Packaged Software Plans in Selected Process Manufacturing Sectors

INPUT

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PACKAGED SOFTWARE PLANS IN SELECTED PROCESS MANUFACTURING SECTORS

I. EXECUTIVE SUMMARY

A. Background

This report summarizes several studies which have examined the market for packaged applications software in the process manufacturing sector.

Much of the material and conclusions are based on primary interview research which INPUT conducted between July and November 1992. During that period INPUT interviewed 114 companies in the food, drug and chemical industries. The analysis contains information from 278 mission-critical applications in those companies.

This summary covers the following topics:

- Overall market size and segmentation
- Buyers values, covering applications, technology and the role of the end user.
- Competitive environment

B. Market Size and Segmentation

This market is not a uniform market. The market varies appreciably in terms of

- The average expenditure per application (from $250,000 in medium-sized chemical companies to $3 million per application in large drug companies)
- The average number of high priority applications per company (from around three per company in most medium-sized companies to five in the larger food and drug companies).
- The number of potential customers (i.e, about 15 large drug companies and about 1,000 medium-sized food processing establishments)

Over the next three years, INPUT estimates that approximately $1 billion will be spent on packaged software in these three target industries (Exhibit I-1).

- These figures are limited, to the extent possible, manufacturing applications within these companies. (Note: These figures exclude hardware expenditures.)

- As Exhibit I-1 shows, about half this figure is in the smaller food processors: This is largely a function of the number of such establishments. The other segments are roughly the same size from a potential revenue standpoint.

- This money may not all be spent; much depends on whether applications meet constantly evolving user needs.

C. Buyer Values

1. Application Focus

Applications with a high degree of "manufacturing" content are those with the highest planned replacement rates. Across the segments measured, there was a fairly constant planned replacement rate of 30% to 40%. The principal applications are the following:

- Plant operations
- Environmental, health and safety
- Customer service
- Resource planning
- Product management

Financial and accounting products are often associated with one or more of the above in the replacement process; however, it is generally the manufacturing applications which drive replacement.

A substantial majority of companies are planning to use software packages as their replacement vehicle.

- Almost 80% of companies interviewed saw a 75% or greater probability of using a software package as their new application.

- Two-thirds of the companies that were less certain of their use of packages would be more likely to use a package if the package was flexible and tailorable.

- The replacement rate compares to a current market share of around 50% for software products (the rest is made up of custom application built in-house or by a vendor).

2. Technology and Other Selection Factors

Technology features (such as client/server) are important to a majority of companies. However, functional issues are even more important, such as ease of integration, standards and built-n features (see Exhibit I-2).

Based on this, and other, research INPUT expects "pure" technology to be less of an attraction as application control shifts even further into end user hands.

Even among technologists, the application benefits of technologies like client/server or object-oriented design are not yet clear

- This uncertainty is partly a question of customers not being fully current on leading edge technology issues.
- Even where customers are informed, there is doubt over whether the actuality of technology will live up to the promises. Many enthusiasts have been sobered by the performance of CASE, for example.

Technology-based solutions will have to demonstrate their effectiveness.

3. The End User Role

One of the most important long term issues is the increased importance of the end user departments in the application selection process.

- Exhibit I-3 shows that in even smaller food processors that the end users have primary decision making in half the companies.
- This percent increases to 70%-80% in the larger companies.
- This trend is expected to continue by all involved.

The involvement of end users has several implications:

- Obviously, the sales process no longer stops at the IS department. (Sometimes it may not even include IS.)
- The process itself will often be different. Functional units are less interested in formal short lists and, even where objective selection criteria exist, they may not be followed.
- More subtilely, end users will be looking for different things from software products (and their vendors). INPUT research in other areas has shown, for example, that application product vendors are valued for their perceived ability to produce a solution, rather than individual characteristics of the package.

D. Competitive Environment

SAP is commonly viewed as the leading vendor in this area (Exhibit I-4). This is undoubtedly true, from the standpoint of SAP's market share among large companies. However, midrange vendors such as J.D.Edwards are quite strong in smaller companies and divisions of large companies.

However, no vendor has a lock on the future market:

- SAP has to prove itself outside of the MVS market.
- All vendors have to prove themselves in a true client/server setting.
- The AS/400 has proved to be a very desirable platform for several firms (Such as J.D. Edwards). However, the AS/400 may prove to be less desirable as an entry into distributed or cooperative applications. At the very least, the turmoil that IBM is going through may produce problems for AS/400 applications developers for reasons outside their control.

Exhibit I-1

Estimated Expenditures per Segment on Packaged Software for Priority Manufacturing Applications: 1993-1995

Industry	Medium Companies ($100-$999 MM)	Large Companies (Over $1 Billion)	Total ($MM)
Drug	110	60	170
Food	500	130	630
Chemical	100	110	210
Total	710	300	1,010

Exhibit I-2

IMPORTANCE OF SOFTWARE PACKAGE EVALUATION CRITERIA

Criteria	Importance (% Respondents Rating 4 or 5*)
Easy to integrate	88%
Conforms to standards	77%
Extensive Built-in Features	76%
Vendor reputation	74%
Full Installation Support	69%
Client/Server Technology	68%
Software Modifiable by Customer	62%
Hardware Independent	56%
Vendor-provided Product Modifications	52%

*1 = lowest importance, 5 = highest importance

Exhibit I-3

Percent of Companies Where End Users Have Primary Decision-Making Authority for Replacing/Changing Application Software

	Company Size*	
Industry	Medium	Large
Chemical	63	71
Drug	75	81
Food Processing	50	82

* Medium = Revenues between $100 and $999 million
Large = Revenues of $1 billion and over

Exhibit I-4

Packaged Software Competitors in Process Manufacturing

(Alphabetic within Groups)

Leading Competitor

- SAP

Primary Competitors

- Datalogix
- J.D. Edwards
- IBM
- Marcam

Secondary Competitors

- ASK
- D & B
- Ross
- System Software Associates

"Potential Primary"

- EDS
- Oracle

II. BACKGROUND AND METHODOLOGY

A. Background

This report is a summary of research conducted for Andersen Consulting in July-December 1992.

- In July 1992 INPUT conducted research to understand software purchase rate profiles among potential customers. Two sectors were selected: utilities and food processors. The questionnaire used is in Appendix A.

- This information, along with other information on "Best Bet" software product opportunities and market entry build-up analyses, was reviewed at a worksession in Chicago on August 13, 1992. This material was later summarized in a written report in September 1992.

- This report has extracted material from the August and September analyses on food processor purchasing plans.

As a follow-on to the July/August research, INPUT conducted additional, expanded research in the chemical and drug industries in October and November 1992.

- This additional research went into more detail on specific applications plans. The questionnaire used is in Appendix B.

- The results from this research were reported to Andersen in a draft written report dated November 16, 1992.

This report below combines the material from the November report as well as appropriate material on the food processing sector from the earlier work.

The food processing data is comparable at the industry segment level

At the application level INPUT makes observations in this report on the extent to which the food processing industry's profile is similar to those of the drug and chemical sectors.)

B. Methodology

The material reported on here was obtained from telephone interviews conducted with 114 companies. The distribution of interviews is shown in Exhibit I-1.

- Respondents were those knowledgeable concerning the applications plans and directions of their company.
  - Usually, the respondents were connected with the central IS department, even though the responsibility for applications planning and/or implementation was often located elsewhere.
  - INPUT has found -- in this and other studies -- that the central IS organization is still a good place to obtain corporate-wide information, even if IS is not fully informed on all details.
- Companies were further divided into "medium" and "large" entities ("medium being revenues between $100 and $999 million). Where divisions of large entities operate independently, they were classified as "medium" for the purposes of this analysis.

Within each company INPUT focused on mission-critical applications: for the drug and chemical industries, these were primarily targeted from a specific list agreed to by INPUT and Andersen prior to the survey; for the food processing sector, the respondents selected applications without prompting. The data contains information on 278 mission-critical applications.

In general, INPUT found the respondents were open and forthcoming concerning their companies' plans. In some cases, as noted above, the respondent was not fully informed concerning decentralized applications plans; however, the decentralized units in this sort of situation are often no more able to precisely define their future plans.

Exhibit II-1

Interview Distribution

	Company Size		
Industry	Medium	Large	Total
Chemical	22	24	46
Drug	21	16	37
Food Processing	13	18	31
Total	56	58	114

* Medium = Revenues between $100 and $999 million
Large = Revenues of $1 billion and over

III. FUTURE APPLICATIONS

This section reports on:

- The planned rate of applications replacement
- The extent of software package usage (versus custom development, whether performed in-house or by a vendor)

A. Replacement Plans

Respondents have seen an increased rate of applications change in the last five years (Exhibit II-1). Large drug companies have seen the largest amount of change.

An analysis of priority applications shows that over one-third are expected to be replaced in the next five years (Exhibit II-2). An additional tenth are currently in the process of being replaced.

This picture is virtually unchanged when the secondary applications (financial and other) are excluded (Exhibit II-3). This replacement rate is very similar across all manufacturing-oriented applications.

B. Package Usage

Currently, packages are used in about 40% of priority applications (Exhibit II-4). Drug companies are more likely to use packages now.

A striking finding is that where a replacement is currently planned, over three-quarters of drug and chemical companies see a high probability of using a package (Exhibit II-5). [Study data is not exactly comparable for food processors. However, their software product replacement rates should be similar, given overall trends (Exhibit II-6).]

Another important finding is that where companies are less likely to use a package, the probability of use increases markedly if the package were "more flexible and tailorable than the current generation of software packages." (Exhibit II-7). Potentially, almost all new applications could use packages as a base.

Exhibit III-1

Percent of Companies with Increased Rate of Application Change/Replacement in Last Five Years

	Company Size*	
Industry	Medium	Large
Chemical	76	71
Drug	57	88
Food Processing	54	72

* Medium = Revenues between $100 and $999 million
Large = Revenues of $1 billion and over

Exhibit III-2

Replacement Status for Priority Applications
All Applications

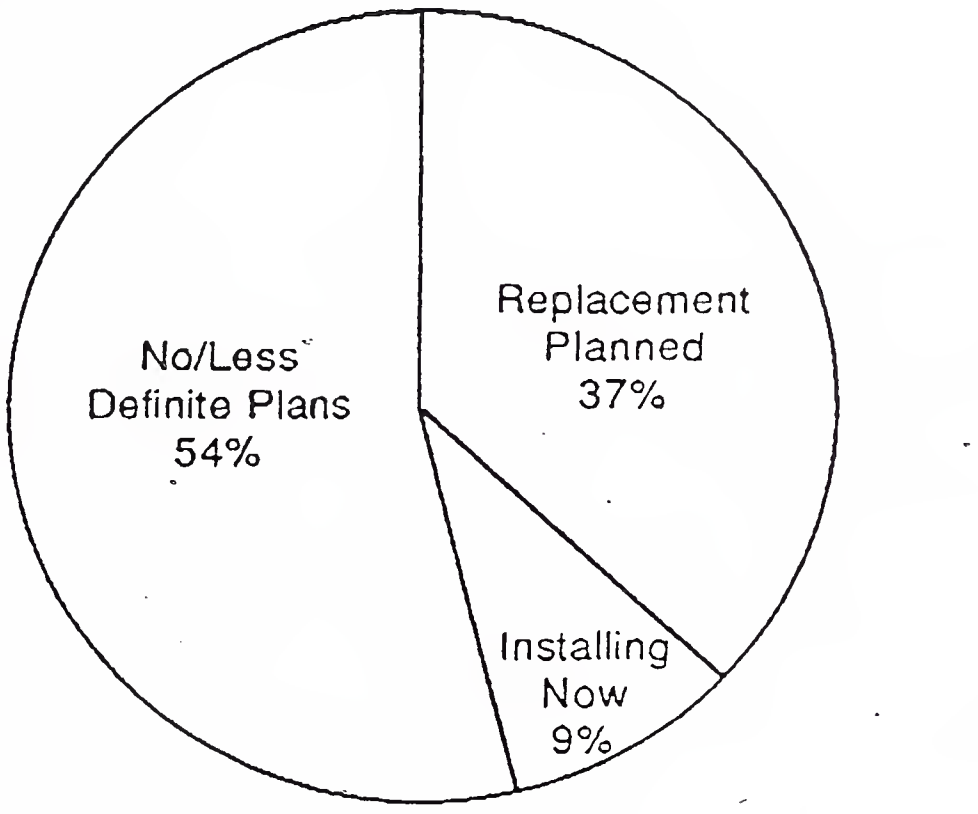
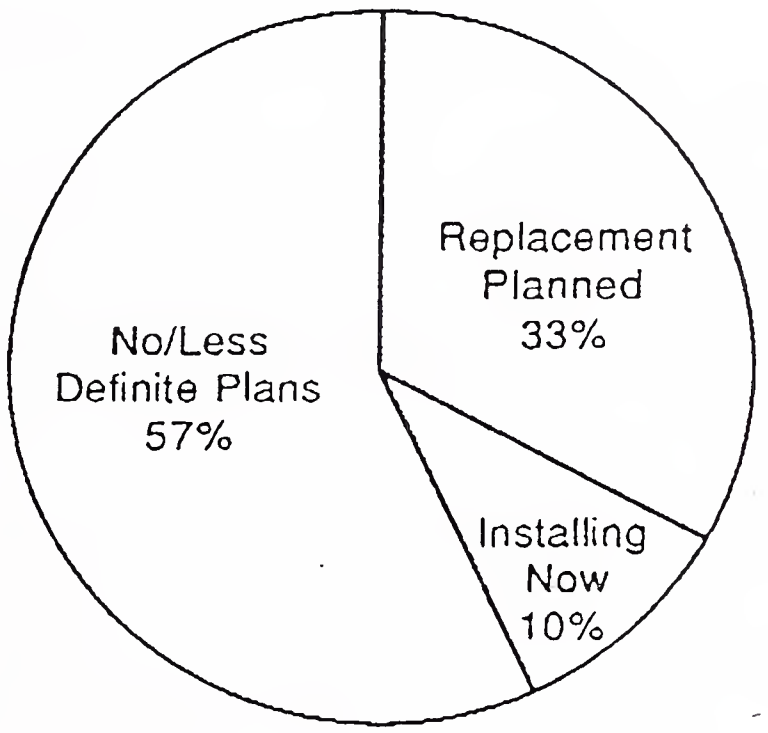


Exhibit III-3

Replacement Status for Priority Applications
Targeted Manufacturing Applications



N = 124

Note: Omits financial and "other" applications

Exhibit III-4

CURRENT PACKAGE USE IN TARGETTED APPLICATIONS

All Firms	40%
Chemical Companies	32%
Drug Companies	52%
Food Processing Companies	38%

Exhibit III-5

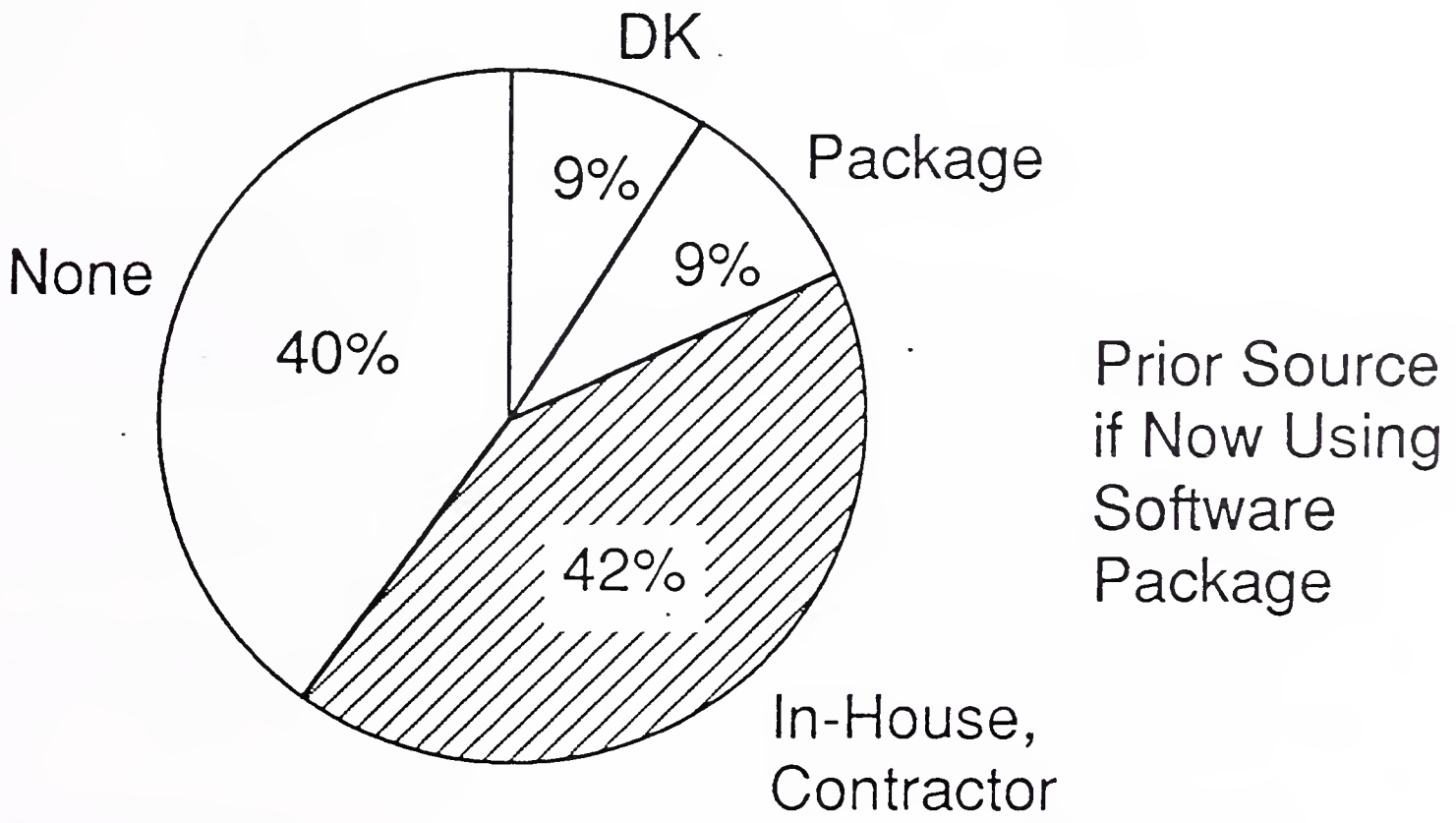
Probability of Using Software Package for Planned Replacement Manufacturing Applications in the Drug and Chemical Sectors *

Probability of Using Package	% of Applications
75% or greater	78%
25-50%	10%
0 or don't know	12%
	100%

*Excluding Financial and "Other"

Exhibit III-6

Switching From Custom To Packaged Software Is Common In The Food Processing Industry



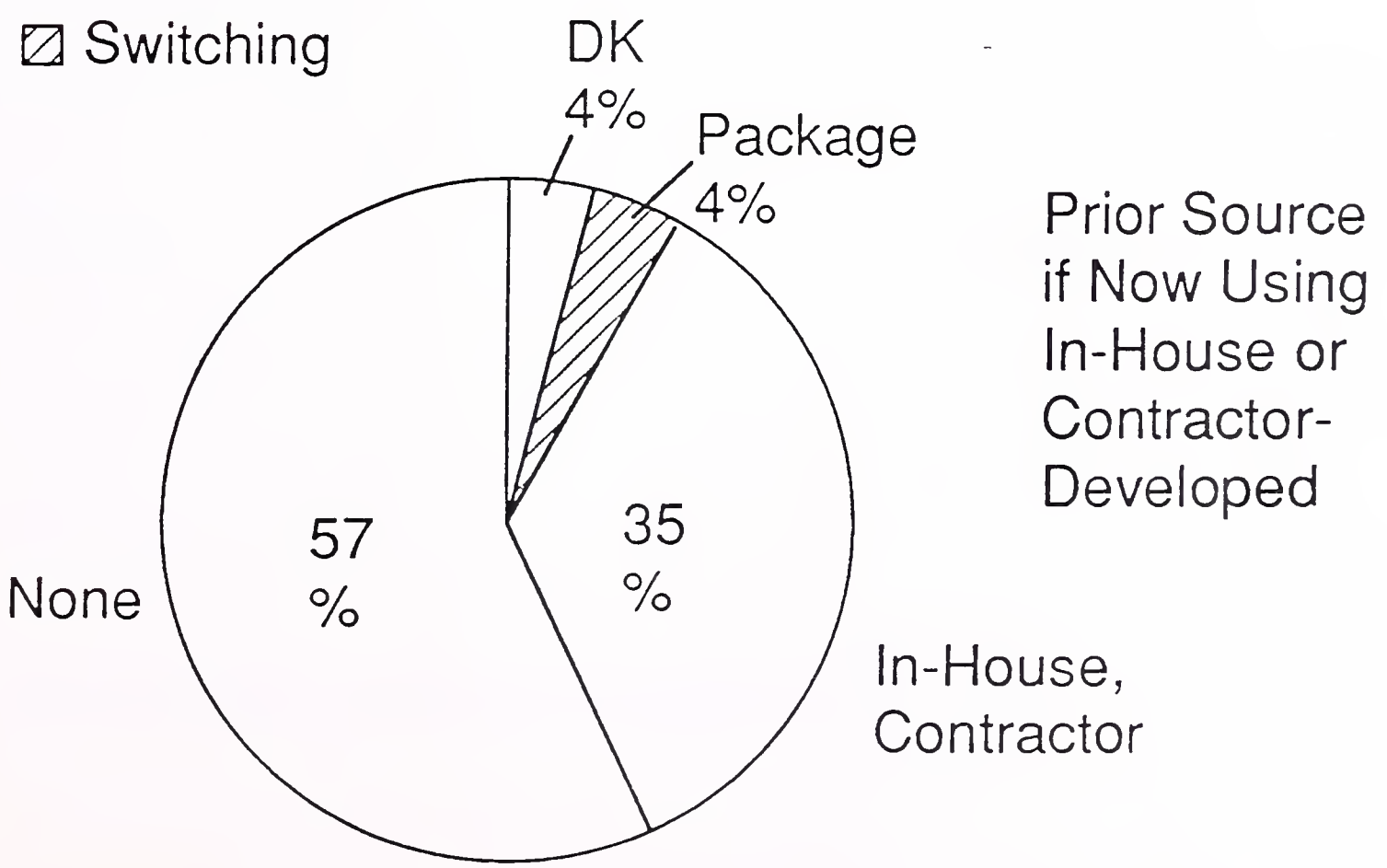


Exhibit III-7

Impact of Flexibility/Tailoring on Increasing Probability of Using Packaged Software

Probability of using package for planned replacement	Number of Cases	Number more likely to use package
75%	5	3 (60%)
25%-50%	4	3 (75%)
0/Don't know	5	3 (60%)
Total	14	9 (64%)

Source: Drug & Chemical Companies

IV. APPLICATION SELECTION MOTIVATORS

In the research performed for this study INPUT found that there were two distinct motivators changing application selection practices:

- Increasing end user involvement in applications in general, especially in the selection process
- Changes in technology

A. End User Involvement

As shown in Exhibit III-1, end users already have primary decision making authority over applications generally in most companies. This tends to be higher in the larger companies; this is not surprising, because the operating units are larger and can be more self-sufficient. The end user role, as perceived by the IS department is still increasing on the whole (Exhibit III-2). This perception is especially important since many IS units' interests would be better served if the opposite were the case.

These figures are even more impressive when specific applications are examined (Exhibit III-3).

- The split between large and medium sized firms is striking.
- This indicates that users are taking control of the most important applications first, leaving the less important and/or "maintenance" work to IS.

B. Impact of Technology Changes

About half of the companies say that technology changes are accelerating general applications replacement. This factor is somewhat more important in the larger companies (Exhibit III-4). Based on other work which INPUT has conducted, these are generally feelings influenced by downsizing in general.

However, when questioned on the importance of incorporating new technologies into specific applications, the response was lukewarm at best (Exhibit III-5). Even client/server and cooperative processing received a relatively low response. (The apparently higher ratings for environmental and resource planning is probably a result of small sample sizes.)

INPUT believes that these ratings are low because:

- Many respondents are not very well informed on the quickly-changing technology issues involved.

- Even when respondents are reasonably well informed on technology issues they will have difficulty relating the technology to changes in a specific application.

INPUT expects this problem to become more acute as user departments assume more influence and as vendors begin making more technology claims.

Exhibit IV-1

Percent of Companies Where End Users Have Primary Decision-Making Authority for Replacing/Changing Application Software

	Company Size*	
Industry	Medium	Large
Chemical	63	71
Drug	75	81
Food Processing	50	82

* Medium = Revenues between $100 and $999 million
Large = Revenues of $1 billion and over

Exhibit IV-2

Role of Users Is Increasing (As Perceived by IS)

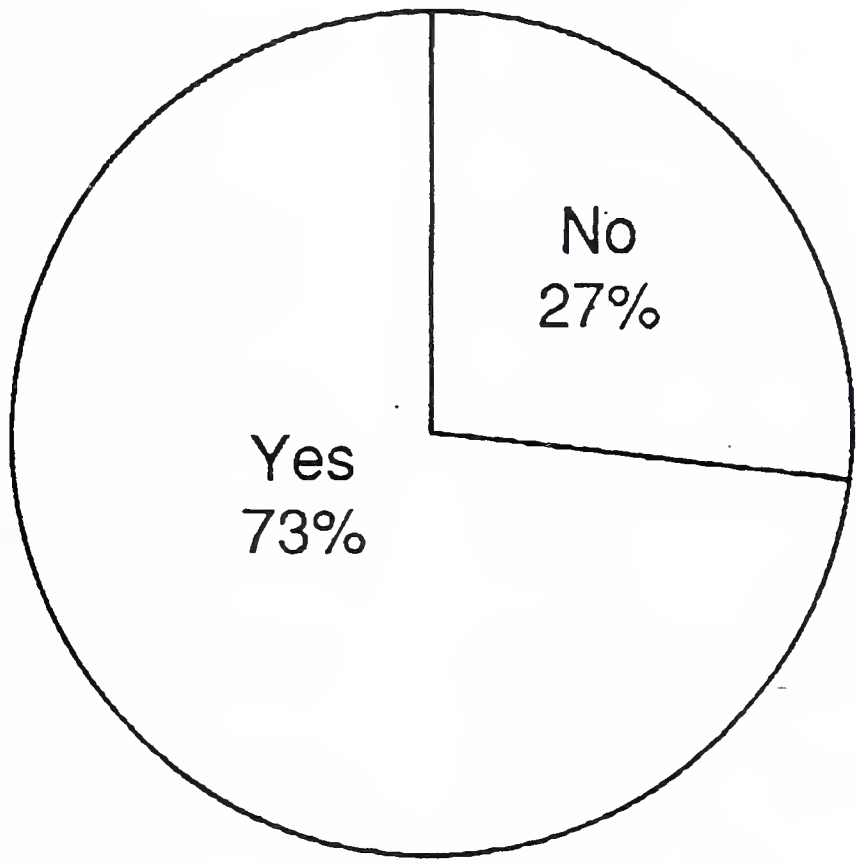


Exhibit IV-3

Percent of Time User Department is Main Decision Maker for Specific Applications in the Chemical and Drug Sectors

	Size of Company	
Application	Medium	Large
Plant Operations	27%	75%
Environment/Health	67%	100%
Customer Service	32%	64%
Resource Planning	40%	100%
Product Management	33%	75%
Industry (as a group)		
Chemical	30%	82%
Drug	50%	71%
All (Not weighted)	40%	78%

Exhibit IV-4

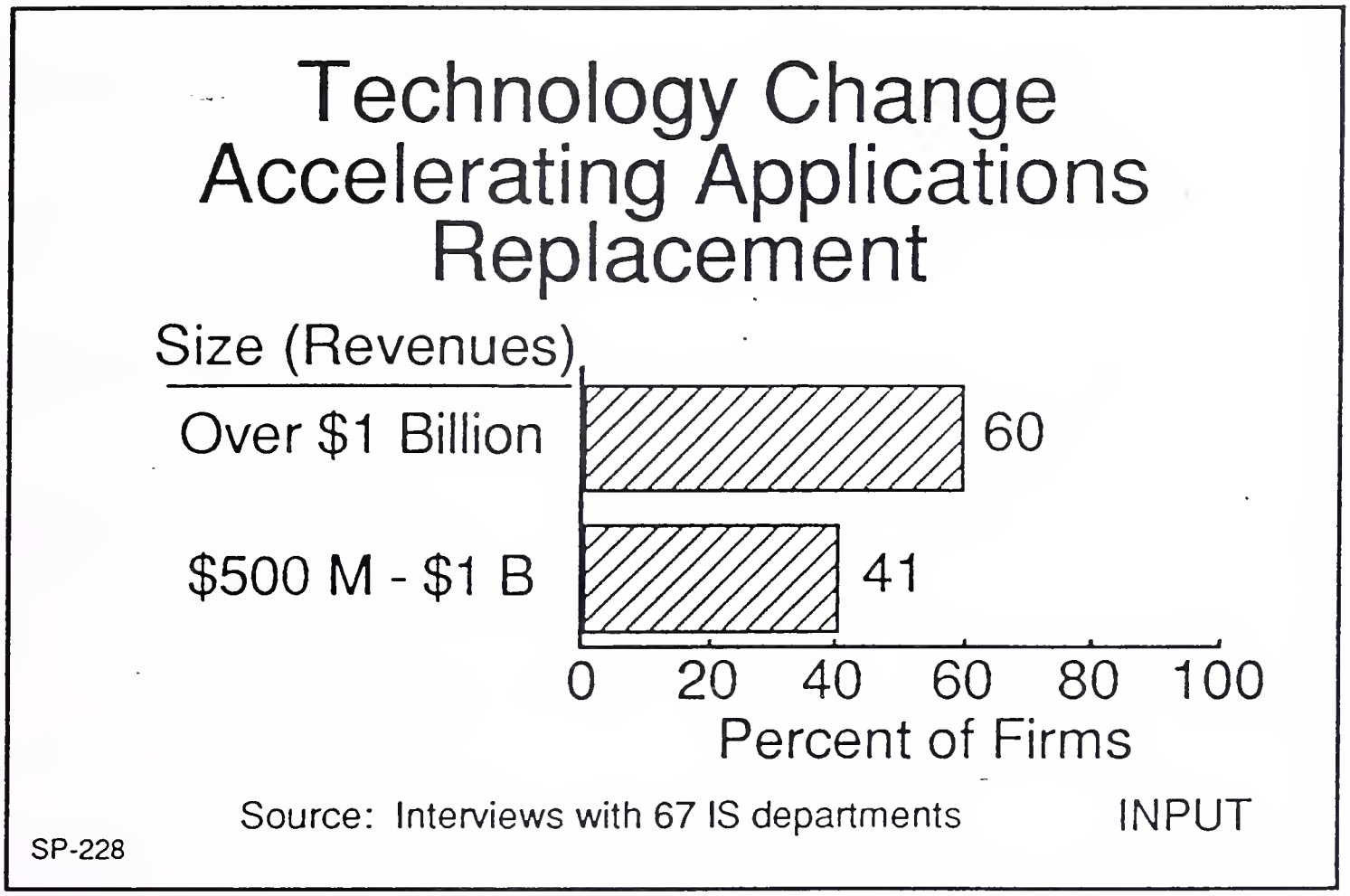

Technology Change
Accelerating Applications
Replacement
Size (Revenues)
Over $1 Billion
60
$500 M - $1 B
41
0
20
40
60
80
100
Percent of Firms
Source: Interviews with 67 IS departments
INPUT
SP-228

Exhibit IV-5

Importance of Incorporating Technologies into Manufacturing Applications

Technology	Plant Op	Env	Cust Serv	Res Plan	Prod Mgt	Avg. *
Client Server	3.1	3.8	3.4	3.7	3.1	3.3
Embedded CASE	2.6	2.4	2.6	2.3	2.6	2.6
Objected-Oriented	2.4	2.4	2.6	2.9	2.6	2.6
AI	2.3	2.3	2.3	1.7	2.1	2.2
Cooperative Processing	3.1	3.1	3.1	2.3	3.1	3.0
Number of Interviews	41	14	37	9	15	

* Not weighted; 1 = Not important 5 = Very Important

V. APPLICATION PRIORITIES IN MANUFACTURING

For the chemical and drug sectors INPUT prepared a list of applications for which respondents rated the importance ("Principal Focus" group in Exhibit IV-1). In addition, many respondents volunteered other applications ("Secondary Focus" group in Exhibit IV-1).

Two applications stood out as being of primary importance: customer service and plant operations, being cited by over two-thirds of respondents (Exhibit IV-2, "Priority Group A").

A second group of applications was seen as important by about half of respondents: product management, environmental/health and resource planning (Exhibit IV-3, "Priority Group B")

The third group ("Priority Group C" in Exhibit IV-4) is made up of the more important applications that were volunteered. These include financial systems, distribution/logistics and order entry. INPUT believes that these applications would probably be rated somewhat higher if all respondents had been asked to specifically rate them:

- A few applications may have been overlooked by respondents when they were volunteering priorities.
- Other applications may have been viewed by respondents as being integral to principal applications (e.g., financial or distribution/logistics as part of plant operations).

Sales and marketing applications are important for drug companies and not important to chemical companies (Exhibit IV-5). INPUT believes the profile for food processors would be similar to drug companies, especially in the importance of sales and marketing applications.

Large drug companies cited an average of 4.8 priority applications per company. Other classes of companies averaged about 3.5 applications per company.

As cited in Chapter III, replacements are planned for over one-third of priority applications overall. This percentage does not vary substantially for individual applications.

Exhibit V-1

Application Focus

Principal Focus

Plant operations
Environmental, health and safety
Customer service
Resource planning
Product management

Secondary Focus

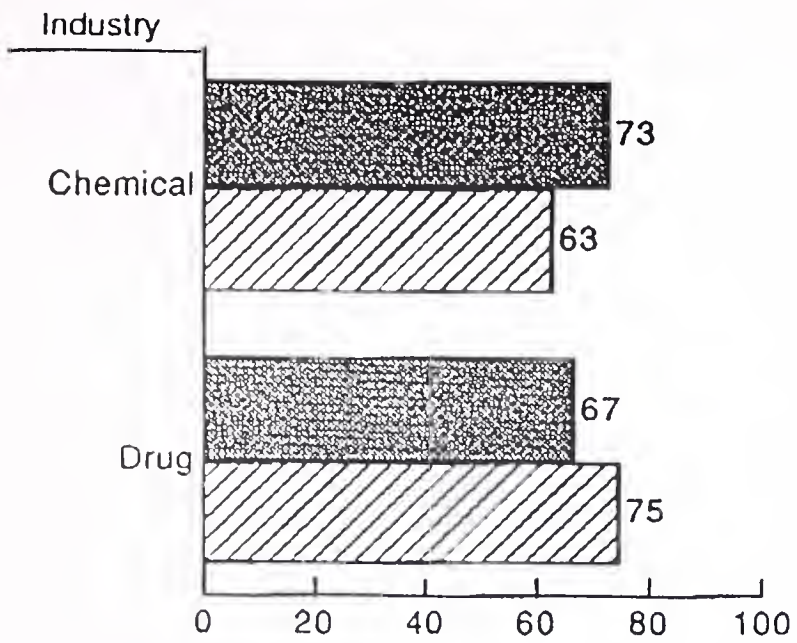
Financial/accounting
Order entry
Distribution
Sales and marketing
Other (e.g., Bar coding, EDI, imaging, maintenance, POS)

Note:

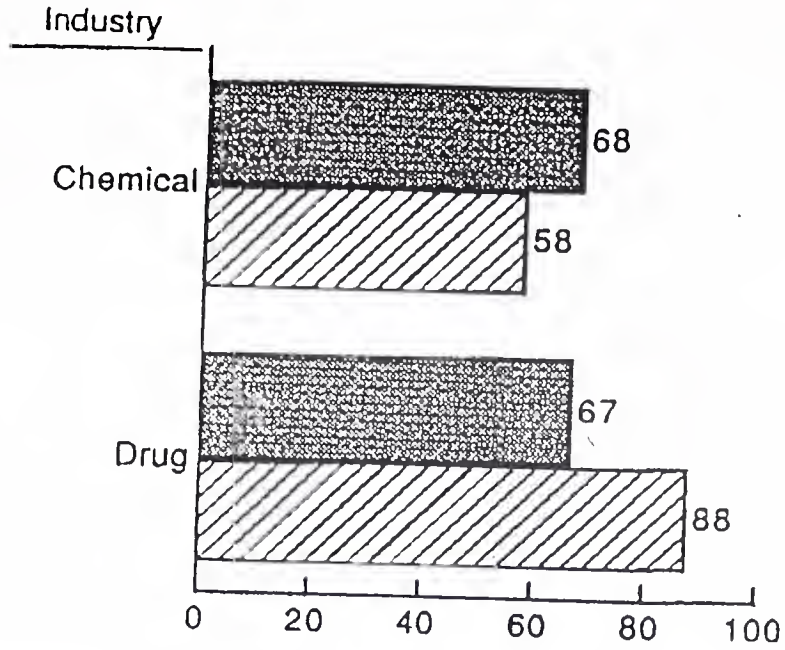
- Respondents specifically questioned on status of "principal" applications.
- "Secondary" application status was volunteered

EXHIBIT V-2

PRIORITY GROUP A: CUSTOMER SERVICES AND PLANT OPERATIONS



PERCENT OF COMPANIES CITING PLANT OPERATIONS AS A PRIORITY APPLICATION



PERCENT OF COMPANIES CITING CUSTOMER SERVICE AS A PRIORITY APPLICATION

Size: ▩ $100 Million - $1 Billion

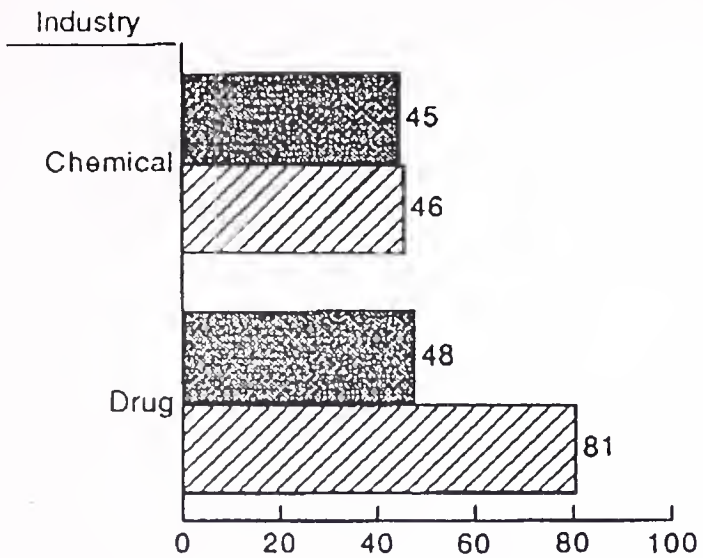
▨ Over $1 Billion

Unweighted average: 70%

Source: Surveys of 83 chemical and drug companies/divisions

EXHIBIT V-3

PRIORITY GROUP B: PRODUCT MANAGEMENT, ENVIRONMENTAL/HEALTH, AND RESOURCE PLANNING

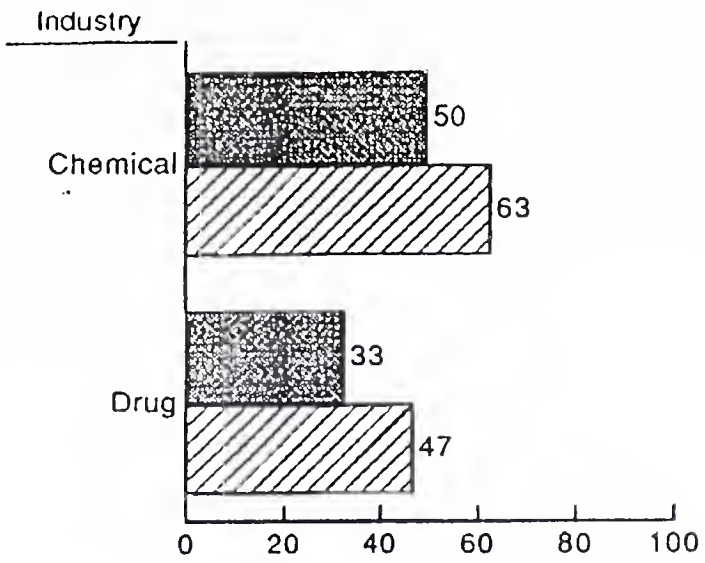


PERCENT OF COMPANIES CITING PRODUCT MANAGEMENT AS A PRIORITY APPLICATION

Size: $100 Million - $1 Billion
Over $1 Billion

Unweighted average: 55%

Source: Surveys of 83 chemical and drug companies/divisions

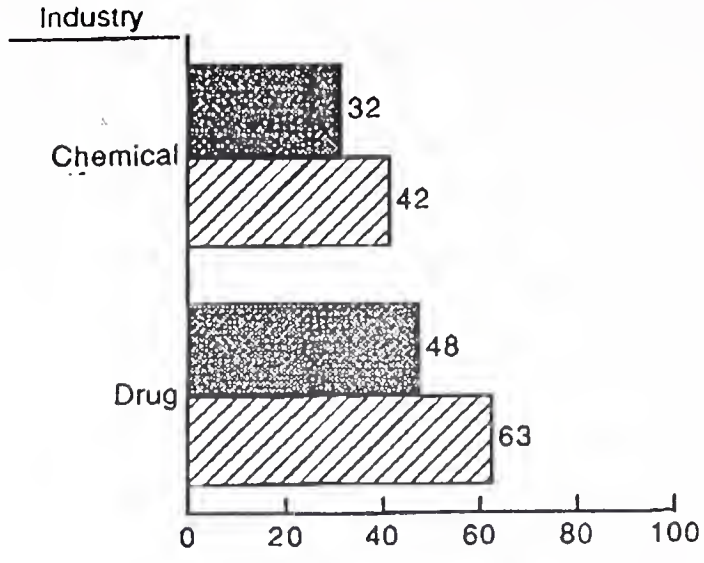


PERCENT OF COMPANIES CITING ENVIRONMENTAL, HEALTH, SAFETY, AND TRAINING AS A PRIORITY APPLICATION

Size: $100 Million - $1 Billion
Over $1 Billion

Unweighted average: 48%

Source: Surveys of 83 chemical and drug companies/divisions



PERCENT OF COMPANIES CITING RESOURCE PLANNING AS A PRIORITY APPLICATION

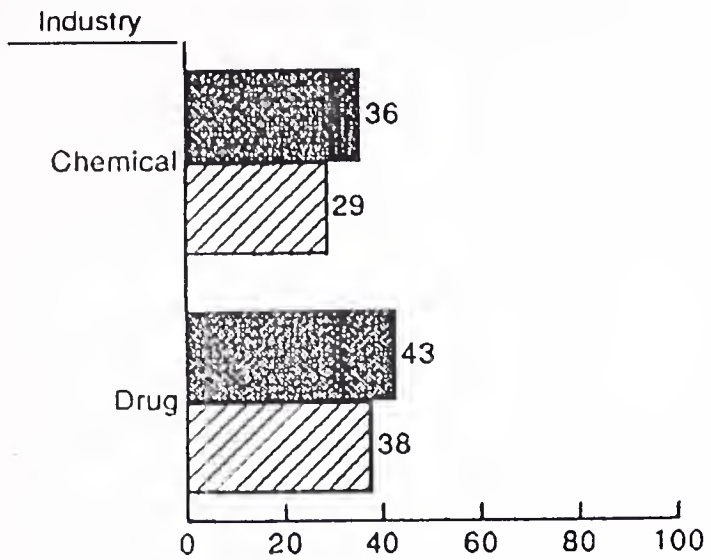
Size: $100 Million - $1 Billion
Over $1 Billion

Unweighted average: 46%

Source: Surveys of 83 chemical and drug companies/divisions

EXHIBIT V-4

PRIORITY GROUP C: FINANCIAL SYSTEMS, DISTRIBUTION/LOGISTICS, AND ORDER ENTRY

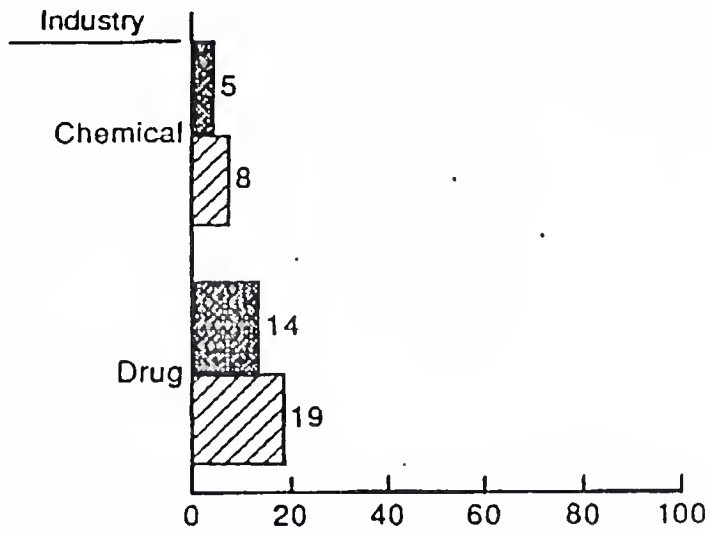


PERCENT OF COMPANIES VOLUNTEERING FINNCIAL SYSTEMS AS A PRIORITY APPLICATION

Size: $100 Million - $1 Billion
Over $1 Billion

Unweighted average: 37%

Source: Surveys of 83 chemical and drug companies/divisions

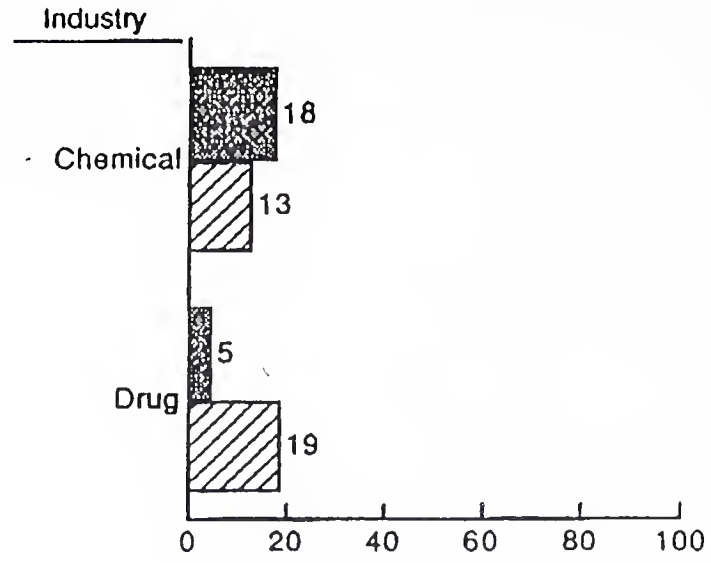


PERCENT OF COMPANIES VOLUNTEERING DISTRIBUTION/ LOGISTICS AS A PRIORITY APPLICATION

Size: $100 Million - $1 Billion
Over $1 Billion

Unweighted average: 12%

Source: Surveys of 83 chemical and drug companies/divisions



PERCENT OF COMPANIES VOLUNTEERING ORDER ENTRY AS A PRIORITY APPLICATION

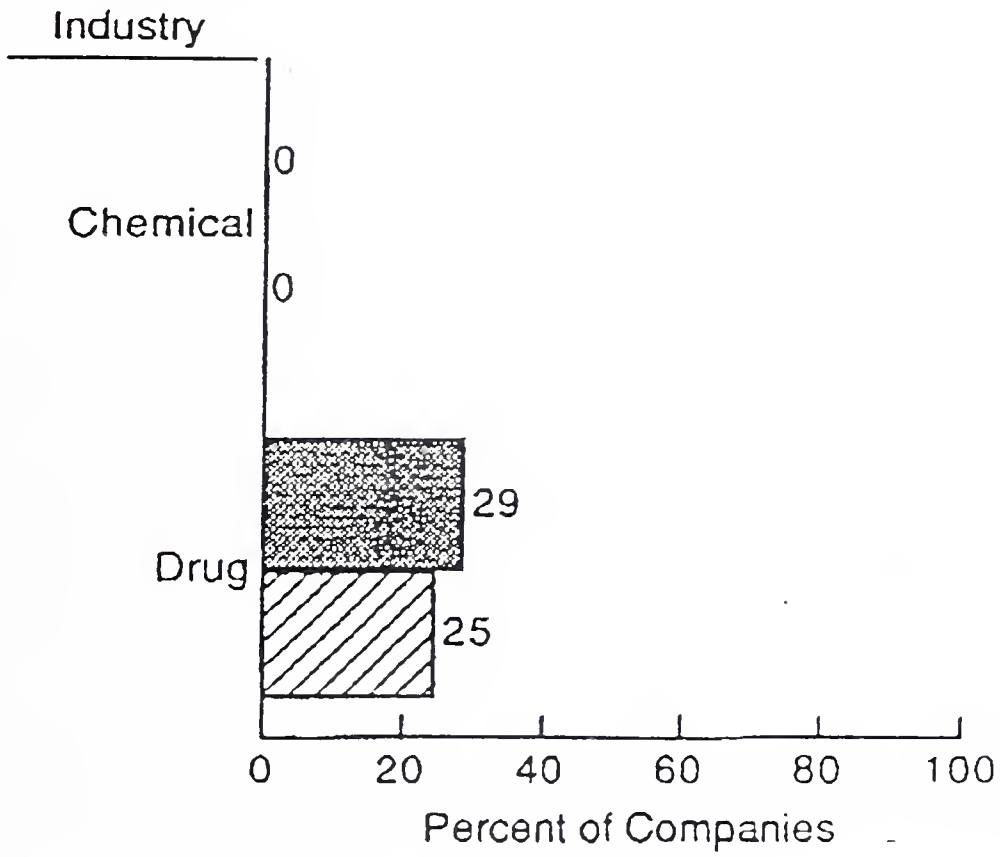
Size: $100 Million - $1 Billion
Over $1 Billion

Unweighted average: 14%

Source: Surveys of 83 chemical and drug companies/divisions

Exhibit V-5

Percent of Companies Citing Sales and Marketing as a Priority Application



Size: $100 Million - $1 Billion

Over $1 Billion

Unweighted average: 14%

Source: Surveys of 83 chemical and drug companies/divisions

VI. SOFTWARE PRODUCT EXPENDITURES

A. Spending by Type of Application

Drug and chemical respondents were asked to estimate the amount that they thought would be invested in software and people costs for particular priority applications over the next five years. Exhibit V-1 shows average spending per application.

- Not surprisingly, large companies are expecting to spend more than medium-sized companies for each application.
- Drug companies plan higher rates of spending per application than chemical companies.

Exhibit V-2 shows spending by application (across chemical and drug companies). Customer service and product management are shown to be the applications with the most spending planned. INPUT expects that food processing companies would have profiles similar to drug companies.

Several cautions should be provided on this data:

- Respondents were generally forthcoming, but often did not know all planned spending (either because they were not totally in the knowledge loop or, more often, because spending plans were part of larger departmental plans that were evolving).
- Figures are order of magnitude and usually ranges.
- While five year figures were requested, INPUT believes that in most cases these figures represent spending over the next 2-3 years.

The net result of these factors is that the figures in Exhibits V-1 and V-2 may be conservative.

B. Market Size Estimates

Exhibit VI-3 takes the average number of priority applications times the average spending per applications to produce an average expenditure per company on priority applications for each segment.

Exhibit VI-4 adjusts the average expenditure per company to average packaged software spending per company and multiplies this by the number of companies in each segment. This produces a market size per segment over the 1992-1995 period.

- As noted above, this figure may be conservative, since not all spending plans could be identified in the research.

- This is balanced by the very real possibility that not all the planned spending may take place: The packaged applications have to be useful ones that meet user needs. In many cases those requiring a new application have not yet come up against the deficiencies of current products in the marketplace.

Exhibit VI-1

Average Spending on Drug and Chemical Applications by Company Size

	Size of Company	
Application	Medium	Large
Plant Operations	$250K	$1 million
Environment & Safety	$250K+	$750K+
Customer Service	$1 million+	$3 million+
Product Management	$500K+	$750K

- Excludes resource planning (insufficient data)
- Based on estimates for 48 applications

Exhibit VI-2

Average Spending per Application By Industry and Company Size

	Size of Company	
Industry	Medium	Large
Chemical	$250K	$750K
Drug	$1 million +	$3 million +

- Includes plant operations, environment and safety, customer service resource planning, product management
- Based on estimates for 53 applications

EXHIBIT VI-3

AVERAGE EXPENDITURES PER SEGMENT ON PRIORITY APPLICATIONS

	MEDIUM COMPANIES			LARGE COMPANIES		
INDUSTRY	AVERAGE # OF PRIORITY APPLICATIONS	X AVERAGE SPENDING PER APPL. ($MM)	= AVERAGE EXPENDITURE PER CO. ($MM)	AVERAGE # OF PRIORITY APPLICATIONS	X AVERAGE SPENDING PER APPL. ($MM)	= AVERAGE EXPENDITURE PER CO. ($MM)
DRUG	4	1.0	4.0	5	3.0	15
FOOD	3	.75	2.25	5	2.0	10
CHEMICAL	3	.25	.75	4	.75	3

EXHIBIT VI-4

EXPENDITURES BY SEGMENT ON PACKAGED SOFTWARE FOR PRIORITY APPLICATIONS: 1993-1995

	MEDIUM COMPANIES			LARGE COMPANIES			
INDUSTRY	AVERAGE SPENDING/CO. ON APPLIC. PKGS ($MM)*	X NUMBER OF COMPANIES**	= APPLICATION PACKAGE EXPENSE ($MM)	AVERAGE SPENDING/CO. ON APPLIC. PKGS. ($MM)*	X NUMBER OF COMPANIES	= APPLICATION PACKAGE EXPENSE ($MM)	TOTAL
DRUG	.75	150	110	3.75	15	60	170
FOOD	.50	1000	500	3.75	35	130	630
CHEMICAL	.20	500	100	3	35	110	210
TOTAL			$710			$300	$1010

* 75% OF TOTAL APPLICATION SPENDING

** ESTABLISHMENTS - INPUT ESTIMATE FROM DEPT. OF COMMERCE DATA

VII. COMPETITIVE ENVIRONMENT

A. Overview

SAP is the current leader in terms of functionality, market share and "mind share". In addition to Andersen, there are four other primary competitors (Exhibit VII-1) as well as several secondary competitors and EDS and Oracle who are potential primary competitors.

However, even SAP does not have a lock on the market: With an MVS product, it is limited to the large scale system, generally inside large companies. Arguably, the delay in r/3 and consequent lost momentum have stopped SAP from becoming the market leader.

- J.D. Edwards is very well placed in the midrange market and from a functionality standpoint comes close to what SAP offers.

- No firm now offers what could be termed true distributed or cooperative processing. Edwards, for example, calls its product "client/server", even though it is on the AS/400 platform.

INPUT believes that this market is in fact quite open to products vendors with these characteristics:

- Provided by a vendor large enough to weather one bad mistake (Datalogix probably could not for example).

- Offered on a client/server architecture (arguably all but possibly Oracle and Ingres would fail this test)

- Committed to the process market (IBM, D & B, SSA, EDS and Oracle are doubtful by this measure)

The following sections assess the strengths and weaknesses of the major vendors as well as an assessment on their futures. (The vendors are listed alphabetically.)

B. ASK

Strengths

- Historic strong position in discrete manufacturing
- Ingres allows tailoring of functions for process applications
- Runs on multiple midrange platforms
- Have made modifications from discrete MRP for process budgeting, forecasting and tracking
- Ingres could serve as long term means of adding client/server functions to applications

Weaknesses

- Ingres commitment probably more of a distraction than a net contributor: An alliance could have produced most or all of benefits (example: NCR and DBMS companies)
- Older technology overall
- Company does not have a great deal of process knowledge and no easy means of getting it (unlike Oracle, with an in-house consulting arm)
- So far, the process components are viewed as add-ons

Futures

- Ingres' strategic commitment is to manufacturing market: It must expand into process
- Similarly, its Ingres investment has to migrate to new technologies.
- This combination means that ASK will remain as a strong, but secondary, competitor

C. Datalogix

Strengths

- A process manufacturing software specialist
- Long-established on various traditional midrange platforms (CIMPRO)
- Recently began offering GEMMS on various UNIX platforms -- objective is a product that runs on multiple hardware platforms in multiple plants. Still in beta.
- Good front end for chemical, energy; adds value in formula management

Weaknesses

- GEMMS still an unknown.
- UNIX platform may prove limiting, especially considering position of AS/400 (which has not been seriously affected so far by UNIX platforms)
- As a fairly small company ($20MM), it cannot afford a product failure.

Futures

- Must remain a competitor (or go out of business)
- Unlikely that UNIX offering can threaten SAP

D. D & B Software

Strengths

- Installed customer base

Weaknesses

- Mainframe orientation; very slow and unsuccessful efforts to break out
- Process offerings offer a limited set of functions based on discrete products
- Overlapping product lines generally from past acquisitions only now being sorted out. Produces confusion among customers and among developers.
- General financial applications and, next, discrete applications take precedence
- Client/server "strategy" depends on third party enabling products and a complex transition strategy: Many things can go wrong

Futures

- Unlikely to be a serious competitor for the foreseeable future

E. J.D. Edwards

Strengths

- Similar functionality to SAP
- Offers full set of financial and discrete functionality
- Large enough company to support full application range
- Even though products run on an AS/400 platform, marketed as a "client/server" product

Weaknesses

- AS/400 platform is both a strength and a weakness: Could lose popularity for reasons outside of Edwards' control.

Futures

- An excellent combination of a specialist that has reached critical mass from a size and market standpoint.
- Is well-positioned to take on r/3.

F. EDS

Strengths

- Very aggressively building its manufacturing presence:
  - McDonnell-Douglas acquisition
  - Investments/alliances with ASK, Consilium, Sherpa
- Resources, people

Weaknesses

- Little activity so far in process software
- In general, EDS has not been successful in software products; services are far more likely to gain support internally
- Alliances are a two-edged sword

Futures

- Will probably not become a major software product competitor

G. IBM

Strengths

- Renewed emphasis on industry orientation at local levels
- Closer linkage between software products, services and other offerings in Trading Area organization
- Increased range of manufacturing software offerings (CIM/400 as general manufacturing product; POMS; PRISM - co-marketed with Marcam)

Weaknesses

- Many opportunities for product and marketing conflicts
  - No longer strong central industry management
  - Trading Areas may not have critical mass to support industry niches
- Product focus is fuzzy, especially between IBM products and partner products

Futures

- Very unclear

H. Marcam

Strengths

- Process software specialist
- PRISM is an established AS/400 product; recently expanded to MS-DOS
- Also agent/consultant for MAPICS
- Good critical mass ($60MM)

Weaknesses

- As with J.D. Edwards, being tied to AS/400 is a strength and a weakness.

Futures

- Will remain a viable competitor, but is unlikely to overtake J.D. Edwards

I. Oracle

Strengths

- Enormous installed base; customers reasonably well-disposed toward Oracle
- Applications in general have become a priority, as part of a reasonable strategy.
- Oracle's evolving architecture is heading in the right direction.
- Excellent sales organization generally; learning about applications.
- New UNIX/MS-DOS products
- Application feedback from consulting organization

Weaknesses

- Process is not a priority now.
- Probably still behind the knowledge curve

Futures

- Oracle will keep up with technology.
- Will Oracle be able to accelerate its knowledge of process applications?
- Is unlikely to be a major process competitor in the medium term

J. Ross Systems

Strengths

- Promix acquisition
- Strength in food industry

Weaknesses

- Older system, written in odd language (Gembase)
- An add-on product, not integrated with other offerings

Futures

- Unclear if acquisition was opportunistic or strategic.
- A narrow base to assault the process market.
- Unlikely to be a major competitor

K. SAP

Strengths

- Dominant position in large companies (both market share and "mindshare")
- Includes all components: Planning, shop floor, accounting, distribution. (Only J.D. Edwards is currently competitive.)
- Beginning to build niche function libraries (e.g., has over 100 functions aimed at oil industry). ABAP 4GL helps address end users from a functional standpoint (developed in C++).
- r/3 can be configured to look like client/server (as an X-window terminal) -- presentation, DBMS and applications modules.

Weaknesses

- Transition from r/2 to r/3 has been slow.
- Unclear if recent management shakeup will affect growth and ability to support clients.

Futures

- Is the benchmark in process software.
- r/3 is now UNIX and Sun-oriented. Windows/OS/2 is next.
- HP, DEC (Alpha), RS6000 on horizon

L. System Software Associates

Strengths

- Discrete core of capabilities

Weaknesses

- Limited process functionality
- AS/400 is strength and weaknesses

Futures

- Unlikely to be a major player

Exhibit VII-1

Packaged Software Competitors in Process Manufacturing

(Alphabetic within Groups)

Leading Competitor

- SAP

Primary Competitors

- Datalogix
- J.D. Edwards
- IBM
- Marcam

Secondary Competitors

- ASK
- D & B
- Ross
- System Software Associates

"Potential Primary"

- EDS
- Oracle

Appendix A

MISSION CRITICAL APPLICATIONS STUDY

My name is _____. I'm with INPUT, a research and consulting firm in Teaneck, New Jersey. We are conducting a study on why and on what cycle companies replace their mission-critical applications. All the information you provide will be kept confidential, as well as your name and your company's name. In return for your assistance, we will send you a summary of the completed study at no charge.

1a. First of all, what are your five most important applications today? (in order of importance).

1b. How will this list change in five years, either in terms of their order on the list, or by the adding of new applications?

	1992	1997
1.	_____	_____
2.	_____	_____
3.	_____	_____
4.	_____	_____
5.	_____	_____

1c. What are the reasons for these changes?

2. Next, I would like to understand more about four of these applications. **[Select as follows: If there were applications added to the 1997 list, take the top two additions, plus the two most important from 1992; if only one was added, take that, plus the top three for 1992; otherwise, the top four in 1992]**

Use one of the attached "Applications Sheets", for each application

_____ **APPLICATION**

A. What is the source of this application?

In-house developed _____

Custom developed by a contractor _____

A commercial software package _____
(Name - _____)

Other (e.g., combination of above, developed by parent company) [describe]

B. Why was this source chosen?

C. What other sources were considered?

D. What year was it installed?

E. What was the time to implement? (From completion of requirements to successful use?)

F. Approximately how much were the implementation costs? (Including design, testing, installation, software licences, but excluding hardware)? [Can prompt with following]

Under $100,000	_____	$1-5 M	_____
$100K - 500K	_____	$5 - 10 M	_____
$500K - $1 M	_____	Over $10 M	_____

G. What were the three most important reasons for installing this application? (What were the underlying business reasons?)

1. _____

2. _____

3. _____

G1. Was it part of a Quality Initiative? Yes _____ No _____

H. On a scale of 1 to 5 (with 5 being highest), how well were initial expectations for this application met? _____

Why?

I. Since installation, when have there been significant changes to the application, why were they made, and about how much did they cost?

Change/Reason	Year	Cost
_____	_____	_____
_____	_____	_____
_____	_____	_____

J. If a software package is used, is it now under a maintenance contract?

Yes _____ No _____

Why?

K. Looking back in time, did this application replace a similar application?

Yes _____ No _____ If yes,

What was the source?

What year was this prior application installed?

Why was the application replaced?

L. Looking ahead, what significant changes, (including replacement), do you expect to make (and why), when do you expect to make them, and what do you expect the order of magnitude costs will be?

Change/Reason	Year	Cost
_____	_____	_____
_____	_____	_____
_____	_____	_____

M. When do you expect to or want to replace the application?

3. Now I would like to ask some more general questions.

   A. Are changes and replacements cycles occurring at a different rate now, compared to say, five years ago? (e.g., percent change, reasons)

   B. What is the role of end users in producing changes to applications now as opposed to five years ago?

   C. What would you say is the split of decision making authority between IS management and users regarding the decision to replace or change application software?

   D. What impact do you see technology having on producing change in applications? (e.g., which ones, on which applications, how important, when)

   E Would technology changes, such as client/server, workstation functionality, or graphic user interface, accelerate replacement of an application independent of business process re-engineering?

4. Do you have any other comments on mission-critical applications in your organization or generally?

Appendix B

APPLICATIONS DEVELOPMENT IN THE MANUFACTURING SECTOR

I am calling from INPUT,
a research and consulting firm in Teaneck, New Jersey. We are conducting a study on applications development in manufacturing. The information that you provide will be confidential and neither your name nor your company's name will be connected with any of the information in this study. In return for your assistance, we will provide you with a summary of the study's findings at no charge.

1a. Which of the following applications may be replaced in your firm in the next five years? What is the approximate probability of this occurring (for each application)? [Use table below.]

1b. What events could increase or decrease these probabilities? [For applications that may be replaced, use table below.]

1c. Is your firm considering the use of software packages or consulting services for applications that may be replaced? [Use table below.]

IF PACKAGES OR SERVICES ARE BEING CONSIDERED, GO TO 2.

Application	% Prob	Rationale for Increase/Decrease	Pkg/Svc (Y/N)
MRP	_____	_____	_____
Order Processing	_____	_____	_____
Warehouse Mgt	_____	_____	_____
Factory Mgt	_____	_____	_____
Procurement	_____	_____	_____
Engineering	_____	_____	_____
Financials	_____	_____	_____
Human Resources	_____	_____	_____

2a. What is driving the replacement?

_____

_____

_____

2b. In evaluating software packages for the applications above, please rate the importance of the following selection criteria below, using a scale of 1 to 5, with 5 being highest importance. Please comment on your rating; for example, if the criteria apply to one application more than another.

Criteria	Rating	Comments
Extensive Built-in Features	_____	_____
Full Installation Support	_____	_____
Vendor-provided Product Modifications	_____	_____
Software Modifiable by Customer	_____	_____
Client/Server Technology	_____	_____
Easy to integrate	_____	_____
Hardware independent	_____	_____
Conforms to standards	_____	_____
Vendor reputation	_____	_____
Other		
_____	_____	_____
_____	_____	_____

3. In performing modifications, there are six elements involved:

	Rank
• Access to source code	_____
• The programming language used	_____
• Structure and quality of code	_____
• Adherence to standards	_____
• The documentation available	_____
• Access to knowledgeable technical staff	_____

Please rank the importance of these elements (from one to six, with one being the most important) and explain your reasoning. In the case of languages, which language (or languages) is preferred?

Explanation

_____

_____

_____

4. I would like to look at the issues involved with software modification in more depth. For your company, by 1995 how acceptable is each of the following enabling technologies, assuming that it was built into an application (1 = low acceptability, 5 = high acceptability)? Please give the reason for your rating.

Technology	Rating	Reasons
Object-oriented design	_____	_____
Object-Oriented database	_____	_____
Built with CASE tools provided with package	_____	_____
Distributed data base technology	_____	_____
Relational DBMS	_____	_____
Written in C++	_____	_____
Written in Smalltalk	_____	_____
Written in another language (_____)	_____	_____
Other (_____)	_____	_____

5. If the designers of a packaged software application asked your advice on the critical issues involving the next generation of software, what advice would you give?

_____

_____

_____

THANK YOU FOR YOUR PARTICIPATION.

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- **Customer satisfaction levels**
- **Competitive positioning**
- **Acquisition targets**

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- **Outsourcing options**
- **Systems plans**
- **Peer position**

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