMSs.

- While both options received below average approval, the respondents indicated a marginal preference for changing the DBMS vendor rather than adding an additional DBMS system.

- This contrasts with INPUT's U.S. research on this issue, where there was a more significant preference for adding DBMS. This would support the contention that the computational overhead is seen in the U.S. as being less of a problem than coping with the technical challenges of changing to a new system and possibly to a new vendor.

- It also supports the view that the European IS department still rates the overall usage efficiency of computer installations as a relatively high priority.

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EXHIBIT IV-2

WILLINGNESS TO CHANGE OR ADD DBMSs

Willingness to Change
DBMS Vendor

Willingness to Add
DBMSs

Low

High

Preference Scale

☐ Europe

▨ United States

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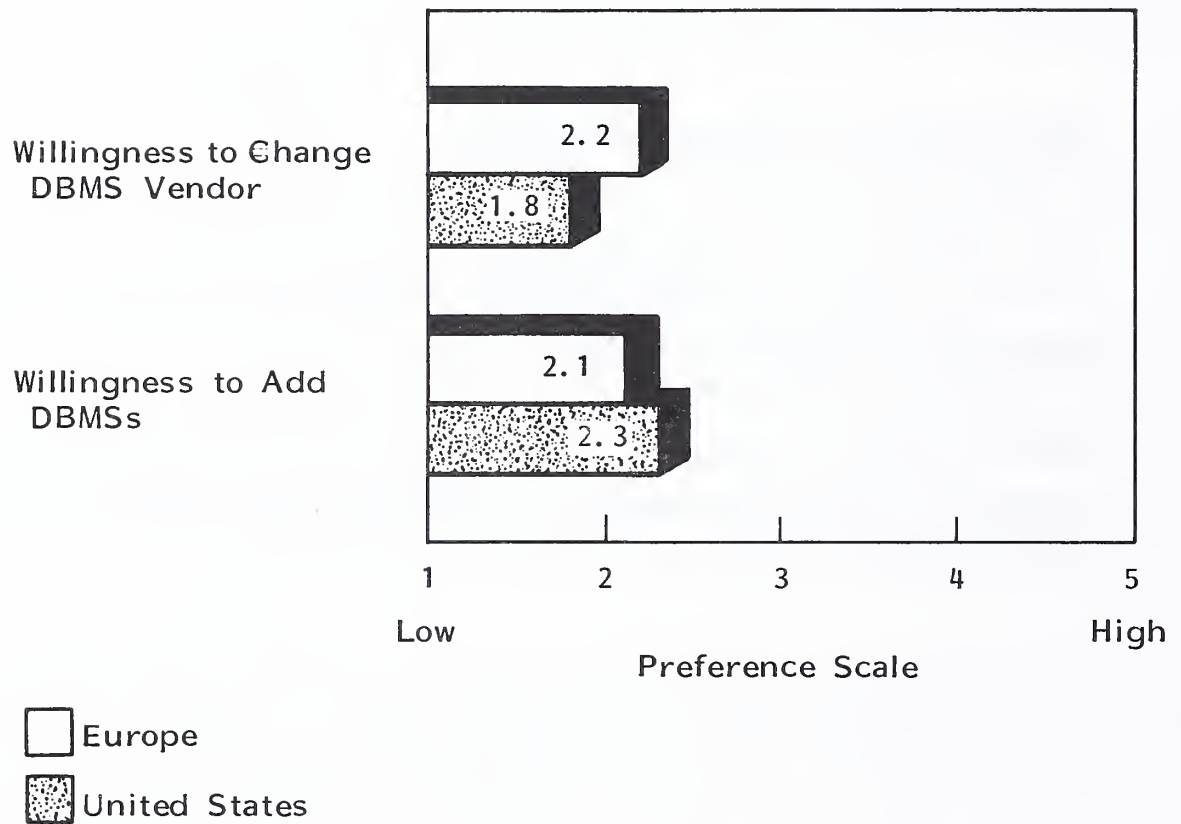
- A key element in the willingness to change or add DBMSs will clearly be the technical characteristics of the particular software systems on offer and their suitability to the user's systems objectives.

- For example, a regional bank interviewed as part of the U.S. research pointed out that IDMS, while good at running business applications, is not well suited for information centers (this was before the availability of IDMS/R).

- Computer Corporation of America's Model 204 was preferred for this function.

- As a result, this particular user preferred maintaining two vendors' DBMSs.

D.   DBMS-APPLICATION SOFTWARE INTEGRATION STRATEGY

- Most users express a stronger preference for adding applications onto existing DBMSs rather than attempting to integrate DBMSs into existing applications, as shown in Exhibit IV-3. This tendency is very marked in the U.S.

- Users are least inclined 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 to be greater.

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

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EXHIBIT IV-3

DBMS - APPLICATION SOFTWARE INTEGRATION STRATEGY

<u>STRATEGY</u>

Add Application
Package to
Existing DBMS — 3.6 / 4.3

Integrate DBMS
Into Existing
Applications — 2.6 / 1.9

Purchase/Develop
New DBMS-
Application
Software System — 2.3 / 1.6

Preference Scale (1 Low – 5 High)

☐ Europe
▨ United States

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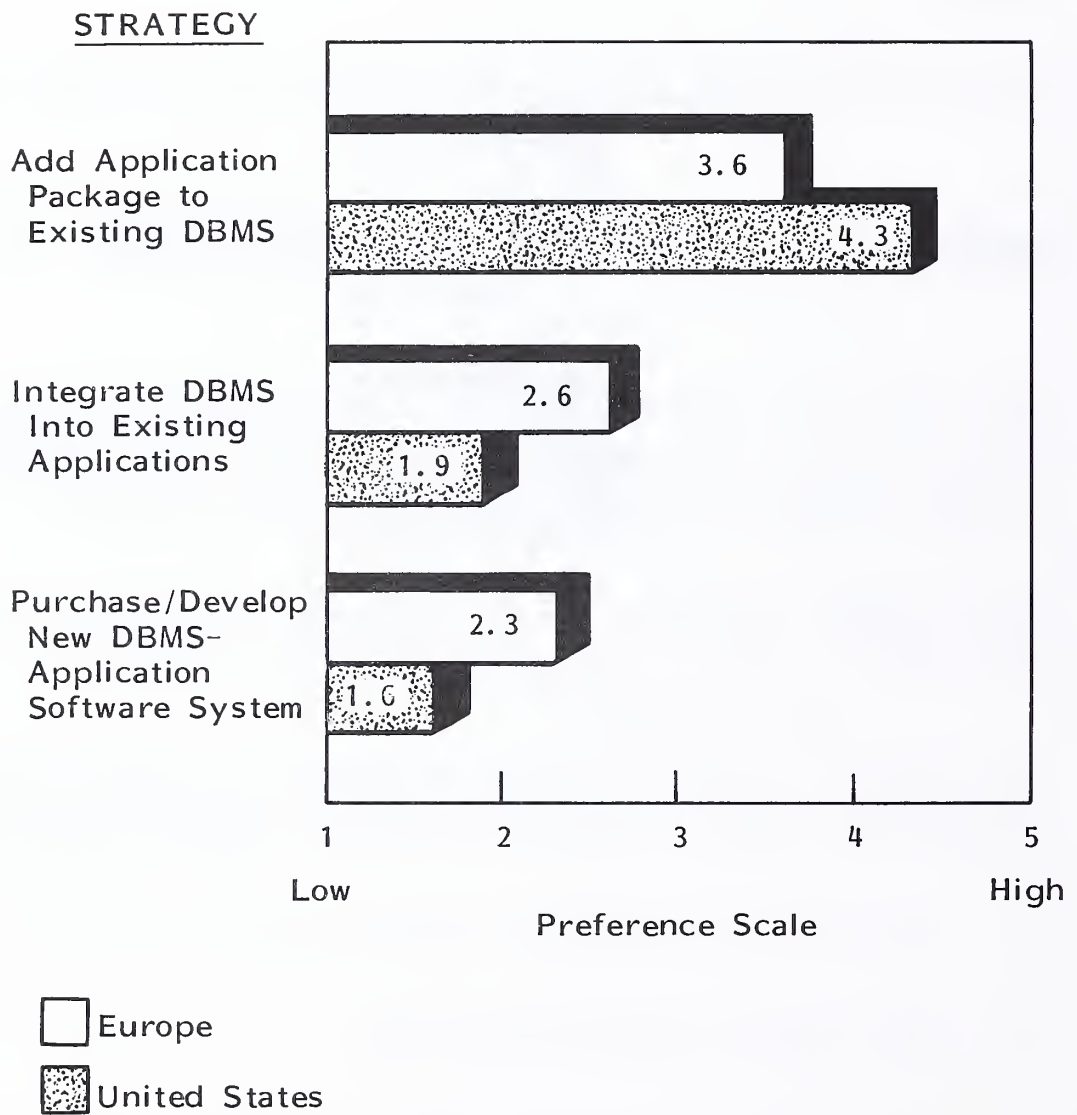
- Data is better structured for audits.

• 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.

    - Some 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.

• 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.

• In some cases the 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.

• There exists also a contrary view that goes against the conventional wisdom that integrated DBMS-application packages are a positive development.

    - Some users believe they are better off purchasing applications designed to run on flat files and integrating the applications into DBMSs themselves. The "transparency" features of ADR's DBMS offering,

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INPUT

DATACOM, have been identified 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.

- Another area of concern relates to specialized industry-specific sectors like process manufacturing and transportation. For example, users may consider that their needs are sufficiently unique for it to be unlikely that packages are or are likely to become available.

• There also exists the view 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.

• Another user viewpoint casts doubt on the real value and usefulness of the DBMS approach. Some reasons for this attitude are given as:

- 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 abrogates the need for new packages; new applications are written so easily in-house that there is no need to go outside for them.

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- These comments (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.

E.   DBMS-APPLICATION SOFTWARE VENDOR PREFERENCE

- Users express a preference for purchasing applications designed for use on DBMSs from DBMS vendors, as indicated in Exhibit IV-4.

- Applications and hardware vendors are ranked in second and third position with third-party integrators being the least-favored suppliers of applications designed for use on DBMSs.

- Previous 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 have indicated that they intend to purchase less rather than more application packages in the future. The reasons relate to 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

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EXHIBIT IV-4

DBMS – APPLICATION SOFTWARE VENDOR PREFERENCE

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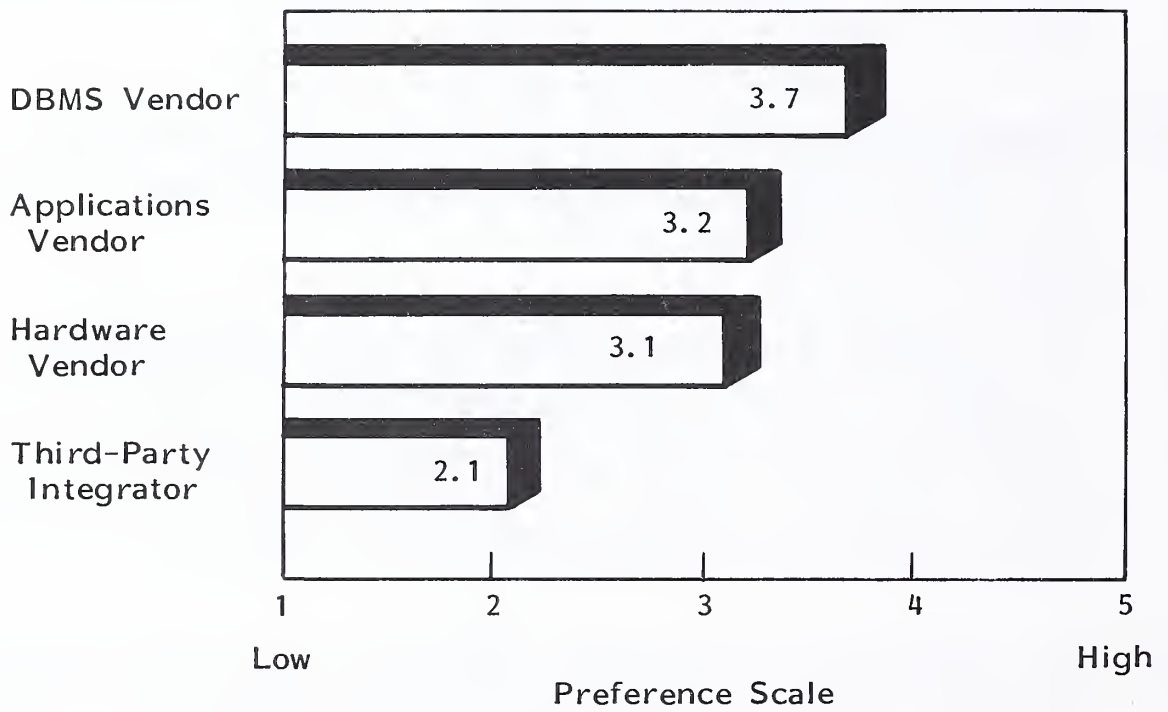
"full-service" vendor (due to increased risk using a sole source) or to their not believing that a single supplier can, in fact, provide an integrated software product.

- In the more complex application areas, like MRP within a manufacturing information system, users may be very reluctant to use outside vendors that are unfamiliar with their existing systems.

- Software vendors will need to ensure that their integrated system plans are realistic and can be effectively supported in the field.

F. APPLICATION PACKAGE PURCHASE CONSIDERATIONS

- Eleven factors were rated by the users in terms of importance in purchasing application software. The results for all respondents are displayed in Exhibit IV-5.

    - The most important factor in purchase decisions is ease of use, closely followed by vendor support, application integration, and vendor viability.

    - Vendor considerations (i.e., support and viability) generally are more important than the characteristics of application software itself (i.e., availability, efficiency, etc.).

    - DBMS integration falls in the mid-range of all factors considered.

    - Language offerings (i.e., query and fourth generation) are among the least important of all factors.

    - Cost and ease of installation were listed relatively low in importance.

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INPUT

EXHIBIT IV-5

IMPORTANCE OF FACTORS IN
APPLICATION SOFTWARE PURCHASES

(User Viewpoint)

Importance of Factor

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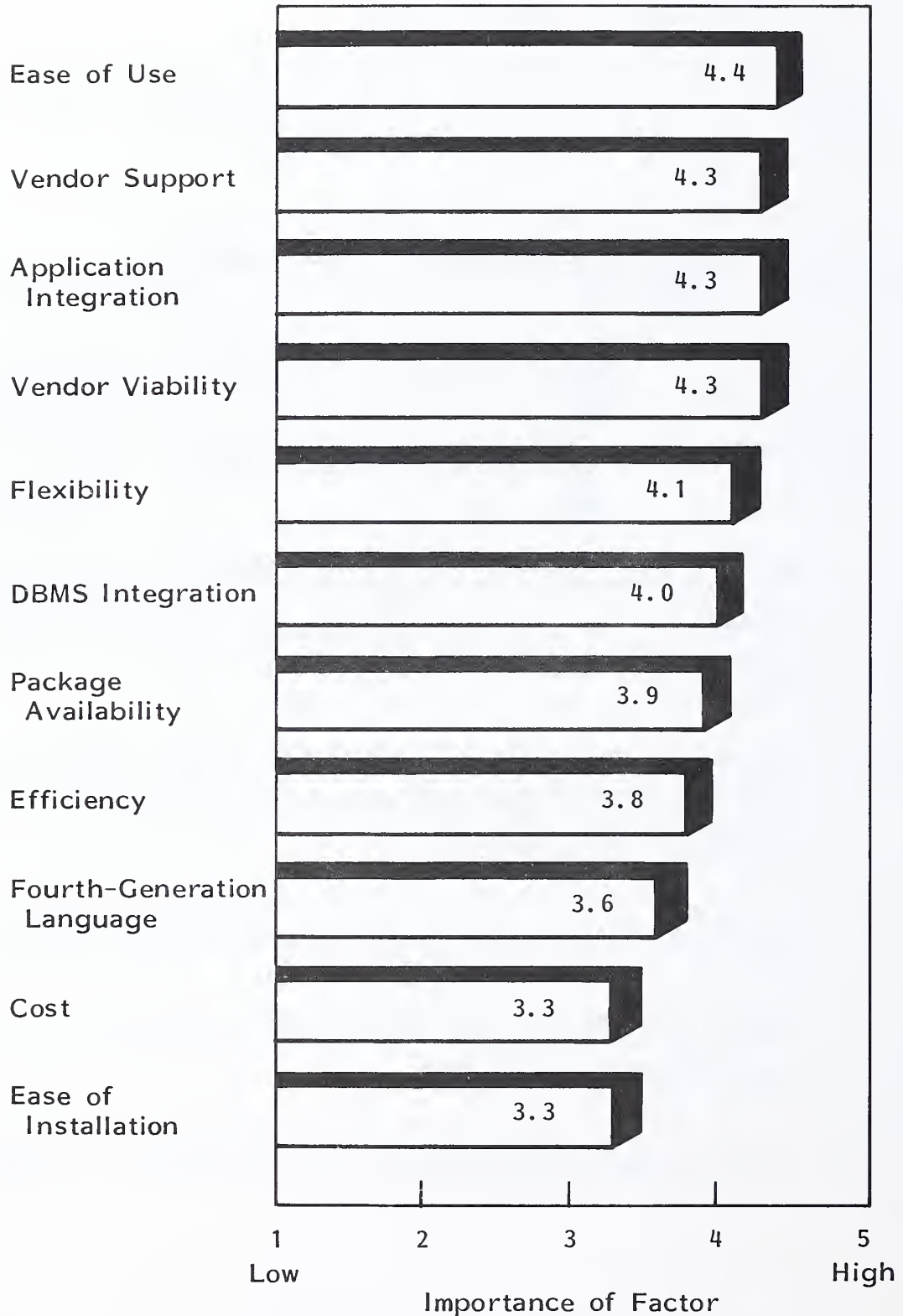
V COMPETITIVE ANALYSIS

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-I.

INPUT

EXHIBIT V-1

SYSTEMS SOFTWARE MARKET STRUCTURE

```
┌─────────────────┐                                      ┌─────────────────┐
│  Data Center    │                                      │     Micro       │
│  Management     │                                      │   Operations    │
└─────────────────┘                                      │   Management    │
                                                         └─────────────────┘
                          ┌──────────────────┐
                          │  Communications  │
                          └──────────────────┘
┌─────────────────┐                                      ┌─────────────────┐
│    Mainframe    │                                      │     Micro       │
│     DBMS        │                                      │     DBMS        │
└─────────────────┘                                      └─────────────────┘

    ┌──────────────┐   ┌──────────────┐  ┌──────────────┐
    │ Professional │   │  End User    │  │  End User    │
    │   System     │   │ System       │  │ System       │
    │ Building     │   │ Building     │  │ Building     │
    │  Tools       │   │ Tools        │  │ Tools        │
    └──────────────┘   │ (Mainframe)  │  │  (Micro)     │
                       └──────────────┘  └──────────────┘
┌─────────────────┐                                      ┌─────────────────┐
│   Mainframe     │                                      │     Micro       │
│  Applications   │                                      │  Applications   │
└─────────────────┘                                      └─────────────────┘
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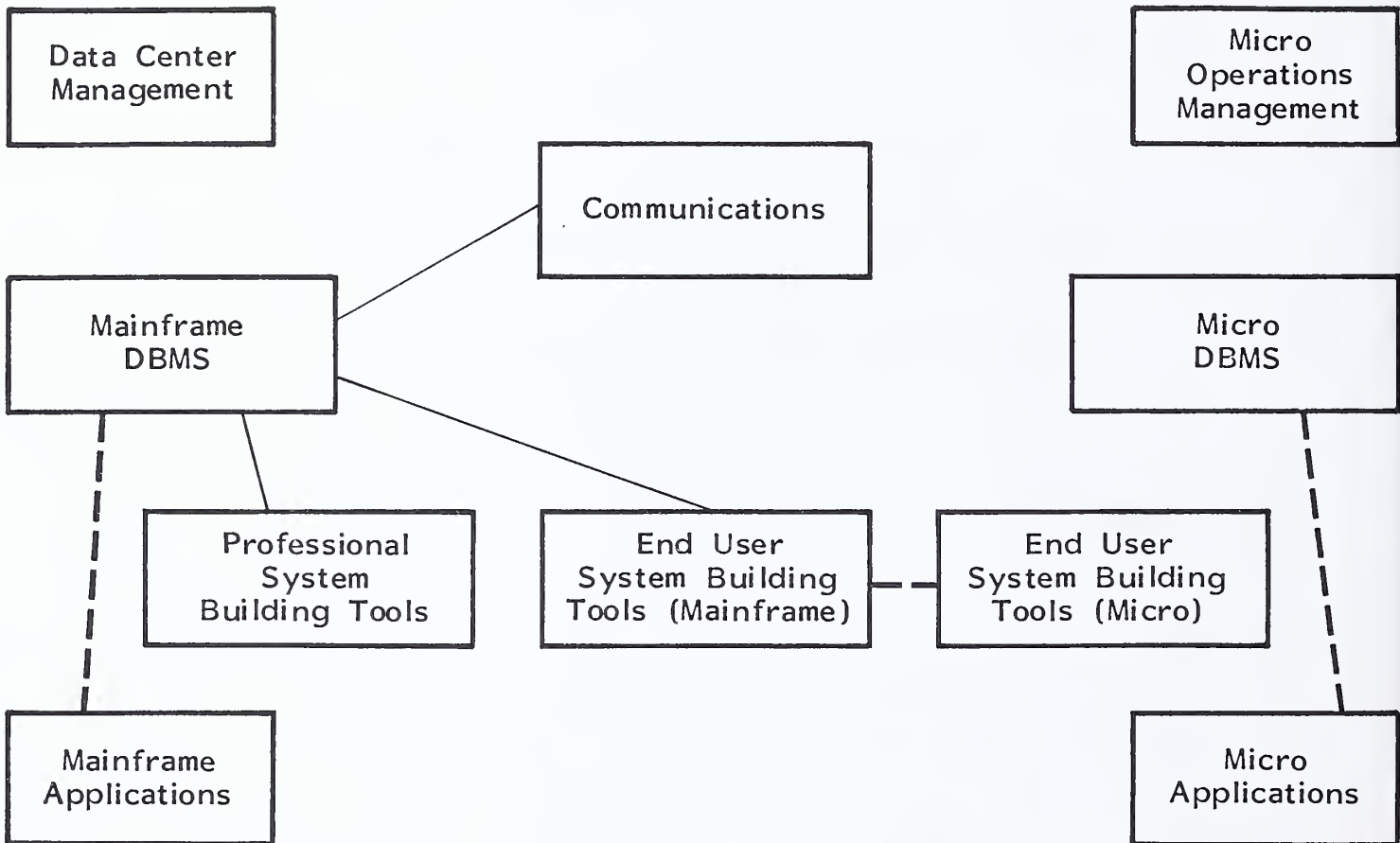
Key:

Weak Linkage   – – – –

Strong Linkage   ————

┌──────────────┐
│ Software   │
│ Product   │
│   Area   │
└──────────────┘

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- 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, both parties are important contributors to the decision process.

    - The survey results indicated that the influence of end users in final applications purchase decisions is about 44%.

    - While the remaining 56% of the decision-making influence rests with data processing.

    - The integration and DBMS aspects of integrated applications purchases can be expected to increase the importance of the role of the data processing department even further.

- Exhibit V-2 highlights the differing purchase criteria for the end user and the data processing manager.

- There are a number of barriers to entering the market for integrated DBMS-application software.

INPUT

EXHIBIT V-2

END-USER AND DATA PROCESSING PURCHASING CRITERIA

CRITERIA	END USER	DATA PROCESSING
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	Strong Influence	Dominant Role

-   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).

-   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).

INPUT

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 order to exploit the commercial opportunities presented by the developing demand for integrated packages, a marketing strategy and development plan are needed.

1.   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).

INPUT

EXHIBIT V-3

VENDOR CLASSIFICATIONS

HARDWARE	DBMS	APPLICATIONS
IBM	Cullinet	MSA
BUNCH	Cincom	McCormack & Dodge
European Independents	ADR	PPL
- BULL	Software AG	Hoskyns
- ICL		
- SIEMENS		
Minicomputer		
- DEC		
- DG		
- HP		

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-    Report writer.

-    Query language.

-    Maintenance and control utilities.

-    Telecommunications interface.

-    Micro-mainframe link.

- Distribution from vendor to customer should recognize 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.

INPUT

- As noted by several users, "premature" announcements and "unrealistic" product descriptions should be avoided, since they could hamper established vendor credibility.

- 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 the attendant benefits.

2. PRODUCT DEVELOPMENT STRATEGY

- Integrated DBMS-application software systems can be developed by hardware vendors, software vendors, or a hybrid of the two.

    - Hardware vendors, particularly IBM, will increasingly offer value-added features and software.

    - DBMS vendors will offer application software in addition to systems software. Cullinet has already developed a series of DBMS-based application products.

    - Relationships between established systems software and application software vendors will be structured such that they will theoretically 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.

INPUT

- 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 has (or adds) personnel with sufficient DBMS experience since unsuccessful development is frequently traced back to the vendor. Because of this, long-term consequences can be disastrous, both in terms of retaining existing customers and in securing new business.

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- 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 the BUNCH and the European mainframe manufacturers can also play a role.

- IBM's domination of the mainframe hardware market has given it a significant position in the DBMS market. However, it is under attack from the marketing efforts of other DBMS suppliers.

- Current hierarchical DBMSs (IMS and DL/I) are intended for day-to-day production environments.

INPUT

EXHIBIT V-4

CHARACTERISTICS OF PRODUCT DEVELOPMENT ALTERNATIVES
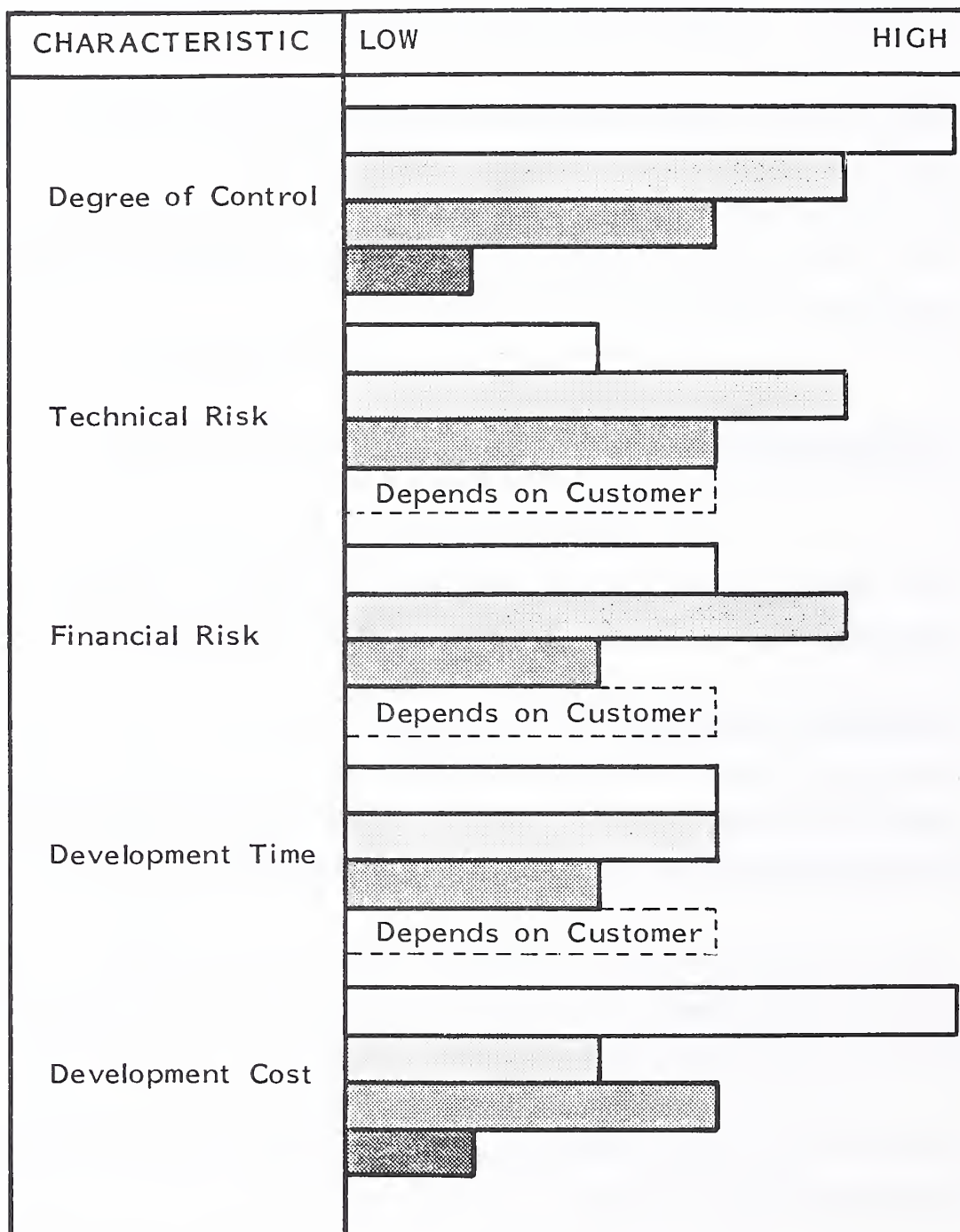
CHARACTERISTIC	LOW	HIGH
Degree of Control		
Technical Risk		
Financial Risk		
Development Time		
Development Cost		

Depends on Customer (Technical Risk)

Depends on Customer (Financial Risk)

Depends on Customer (Development Time)

☐ Internal Development   ▨ Joint Venture

▨ Third-Party Contract   ▨ Customer Development

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- IBM's relational data base, 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.

- IBM offers a number of strengths:

  - 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.

- 57 -

INPUT

- Overall, IBM's strategy is geared to protecting the existing customer base and 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

- In this section, six internationally prominent DBMS vendors are profiled.

  a. Cullinet

- DBMS revenues account for about a third of total sales.

- Application software is projected to account for half of all revenues by 1987.

- In 1984 Cullinet claims that 15% of DBMS sales were integrated with applications sytems. They are projecting that this integration will be 25% in 1985 and 40% by 1987.

- Some application software is developed in-house; the rest is purchased and modified:

  - Manufacturing software purchased from Rath and Strong.

- 58 -

INPUT

- 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 installations 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:

INPUT

- 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 improved. 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.

INPUT

b.   Cincom

- 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 upgrading.

  - 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 under-lying data base foundation:

- 61 -

INPUT

- 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 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 were $128 million, with growth at a 44% 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, with each representing less than 5% of the installed base.

- Strengths include:

- DBMS technology is well recognized and accepted.

INPUT

- 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 in autumn 1983 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.

INPUT

d.   Software AG

- 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.

- 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.

INPUT

- 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 its products at the end user would improve Software AG's long-term position.

  e. Computer Associates International

- Company revenues have now reached nearly $130 million, maintaining a very high annual growth rate of around 35%.

- 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.

- 65 -

INPUT

- 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.

3. APPLICATIONS VENDORS

- Descriptions are provided for two major applications vendors, MSA and McCormack & Dodge, together with some details of Walker Interactive Systems and Hogan Systems, both of which are attempting to build a European base.

a.   <u>MSA</u>

● MSA is the largest independent supplier of application software, with $142 million in annual revenues for 1984 and a growth rate of over 20% 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.

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INPUT

- An established company and management team.

- An established presence in selected vertical markets such as banking and insurance, health care, 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.

INPUT

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.

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INPUT

- 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 by applications.

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e.   <u>Summary</u>

- Exhibits V-5 and V-6 summarize the comparative characteristics of the hard-ware, DBMS, and applications vendors discussed above:

    - Exhibit V-5 positions the vendors in terms of their orientation (DBMS or application software) and level of integrated product offerings.

    - Exhibit V-6 contains profiles for the major DBMS vendors discussed above.

- 71 -

INPUT

EXHIBIT V-5

DEGREE OF INTEGRATED DBMS –
APPLICATION SOFTWARE IMPLEMENTATION

- 72 -

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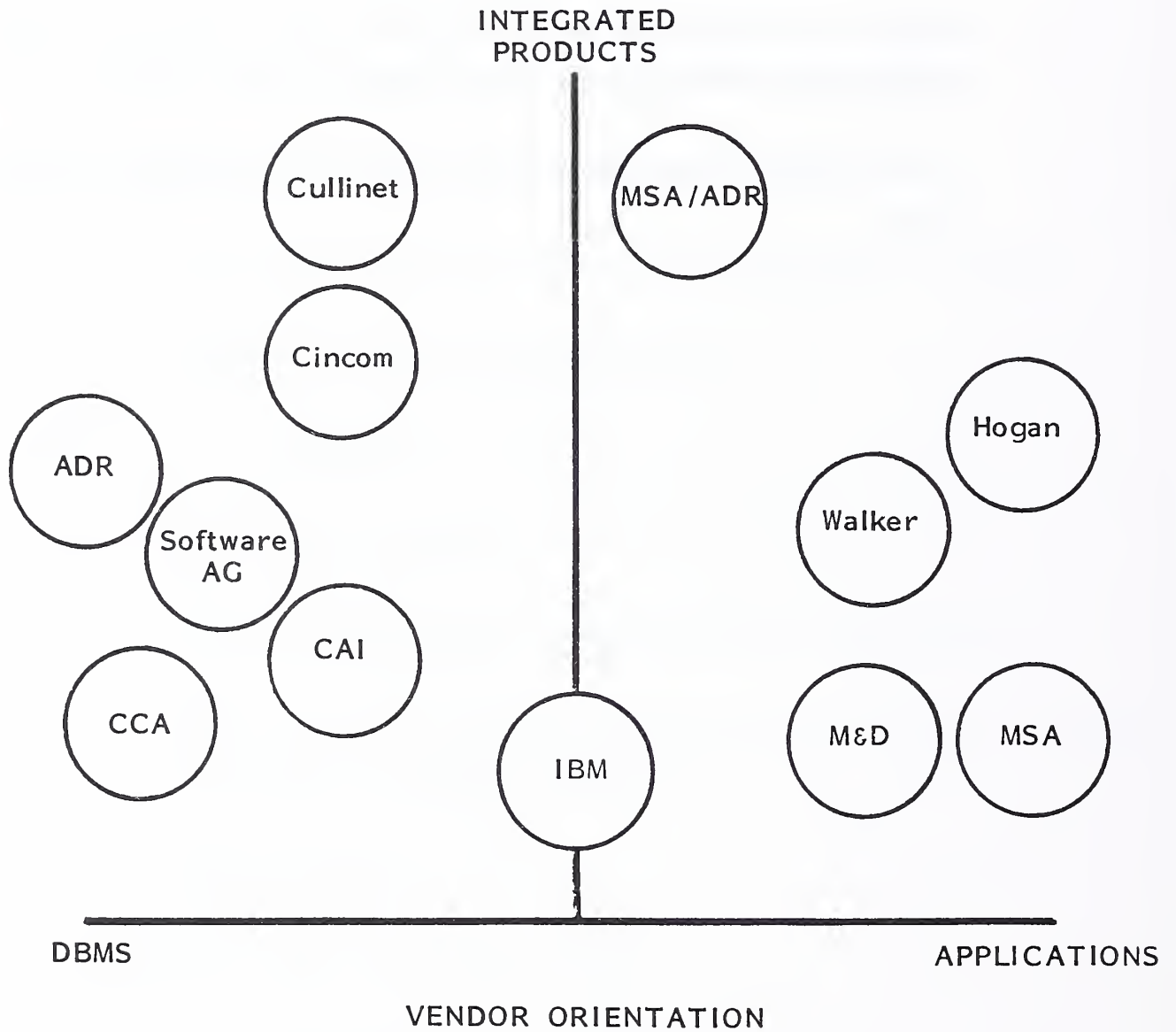
EXHIBIT V-6

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
DBMS CHARACTERISTICS					
Name	IDMS, IDMS/R	Total, TIS	DATACOM	ADABAS	IMS, DL/1, DB2
Type*	H,R	H,R	R	R	N,H,R
Fourth-Generation Language	ADS/O	MANTIS	IDEAL	NATURAL	SQL
Percent of Company** Revenues	80%	50%	20%	–	1%
Customer Sites**	1,800	2,000	500	1,300	5,000

* N = Network
H = Hierarchical
R = Relational

* * Source: INPUT Estimates

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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 1990, 80% will be running DBMSs.

INPUT

- Within the overall applications market:

    - Industry-specific software expenditure is likely to rise significantly.

    - 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.

INPUT

- 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.)?

    - Product reputation?

    - Sales/service support?

    - Overall image?

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INPUT

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

- 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:

    - Applications development tools?

    - High-level languages?

- How much "distributed processing" capability should be provided?

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INPUT

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	►———————————————◄	

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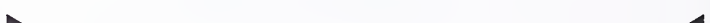
- What should the interfaces be for mini/micro/personal computers?

- How compatible should our present and future DBMSs be?

- How will we develop integrated systems? Will it be:

    - In-house?

    - Purchased 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?

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INPUT

EXHIBIT VI-3

VENDOR TECHNOLOGICAL PROFILE

CHARACTERISTIC	VENDOR POSITION	
	POOR/LOW	GOOD/HIGH
● DBMS Relationality	►————————————◄	
● Functionality		
– Applications Development Tools	►————————————◄	
– High-Level Languages	►————————————◄	
● Distributed Processing Capability	►————————————◄	
● Interfaces with Mini/Micro/ Personal Computers	►————————————◄	
● Compatibility with Other DBMSs	►————————————◄	
● Integrated Systems Development		
– In-House	►————————————◄	
– Purchased	►————————————◄	

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INPU
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- 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.

D.   STRATEGY DEVELOPMENT

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

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INPUT

EXHIBIT VI-4

VENDOR MARKETING MIX PROFILE

CHARACTERISTIC	VENDOR POSITION	
	POOR/LOW	GOOD/HIGH
● Marketing Philosophy		
– End User	◄─────────────────────────────►	
– Data Processing	◄─────────────────────────────►	
● Product Orientation		
– Cross-Industry	◄─────────────────────────────►	
– Vertical Markets	◄─────────────────────────────►	
● Other Vendor Compatibility		
– DBMS	◄─────────────────────────────►	
– Applications	◄─────────────────────────────►	
● Selling Approach		
– Own Sales Force	◄─────────────────────────────►	
– Joint Agreements	◄─────────────────────────────►	
● Pricing vs. Competition		
– Software	◄─────────────────────────────►	
– Modifications	◄─────────────────────────────►	
– Maintenance	◄─────────────────────────────►	
– Training, Documentation, etc.	◄─────────────────────────────►	

ADDITIONAL CONSIDERATIONS

● Competitive Reductions: _____

● Niche Opportunities: _____

● Promotion/Advertising: _____

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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.

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INPUT

- 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.

  - 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 there need 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.

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INPUT

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						
DBMS 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

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EXHIBIT VI-6

INTEGRATED APPLICATIONS

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- 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.

  - Joint 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 further existence).

• Each of these alternatives will have different impacts on business factors such as:

  - Control over:

    . Company strategy.

INPUT

- Product/marketing strategy.

- Product development.

  - Expenses:

    - Initial.

    - Ongoing.

  - Company flexibility.

  - Revenue opportunities.

- As shown in Exhibit VI-7, internal development, 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.

- 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.

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INPUT

EXHIBIT VI-7

RELATIVE MERITS OF INTEGRATION STRATEGIES

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

A = High, D = Low

INPUT
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- 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.

INPUT

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.

INPUT

- 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.

INPUT

APPENDIX B: USER QUESTIONNAIRE

APPENDIX B

INTEGRATED DBMS - APPLICATIONS SOFTWARE
USER QUESTIONNAIRE

1. What is your attitude towards the development of Integrated DBMS - Applications software in respect of:

    a) Cost_____

    _____

    b) Conversion_____

    _____

    c) Efficiency _____

    _____

    d) Flexibility _____

    _____

    e) User Interface_____

    _____

    f) Maintenance_____

    _____

    g) Any other considerations (please state)_____

    _____

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

    i) _____

    ii) _____

    iii) _____

3. In choosing an integrated DBMS - Applications system, how would you rate the following factors on a scale of 1 to 5 (1=low importance, 5=high importance).

    a) Packages available   _____

    b) Cost considerations   _____

    c) Vendor support   _____

    d) Vendor viability_____

    e) Integration with other applications_____

    f) Integration with existing DBMS _____

    h) Flexibility   _____

    i) Ease of use   _____

    j) Efficiency _____

    k) Ease of installation _____

    l) High order language interface _____

    m) Other (please specify)   _____

INPUT
MIDE

4. What is the likelihood you would change DBMS vendors if one offered a good integrated DBMS
   — Applications software system? Please rate on a scale 1 (low) to 5 (high likelihood).

   _____

5. What is the likelihood you would buy an integrated system requiring you to maintain a DBMS
   in addition to your existing one? Please rate on a scale 1 (low) to 5 (high likelihood).

   _____

6. Would you place most emphasis on choosing DBMS first, then finding applications to fit it,
   or applications first, choosing whatever DBMS they support?

   _____

7. Do you think applications designed to run originally on, for example, VSAM, and then converted
   to a DBMS are limited? If so, in what ways?

   _____

   _____

8. What is the process your company goes through in acquiring applications software packages?
   For example:

   a) What process is used to identify software needs?

      _____

      _____

      _____

   b) Who is involved? (Please state position in company)

      _____

   c) Who makes the recommendation to acquire particular software packages?

      _____

      _____

   d) Who makes the final decision?

      _____

      _____

   e) How long does the process take?

      _____

      _____

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

      _____

      _____

      _____

9. Which of the following types of system would you be most likely to acquire? Please rate from
   1(low) to 5 (high likelihood).

   a) An integratable applications package to attach to your existing DBMS

      _____

   b) A DBMS that can be tied into your existing applications packages

      _____

   c) An integrated DBMS — applications software system unrelated to your current systems

      _____

INPUT
MIDE

10. Please rate the type of vendor you would most likely buy integrated DBMS applications packages from? Please rate from 1 (low) to 5 (high likelihood).

   a) A hardware supplier _____

   b) An applications supplier _____

   c) A DBMS supplier _____

   d) A third-party integrator _____

11. Please rate from 1(low) to 5 (high) how willing you would be to purchase an integrated DBMS-application package from:

   IBM   _____

   CULLINET   _____

   CINCOM   _____

   MSA   _____

   ADR   _____

   OTHERS (please name)   _____   _____

                                 _____   _____

                                 _____   _____

12. a) What percent of your applications software purchase do you expect will be of applications designed to use DBMSs?

      In 1984   _____%

      By 1987   _____%

   b) What percent would be of applications designed to use DBMSs if appropriate packages are available?

      In 1984   _____%

      By 1987   _____%

13. Are you running any integrated DBMS - applications software already?

   a) What are the applications? _____

      _____

   b) Please give date of installation of package? _____

      _____

      Cost (£ or man years)?   _____

      Size of applications?   _____

   c) Did you develop them internally or purchase them? (If purchased, please state name of package and vendor)

      _____

      _____

   d) Which DBMS is used? _____

   e) Were any application tools used in this development?

      _____

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

      _____

   g) What alternative vendors or methods of acquiring the software did you investigate, and why did you choose the source you used?

      _____

      _____

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INPUT
MIDE

h) How would you rate your satisfaction with this software overall? Please rate on a scale of 1(low) to 5 (high satisfaction).

_____

_____

1) Why? What problems have you had with it?

_____

_____

14. What are your three most important applications?
Please indicate reasons for importance e.g. for reasons of resource use, criticality to the company, purchase price, etc.

i) _____

ii) _____

iii) _____

NAME _____

Company   _____

Address   _____

            _____

            _____

Tel No: _____

Thank you for completing this questionnaire. Please return to: Peter Lines
Principal Consultant
INPUT LTD
35, Piccadilly
London W1V 9PB

INPUT
MIDE

APPENDIX C: VENDOR QUESTIONNAIRE

APPENDIX C

INTEGRATED DBMS - APPLICATIONS SOFTWARE
VENDOR QUESTIONNAIRE

INPUT is a market research firm specializing in the
information services industry. We'd like to find out
what your views are on integrated DBMS - Applications
software.

As I'm sure you realize, several DBMS vendors - particularly
Cullinet - are beginning to sell packaged applications that
use the vendor's DBMS instead of traditional files to
store data.

1. Can you tell me what your reaction is to this develop-
    ment in respect of:

    a)   Cost _____

         _____

    b)   Conversion _____

         _____

    c)   Efficiency _____

         _____

    d)   Flexibility _____

         _____

Continued

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INPUT
MIDE

e)   User interface _____

_____

f)   Maintenance _____

_____

g)   Any other considerations (please state) _____

_____

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

i)   _____

ii)   _____

iii) _____

3.   What are the main technical considerations which are
     encouraging - and holding back - DBMS/application
     integration?

	Encouraging		Holding Back
i)	_____	i)	_____
ii)	_____	ii)	_____
iii)	_____	iii)	_____
iv)	_____	iv)	_____

4.   What types of applications packages tend to be
     integrated first, and why is this?

_____

_____

_____

_____

INPUT
MIDE

5. Which applications areas do you believe offer the most opportunities in this area, and why?

_____

_____

_____

_____

6. What applications packages do you currently offer which use an integrated DBMS?

Application Type   DBMS

_____   _____

_____   _____

_____   _____

_____   _____

_____   _____

7. What applications packages are you planning to offer which will use an integrated DBMS?

Application Type   DBMS

_____   _____

_____   _____

_____   _____

_____   _____

_____   _____

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INPUT
MIDE

8. In choosing an integrated DBMS - applications system, how would you think that your customers rated the following factors on a scale of 1 to 5 (1=low importance, 5=high importance).

a)   Packages available _____

b)   Cost considerations _____

d)   Vendor support _____

     Vendor viability _____

f)   Integration with other applications _____

g)   Integration with existing DBMS _____

h)   Flexibility _____

k)   Ease of use _____

l)   Efficiency _____

m)   Ease of installation _____

     High order language interface _____

n)   Other (please specify) _____

9. How likely is it that customers will change DBMS vendors because of a particularly good integrated DBMS - applications software system? Please rate on a scale 1 (low) to 5 (high). _____

_____

_____

10. How likely is it that customers will buy an integrated system which requires them to maintain a DBMS in addition to their existing one? Please rate on a scale 1 (low) to 5 (high). _____

Comments: _____

_____

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INPUT
MIDE

11. Do you think users place most emphasis on choosing a
    DBMS first, then finding applications to fit it, or
    applications first, choosing whatever DBMS that supports
    it?

    _____

    _____

12. What limitations are there, in your opinion, in
    converting applications packages designed to run
    originally on, say, VSAM?

    _____

    _____

13. What percent of DBMS sales do you expect will be tied
    to sales of integrated DBMS - applications systems in
    the next three years?   _____

    _____

    DBMS and existing (modified) packages. _____

    _____

    DBMS and newly-constructed packages _____

    _____

INPUT
MIDE

14. Which system do you think users are most likely to acquire? Please rate from 1 (low) to 5 (high likelihood).

a)   An integratable applications package to attach to their existing DBMS _____

_____

b)   A DBMS that can be tied into their existing applications packages _____

_____

c)   An integrated DBMS - applications software system unrelated to their current system _____

_____

15. 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 suppliers _____

b)   Applications suppliers _____

c)   DBMS suppliers _____

d)   Third-party integrators _____

16. What percent of applications software purchases do you expect will be of applications designed to use DBMSs?

In 1984 _____ %

By 1987 _____ %

INPUT
MIDE

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

_____

_____

18. What other vendors do you see becoming active in offering integrated DBMS/applications packages?

_____

_____

19. What share of the market do you estimate is controlled by your competitors in this field?

_____

_____

20. What do you consider to be your key success factors?

_____

_____

_____

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

_____

_____

_____

Thank you for completing this questionnaire.

INPUT
MIDE