

OPERATIONAL SOFTWARE SUPPORT AND
MAINTENANCE OPPORTUNITIES
WESTERN EUROPE 1991-1996

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**OPERATIONAL SOFTWARE
SUPPORT AND MAINTENANCE
OPPORTUNITIES IN
WESTERN EUROPE**

1991-1996

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Market Analysis Programme—Europe

***Operational Software Support and
Maintenance Opportunities in
Western Europe, 1991-1996***

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Abstract

Software maintenance is seen by IS departments as a great millstone restricting the resources which could be better put to implementing new applications. For software product vendors it is an activity aimed at improving their product quality and eliminating the least obscure bugs. For vendors producing custom software systems it is an essential part of their continuing support service to clients.

This report looks specifically at the opportunity for vendors to take on the support and maintenance of operational software applications previously handled in-house by clients. It is based on European vendor and user research and analysis aimed at quantifying the potential market size and recommending suitable vendor software maintenance business development strategies.

OPERATIONAL SOFTWARE
Support + MAINTENANCE
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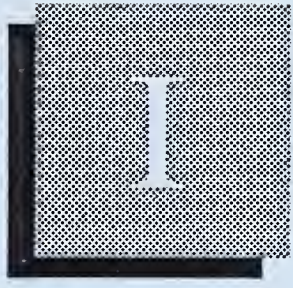
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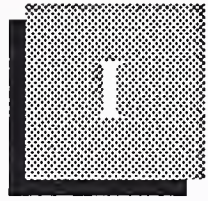
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Introduction





Introduction

A

Objectives

The purpose of this report is to identify opportunities relating to software maintenance within the professional services market and indicate in broad terms how this market is likely to develop over the next five years. In particular the report will address:

- Estimates of the size and structure of the software maintenance services market for Western Europe and its growth potential to 1995.
- Identification of the major forces at work in the market, especially:
 - The impact of new software products and development tools on the demand for custom software maintenance and support.
 - The response of professional services vendors to their clients' heavy applications software maintenance workload.
- Assessment of possible major new opportunity areas for professional services vendors arising out of this changing structure of the user market.
- Recommend possible strategies for vendors in the area of software maintenance for the 1990s.

B**Scope**

This report reviews the current market conditions for software maintenance and anticipated changes for Western Europe during the period 1990 to 1995.

Geographically the report analyses the market across the following regions:

- France
- Germany
- United Kingdom
- Italy
- Scandinavia
- Rest of Europe

Exhibit I-1 illustrates the schematic structure of INPUT's representation of the professional services market. Detailed definitions of the terms used by INPUT are given in Appendix B.

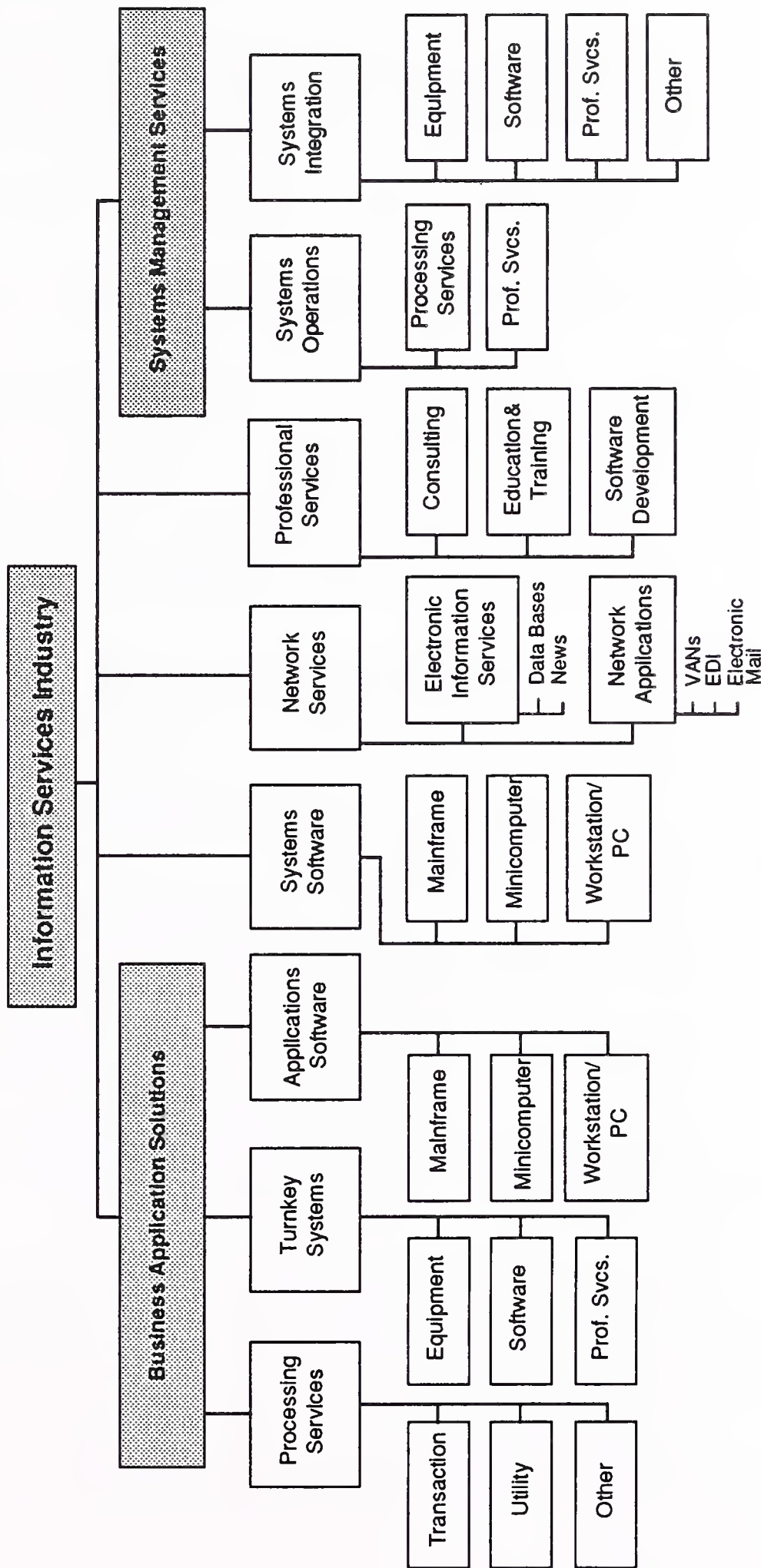
Omitted from the analyses of professional services are the user spends on:

- Professional services supplied as part of major systems integration contracts.
- Professional services bundled into a turnkey systems bid along with hardware and software products.
- Professional services supplied as part of a systems operations contract such as facilities management.

Full details of the definitions used by INPUT are given in Appendix B.

EXHIBIT I-1

Information Services Industry Structure—1990



Source: INPUT

C**Methodology**

This report is based principally on research activities conducted by INPUT between 1989 and 1991:

- An annual vendor research programme of more than 300 interviews with software and services vendors across Europe. Approximately 60% of those interviewed are active in the professional services sector.
- A further 200 vendor and user interviews across all European market sectors to determine trends and opinions.
- INPUT's continuous analysis of all the delivery modes comprising the computer software and services market.

INPUT's extensive library and data-base of information relating to the software and services industry was utilised.

In addition a selection of 20 leading vendors across Western Europe specialising in the professional services sector, were specifically consulted using the questionnaire in Appendix A.

D**Report Structure**

This report examines the software support and maintenance segment of the software and services industry in the following Chapters:

Chapter II is an Executive Overview, which provides a management summary of the essential points of the entire report including conclusions and strategic recommendations.

Chapter III sets out the structure of the software market for analysis purposes and provides definitions of software support and maintenance.

Chapter IV is a Europe and country market analysis identifying both potential and actual market sizes and with a forecast for 1990-1995.

Chapter V presents the issues and trends identified during the study followed by analysis of strategic directions among professional services vendors.

Appendix A is the vendor questionnaire used in this research.

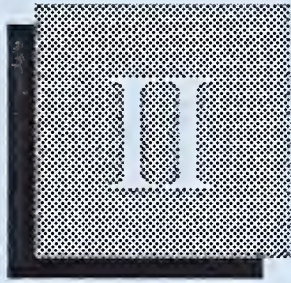
Appendix B contains a detailed definition of the terms used by INPUT in the analysis of market sectors.

Appendix C is the set of economic assumptions and exchange rates on which all the estimates and forecasts are made.

E**Related INPUT
Reports**

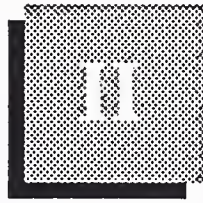
Readers may find it useful to refer to other INPUT reports which relate to the findings of this report:

- Overall Western European market reviews
 - The Western European Market for Computer Software and Services, Forecast and Analysis, 1990-1995 (January 1991)
 - The Professional Services Market, Europe, 1990-1995 (January 1991)
 - The Systems Software Products Market, Europe, 1990-1995 (February 1991)
 - The Applications Solutions Market, Europe, 1990-1995 (March 1991)
- Industry sector reviews
 - European Software and Services Market, 1990-1995, Banking and Finance Sector
 - European Software and Services Market, 1990-1995, Insurance Sector
 - European Software and Services Market, 1990-1995, Discrete Manufacturing Sector
 - European Software and Services Market, 1990-1995, Process Manufacturing Sector
 - European Software and Services Market, 1990-1995, Distribution Sector
- Vendor analysis programme
 - Over 300 profiles of prominent software and services vendors across Europe, includes both regular updates and new profiles.



Executive Overview





Executive Overview

In-house Operational Software—Huge Untapped Support Market

For the average software vendor support and maintenance business is only a small 15% of their overall business of supplying software, whether bespoke, custom or packaged product. For their clients in the IS departments the opposite is true. So called “software maintenance”—the support of operational software—represents typically 65% of the workload for their in-house staff.

In 1990 new application development projects represented European software expenditure of about \$50 billion, with 40% of it applied internally and 60% outsourced. Operational software support for in-house developed applications represented a further budget of \$40 billion, but over 99% of that was spent in-house and less than 1% was outsourced to third party service vendors.

The success of some highly specialised service vendors in this area of third party operational software support indicates that software services vendors can profitably apply their software management and engineering skills to their client’s own application software. In the process they can build a much larger penetration of this market to the mutual profit of vendor and client alike. Undoubtedly operational software support is the largest un-tapped sector of the software services market in Europe.

A

Market Summary

IS departments seem quite determined to hang on to the millstone round their necks - the support and maintenance of all the applications software they have developed themselves and which is still fundamental to end-users in their organisation. They are keen, when it can be cost justified, to seek out vendors of new applications solutions. But very few would even consider passing responsibility for support and maintenance of applications to a third party, except perhaps as part of an all embracing systems operations or facilities management contract.

This market study - summarised in Exhibit II-1 - reveals that on average 65% of all IS staff activity is taken up with operational software support and maintenance. \$44 billion was spent on such activities in Europe during 1990. \$5 billion of that went to suppliers for the support and maintenance of their software products - both standard and custom. Only about \$0.3 billion was spent with third parties supporting in-house developed applications. All the rest was spent in-house on software staff.

Today third party applications software support is the most neglected services market segment for both vendors and users. It represents a huge opportunity once vendors gear up to supply these services and once users can see proven financial and operational benefits.

EXHIBIT II-1

Operational Software Support (Software Maintenance)

- Support and maintenance of in-house-developed software
 - Two-thirds of all software activity
 - Today the smallest outsourced sector
- Largest services opportunity of the 1990s
- Centred on management issues
 - Contracted end-user service levels
 - Problem containment
 - Environmental quality improvements

On the face of it the issues would seem to revolve around the difficult technicalities of working on software written by someone else, probably several years ago and without good documentation. However this is a misleading view as the fundamental issues centre on management.

There is a general lack of good measures of such things as service levels, reliability, software quality, the priority given to each problem, compatibility of software releases, call-out response times, fix times, and so on. Without good measures it is difficult to manage. Good software measures and good software management are valuable commodities and experienced professional services vendors should have plenty to offer.

Improvement in the management of problems, the software, the support and maintenance staff and the end-user interfaces are all key to success in this business.

Good methods and working practices are essential. Availability of software tools is probably secondary to access to skilled staff. At least three different skill profiles are needed: support staff who are good with end-user and IS-user alike; maintenance experts who can use whatever tools are available to improve quality; and managers who can manage to contracted cost and end-user service performance levels.

B

Defining Software Maintenance

For the purposes of market analysis it is convenient to classify softwares into four categories as specified in Exhibit II-2.

EXHIBIT II-2

Categories of Software by Source

- | | |
|-----------|----------------------|
| • Class A | In-house developed |
| • Class B | Custom/contracted |
| • Class C | Application products |
| • Class D | System products |

Classes B, C and D are all provided by software vendors of one type or another:

- Class A - applications software developed and supported in-house by IS staff - the primary focus of this report. There is relatively very little vendor service demand for this Class.
- Class B - covers all the software which is developed to the customers specification by a professional software service vendor. This could range for example from a simple cheque printing application up to a large sales and marketing information system.
- Class C - is all application software products sold and supported as packages. Examples would be: payroll; financial accounting; production control; office automation; real estate management; etc..
- Class D - is system software products such as: operating systems; utilities; languages; CASE tools; relational databases; etc..

These class definitions are used throughout the report.

EXHIBIT II-3

Differing Definitions of Software Maintenance

- Product Vendor - "Software Maintenance"
 - Fixing faults in software product
 - Carefully separates maintenance from support functions
- Services Vendor - "Software Maintenance"
 - Keeping each client happy
 - Often uses same resource for support, maintenance and enhancement
- IS Management - "Software Maintenance"
 - Everything done after software goes live

Exhibit II-3 summarises the differing views of software maintenance as seen by product vendors, service vendors and users (IS management).

To a product vendor the term maintenance has a very tight definition. It is the process of improving the quality of a software product, by documenting errors and developing new versions which fix any problems seen as damaging.

Many product vendors manage the maintenance and enhancement of their products as separate activities, resulting in separate software releases, or issues, for bug-fix and new features. Product vendors manage their maintenance activities down to absolute minimum levels.

Software service vendors do follow the same principles of minimising maintenance activity, but they work much closer to the end customer/user, so can have a clearer view of customer satisfaction than some product vendors. They usually use the same team to develop, enhance, support and maintain their own software. Contracts normally offer both support and maintenance services combined.

IS managers have a wholly different view of software maintenance. For most the only clear definition is that it covers everything done after the software is installed and is in active use - operational software support. In this sense it often not clear that enhancement, bug-fixing, re-engineering, end-user or operator support, and modifications are separately identified and managed actions.

C

European Software Expenditure

Users in Europe spent about \$90 billion on the provision and support of software during 1990. As Exhibit II-4 shows, they spent about 15% of that on external professional service contractors and a further 18% on purchased or licensed software products.

EXHIBIT II-4

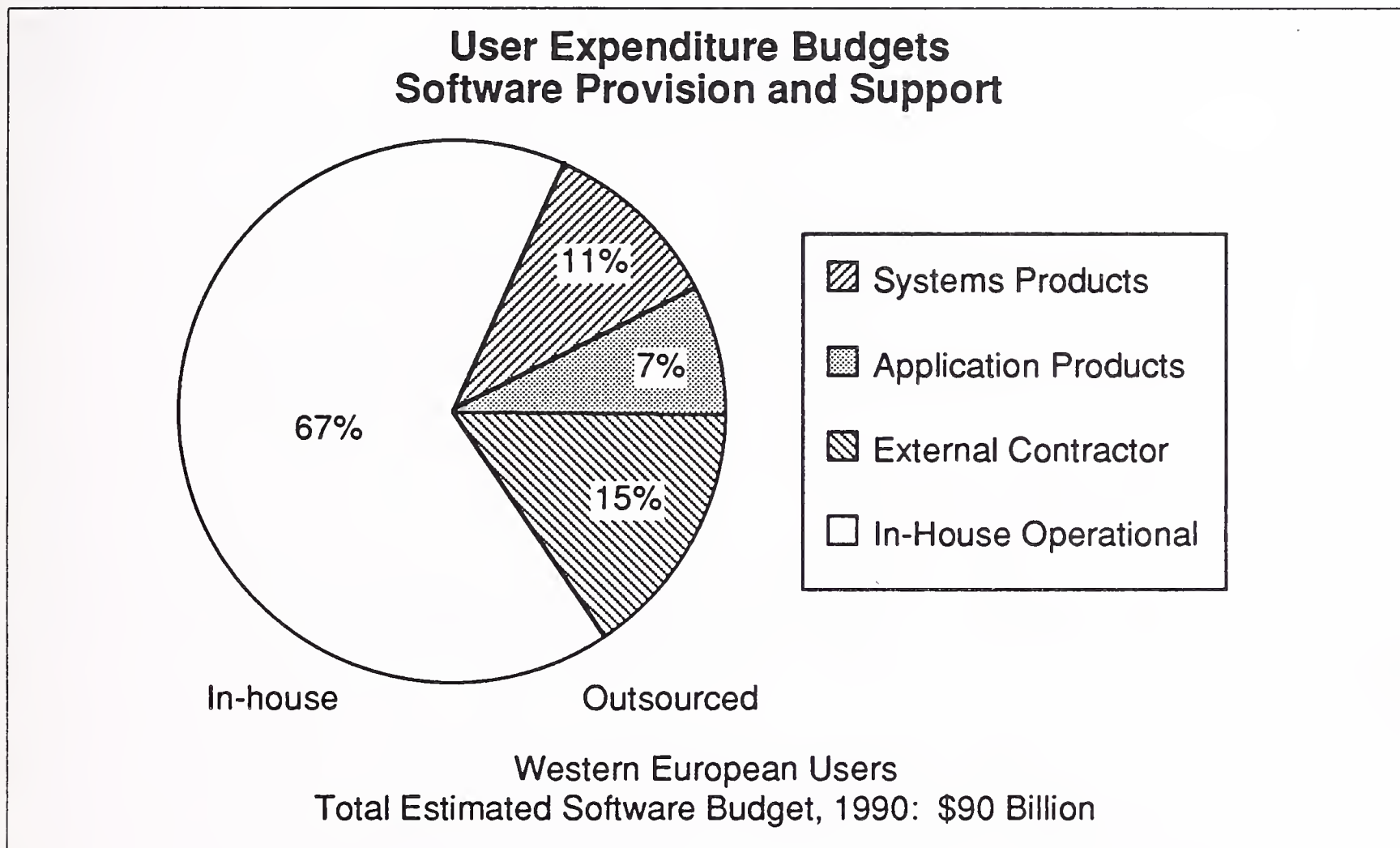


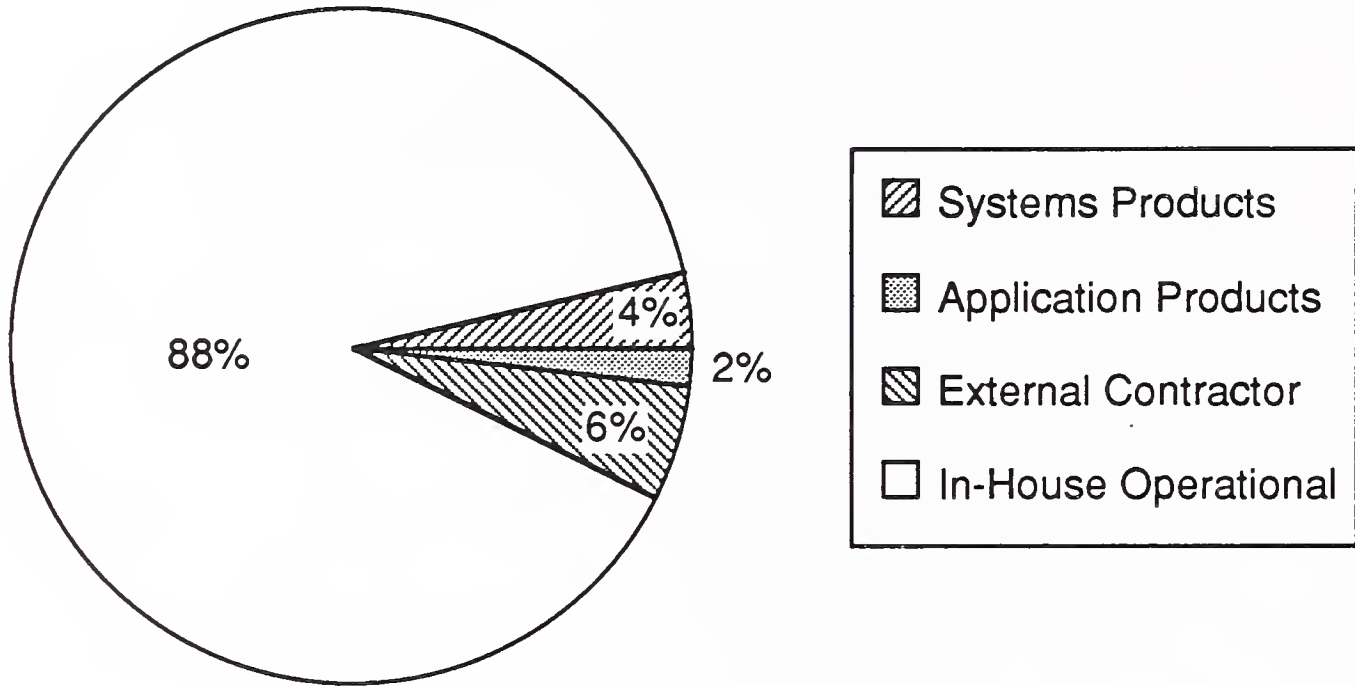
Exhibit II-5 shows the contrasting picture if one only looks at the operational software support and maintenance activity. The in-house IS staff consume 88% of the budget. Less than 1% goes to vendors servicing the customers own in-house developed software, so it doesn't even show on the chart. The vendor revenues shown in the pie are those related to the support of software supplied in the first place by those vendors.

The relationship between the cost of supply or provision of the software and the expenditure on its support is shown in Exhibit II-6. Here one can clearly see the overwhelming size of the in-house "software maintenance" task in supporting operational in-house software.

Overall \$47 billion is spent buying or developing software compared to \$44 billion spent supporting it once it is in use.

EXHIBIT II-5

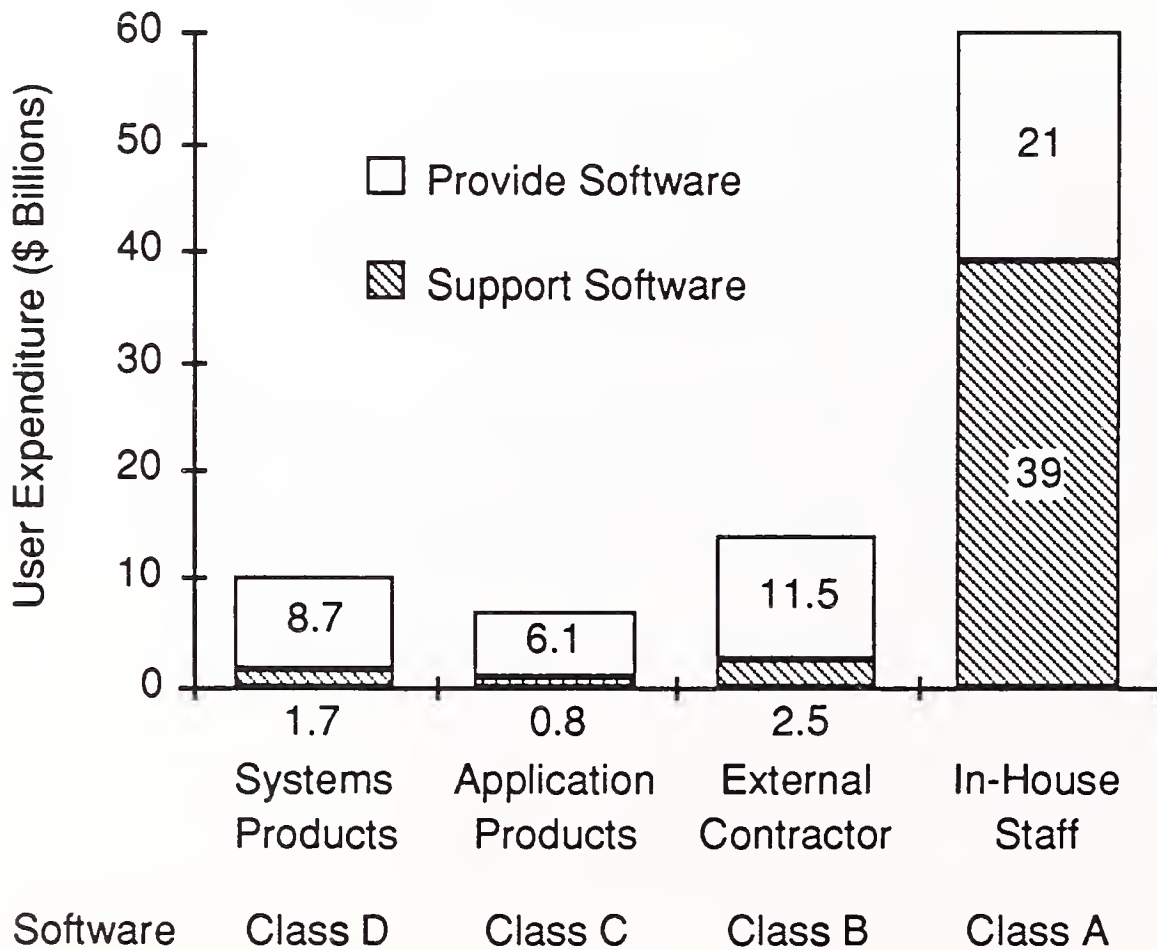
User Expenditure Budgets Software Maintenance and Support



Western European Users
Total Estimated "Maintenance" Budget, 1990: \$44 Billion

EXHIBIT II-6

Software Provision and Support— Western Europe, 1990



D**Areas of Opportunity
in Operational
Software Support**

Exhibit II-7 shows industry sectors most positive about outsourcing software maintenance, from a survey by INPUT of 200 European users. The most positive responses seem to come from sectors which are heavily mainframe orientated. Discrete manufacture, insurance and utilities are all sectors in which mainframes have a good market share and in-house applications have been normal business practice in the past.

EXHIBIT II-7

User Opinions by European Industry Sector Software Maintenance and Support

- Most Positive Sectors
 - Discrete manufacture
 - Insurance
 - Utilities
- Least Positive Sectors
 - Banking and finance
 - Process manufacture
 - Wholesale distribution

Sample size: 200

Preferences analysed by country—Exhibit II-8—show Italian respondents as the most concerned about operational software support - third party software maintenance services for in-house developed software. This probably reflects the fragmented nature of the Italian software services market, which spends significantly less as a proportion of GDP than France, U.K. or Germany.

When in-house IS staff activities are included, the spread of operational software support activity closely mirrors the GDPs of Europe's different regions. Exhibit II-9 shows the distribution, which is markedly different from that of the actual vendor-only market for software and services as published in other INPUT reports.

EXHIBIT II-8

Regions Most Concerned About Software Maintenance and Support

- Italy
- Benelux
- France
- United Kingdom

Sample size: 200

EXHIBIT II-9

Operational Software Support by Region—Europe, 1990

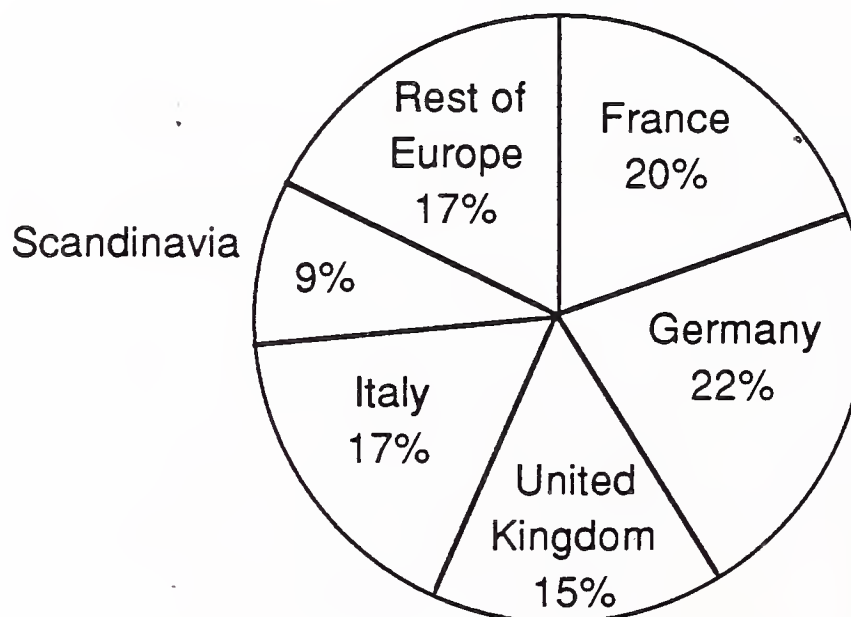
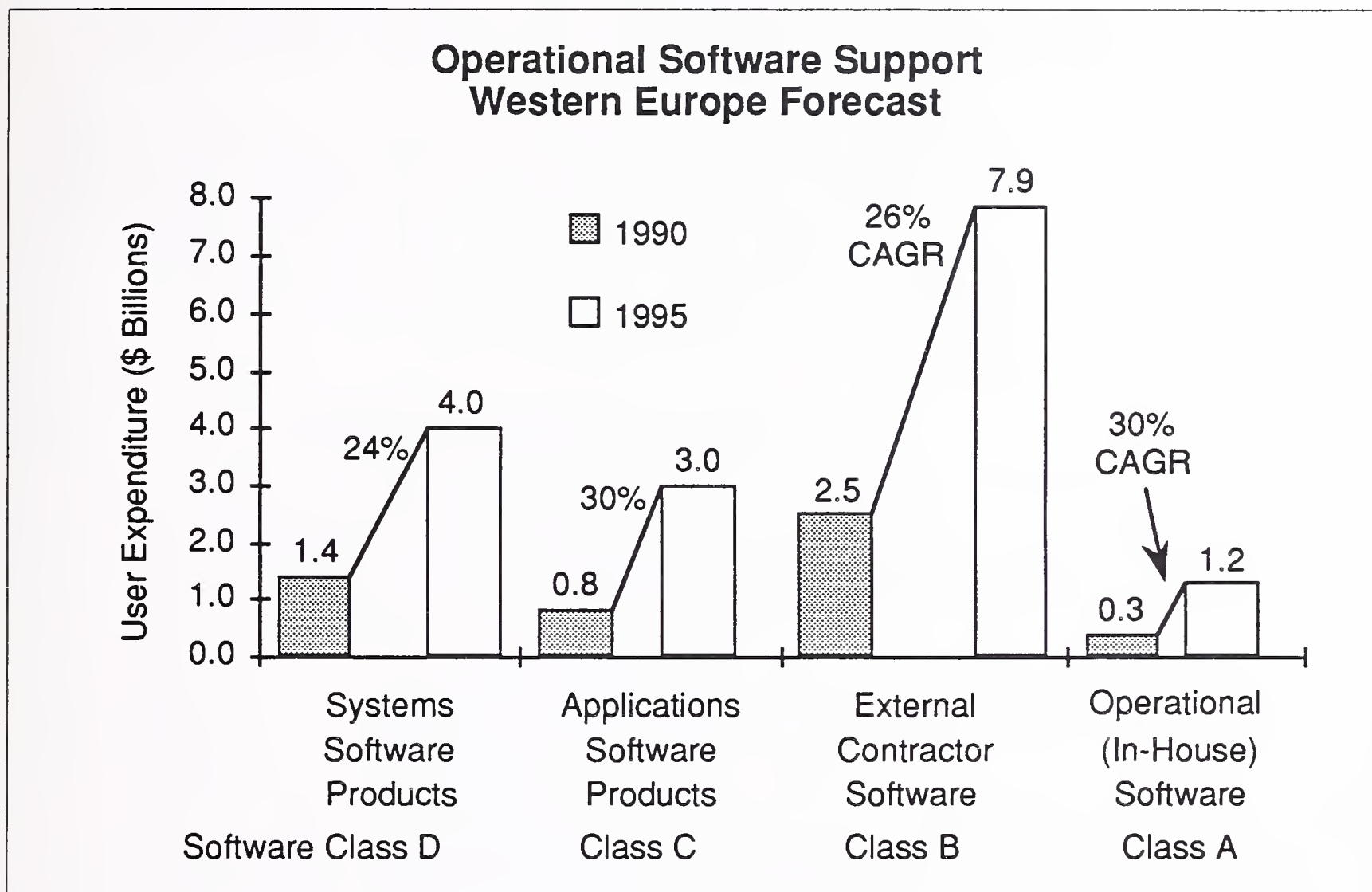


Exhibit II-10 illustrates INPUT's market size forecast for each Class of outsourced operational software support and maintenance service.

All sectors exhibit healthy growth rates well above those for software licences only. This is the result of the cumulative effect of providing support over several years following the initial provision of a suite of software.

The estimates for growth in Class D operational software support should be treated as a guide line, as the market is extremely fragmented. Market leaders are only doing \$10 to \$20 million per year, and large numbers of vendors do less than 1% of their business in this area, and then mainly as an account development activity rather than as a strategic line of business.

EXHIBIT II-10



Even with a growth rate of 30% per annum, by 1995 the market for Class D software services will only represent 2.5% of the in-house operational support opportunity.

E

Factors Shaping the Operational Support Market

The amount of outsourcing of the support and maintenance of operational software developed in-house is minute. What pressures are there on the user management to outsource more, or to keep the problem in-house? This section looks at market drivers and inhibitors, at two successful user case studies and at the primary benefits which can be achieved for clients' users.

The main pressures encouraging clients to outsource operational software support are listed in Exhibit II-11. They are all primarily management issues, some resulting from technical difficulties:

- *Software* - Applications are becoming difficult to maintain because they are aging, skills have been lost, or languages and other systems software have become out-of-date. Managing the housekeeping of such software environments is a skill many IS departments lack.

- *Staff* - Retaining and motivating staff on “maintenance” projects can be hard as it doesn’t have the glamorous image of new development projects. Outsourcing makes this someone else’s problem, and frees staff to work on new business projects.
- *End-users* - If the quality of service provided to end-users has declined unacceptably, the hassle resulting from their discontent, often resulting in new systems, can equally well result in outsourcing the support of existing applications. Giving end-users sufficient ownership and control over applications service stands out as a key factor in the success of any outsourcing service project.

EXHIBIT II-11

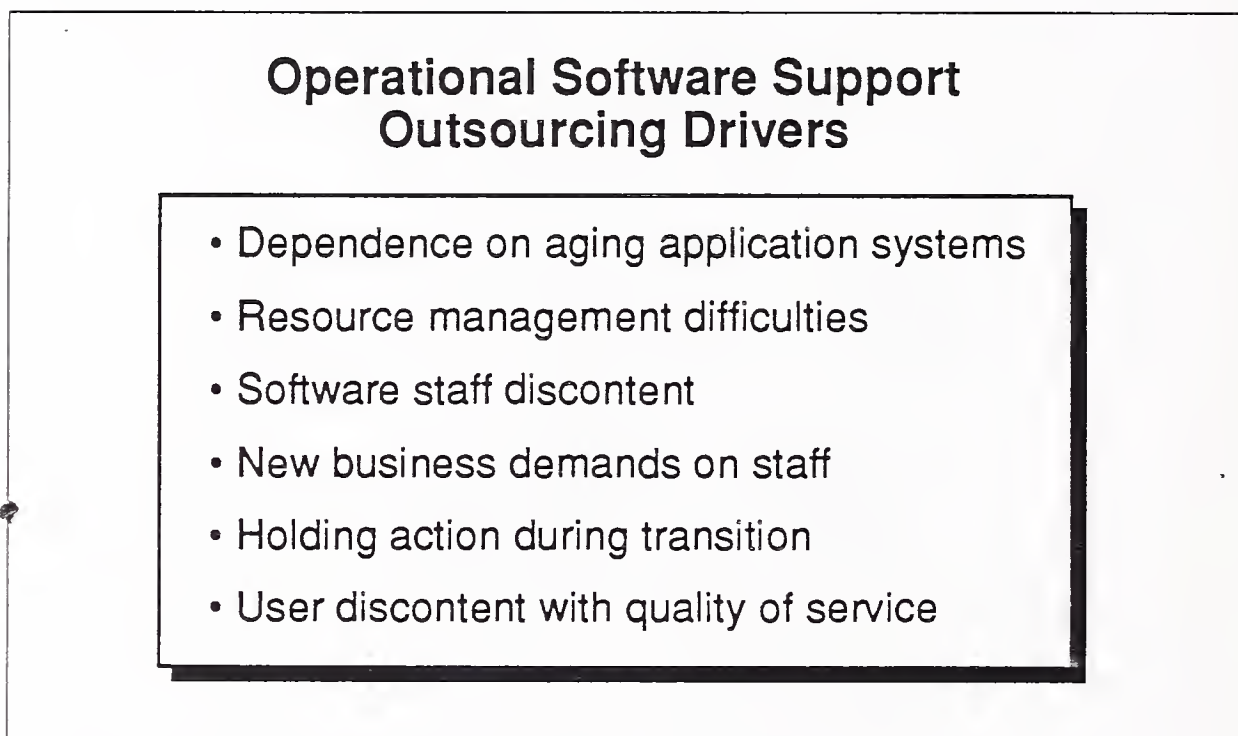


Exhibit II-12 identifies the factors that, in the main, prevent IS departments from even considering outsourcing their operational software support.

The user/IS community has a strong mind-set which more or less says it is not feasible to get a third party to provide their end-users with operational software support. They believe that the knowledge of their in-house staff cannot be replicated by external vendor staff, and that an external vendor would reduce the management control they currently exert over their service to end-users.

The low level of vendor activity in operational software support and maintenance means that few IS managers are even aware that there are vendors who could offer a mutually beneficial service to them.

When they do consider outsourcing, cost can be an obstacle, particularly because it invariably goes up at the start of a project during a hand-over phase, even if it results in the medium term in an overall saving and improvements in end-user service levels.

EXHIBIT II-12

**Operational Software Support
Outsourcing Inhibitors**

- Top-ranking limiting factors:
 - Too expensive
 - Loss of internal expertise
 - Dependence on vendor
 - Vendor ignorance of business
 - Loss of control
- Unaware of vendor capabilities
- Initial cost of knowledge transfer

Exhibit II-13 summarises the experience of a Government department in contracting out the maintenance and support of a very old database application.

The objective of contracting out to a third party was to improve the service received by the end-user and to lower the costs of running the service. Some applications are over 20 years old, and end-users are continually requesting changes to the application parameters and database fields.

Perhaps the most interesting aspect of this example is the way the IS department passed full responsibility to the service vendor who now deals directly with the end-user department on all issues. The potential cost of any changes is now visible to the end-user management in the form of costed quotations. This has allowed the end-user to improve his own decision making as to the cost effectiveness of changes being requested.

The improvements in reliability are a spin-off from the vendor's strong management methods applied to the whole applications software environment. Far less time is now spent analysing the cause of problems, or re-inventing solutions to problems which have occurred before. This has allowed the vendor to negotiate a lower cost service level which still satisfies the end-users' needs.

EXHIBIT II-13

**User Case Study
Government Sector**

- Problem - Operational Software Support
 - Improve user service / lower costs
 - Some software 20 years old
 - Many change requests still
- Solution - Outsourcing
 - 3rd-party staff working on-site
 - 3 months parallel working hand-over
 - Users interface direct with vendor
- Benefits
 - >50% cost saving on staff ~\$70K/yr.
 - 8 full-time staff replaced by 4 part-time
 - System life extended 5 years

The second case study is outlined in Exhibit II-14. It concerns a large IS group where there is tremendous pressure for new applications which reflect a more customer-facing business stance. Freeing up IS staff with valuable internal business knowledge was the main objective.

The application was a major inventory and warehouse management system implemented at several locations for regional operations. The five-year-old system had been treated like most heavily used applications - speedy fixing of problems had taken precedence over elegantly engineered solutions. With 23 people employed in supporting the applications, it was an excellent test case on which to judge the promises of the service vendor.

In this case the knowledge transfer required to release 19 of the in-house support and development staff took six months. There was also considerable spin-off in knowledge transfer from the vendor to the computer operations staff, as the improved working practices were applied to establishing a more stable and reliable software environment.

The original high level of end-user complaint has given way to silent satisfaction and the original 24-hour emergency service level has been reduced to a normal working hours service. Many of the new working practices introduced by the vendor have been adopted by the IS client management.

EXHIBIT II-14

**User Case Study
Telecommunications Sector**

- Problem - Operational Software Support
 - Free-up staff & improve user service
 - Bad system response times
 - 23 people - fire-fighting support
- Solution - Outsourcing
 - Mix of in-house and 3rd-party staffing
 - 6 months for knowledge transfer
 - Client's quality system
- Benefits
 - 19 staff released for new projects
 - Call-outs reduced ten-fold
 - Working practices adopted by client

As with other types of systems operations or facilities management service, the major benefit seen by client management is having a defined and costed service level as the primary objective of the service contract. Exhibit II-15 expands on the major benefits, most of which are definable and measurable.

This measurability of course is the key to the success of such projects. Most IS departments have not acquired the tools or management techniques to clearly define and regularly measure the performance criteria by which both end-users and IS management can judge the success of an application. They are more normally trapped in a fire-fighting mode.

When end-users have more than just response times by which to measure the service they receive and can assess the cost-benefits of changes they would like, then they can make informed decisions and become involved in reducing running costs with clear ownership of their own application requirements.

IS staff concerned about career prospects and job satisfaction are often strongly demotivated by "maintenance" activities. Recognising this some managements rotate their IS staff, and for example only provide training to staff during their support and maintenance phase. Others set up elite maintenance teams.

Vendors also face the same staff difficulties and need strong internal PR to enhance the image of support and maintenance work.

EXHIBIT II-15

Operational Software Support Outsourcing Benefits

- Contracted quality of service for users
 - Better performance and reliability
 - Visible cost implications of changes
 - Running costs known, and reducing
- In-house staff released for new projects
- Exploiting business knowledge
 - Personal development & motivation
- IS operational efficiency improved
 - Improved operations practices
 - Proven management techniques

F

Implications for Vendors

In terms of market position and business strategy, vendors can be split into two groups - Exhibit II-16. Both groups contain a few specialist vendors who have already recognised the opportunities in operational software support and have created portfolios of relevant services and products:

- Software service vendors - offering professional services tailored to individual customer requirements. These form three groups:
 - Professional services vendors normally carrying out various development projects for clients, and supporting the software they have supplied.
 - Systems operations vendors providing facilities management services to clients for computer operations, end-user support or application development.
 - Operational software support vendors who specialise in supporting and maintaining their clients' in-house developed software.

EXHIBIT II-16

Operational Software Support Vendor Strategies

Systems Operations
Vendor

Tailored Services

Professional Services
Vendor

Operational Software
Support Specialist

Software Systems
Development Market

Operational Software
Support Market

Case Tool
Product Vendor

Products

Re-engineering
Product Vendor

- Software product vendors - specialising in software engineering tools primarily aimed at IS department with heavy software workloads. These are either whole software life-cycle or re-engineering tools vendors.

The number of vendors with a strong focus on operational software support and maintenance is small. But the experiences of companies like Andersen Consulting, Sligos, Mesarteam, FI Group and K3 provide some blueprints for success in this market.

The following basic attributes, expanded in Exhibit II-17, are required by vendors offering operational support services:

- Strong management working practices, skills and experience are required, particularly as applied to end-user relations, control of complex software environments, and management of resources to meet fixed service and cost objectives.

- Well motivated and mature staff who are concerned about customer service and software quality rather than just becoming an expert in the latest software technology. Maturity is a particularly positive staff attribute when the client's applications are growing old. Support skills are very different from maintenance skills. Analysis of the source of problems is often the bulk of the work and can be highly technically demanding.
- Packaging and marketing a full range of services which can be appreciated by clients, can be tailored to individual needs and modified over time. Such packaging is viewed by vendors as part of their unique competitive edge.

EXHIBIT II-17

Operational Software Support Vendor Success Factors

- Successful track record managing operational software support projects
- Proven working practices for managing
- Quality/level of service to users
- Problem containment
- Operational software environment
 - Networked human resources
- Personnel profiles:
 - Client/user-friendly support staff
 - Mature, high-tech software maintainers
- Positioning these services as:
 - Professionally challenging
 - Beneficial for staff and clients alike

The opportunity for operational software support services differs from client to client and from project to project. It is tempting to offer a "we can do anything you want" general service. However, since IS managers barely recognise that they can outsource the support of their own applications, there is great merit in carefully packaging up a complete portfolio of support and maintenance services from which to "pick-and-mix" to meet particular needs.

Exhibit II-18 groups the potential portfolio into five classes of service:

- The basic support service contract, agreed after an extensive consulting and analysis study of the client's situation and requirements, specifying the measures by which fulfilment of the contract will be judged
- The form, if any, of the emergency services required with call-out response times.
- The management and engineering of modifications to the applications software and its environment.
- Changes to operating procedures such as software release controls.
- Overall project management, progress meetings, formal reporting lines, methods and responsibilities.

EXHIBIT II-18

Operational Software Support Service Vendor Opportunities

Services

- Support and maintenance contract
 - User service levels
 - Improvement timescales
 - Procedures and interfaces
 - Hand-over staffing and timing
 - On-going response levels
- Emergency services
 - Problem determination & correction
 - User and operator support
- Software maintenance/enhancement
- Procedures/methods enhancement
- Management control and reporting

This report does not address the availability of software *products* specifically aimed at operational software support and application conversion, but Exhibit II-19 provides two classifications for such tools:

- Software tools and methodologies to help IS departments with the management of their operational software seem to be in short supply. Users attracted to Durham University's Centre for Software Maintenance, which has some 30 researchers active in this area, put the need for management tools top of their priorities, higher than new software engineering products.
- CASE tool vendors seem still to concentrate on engineering new systems, rather than managing the support of old ones. Management tools for operational software support and maintenance is a major product opportunity area.
- Software engineering tools have become very popular for those involved in new software developments and naturally they cater for the important stages of the whole life-cycle of an application software suite. Relatively few tools are yet available, though there is significant research and development under way, which focus on existing software which may have been engineered over the past decade or two.

EXHIBIT II-19

Operational Software Support Product Vendor Opportunities

Products

- Management tools:
 - User service levels
 - IS resources
 - Software
- Software engineering tools:
 - CASE tools, whole life-cycle
 - Reverse, re-engineering, conversion

G

Conclusions— Un-tapped Market Opportunity

Third party operational software support - the support and maintenance of a client's in-house produced applications software can best be considered as a systems operations (facilities management) service. It is a natural component of a total systems operations service portfolio, but can also be offered as a service in its own right.

The market opportunity is summarised in Exhibit II-20 as a \$44 billion IS expenditure on software support and maintenance, of which less than 1% is currently outsourced to a third-party vendor.

EXHIBIT II-20

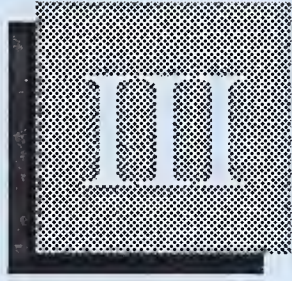
Conclusions

- Operational software support services
 - Un-tapped market opportunity
 - Total user spend ~\$40M
 - Less than 1% is outsourced
- Primary need is IS management skills rather than software engineering tools
- These support services fit most naturally within the systems operations market
- Strong vendor marketing is needed
 - To raise IS awareness
 - Stimulate the rapid growth

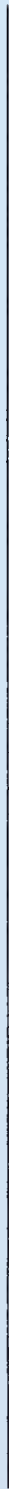
The demand - often hidden behind a mass of technical difficulties - is for the commercial management and control of support and maintenance activities associated with live and often aging applications.

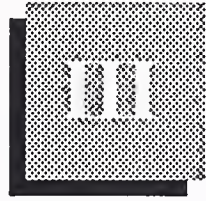
The very low awareness among users that such work can be outsourced - to everyone's benefit - implies that vendors need to invest significantly in packaging and marketing their services.

Moving the attention of the IS world away from the glamour and excitement of new technologies and new software development projects and onto the huge "good housekeeping" services opportunity in operational software support will be no mean feat.



Software, Support and Maintenance Definitions





Software, Support and Maintenance Definitions

This chapter addresses the definition of the terms used in this report to describe different types of:

- Software, distinguishing between systems and applications software, and between packaged products and bespoke third-party or in-house developments
- Support services, aimed at helping users get the maximum benefit out of the software
- Maintenance services, which help resolve technical difficulties arising within the software affecting its proper performance, function or reliability.

A

Software Classifications

In the context of software, confusion exists between the uses of the words maintenance and support. There are separate sections to help distinguish between the different definitions of these functions as perceived by the following groups of providers:

- Software product vendors serving a community of customers and users.
- Professional service, turnkey system, or systems integration vendors who design, develop, configure, support and maintain software to specific customer needs.
- In-house IS or DP departments who tackle these same software life-cycle tasks using in-house resources.

Exhibit III-1 shows INPUT's formal classification of software products in a hierarchical manner with systems and applications being the main split. Application development tools are increasingly coming to play the interfacing role between these two main categories of software product.

EXHIBIT III-1

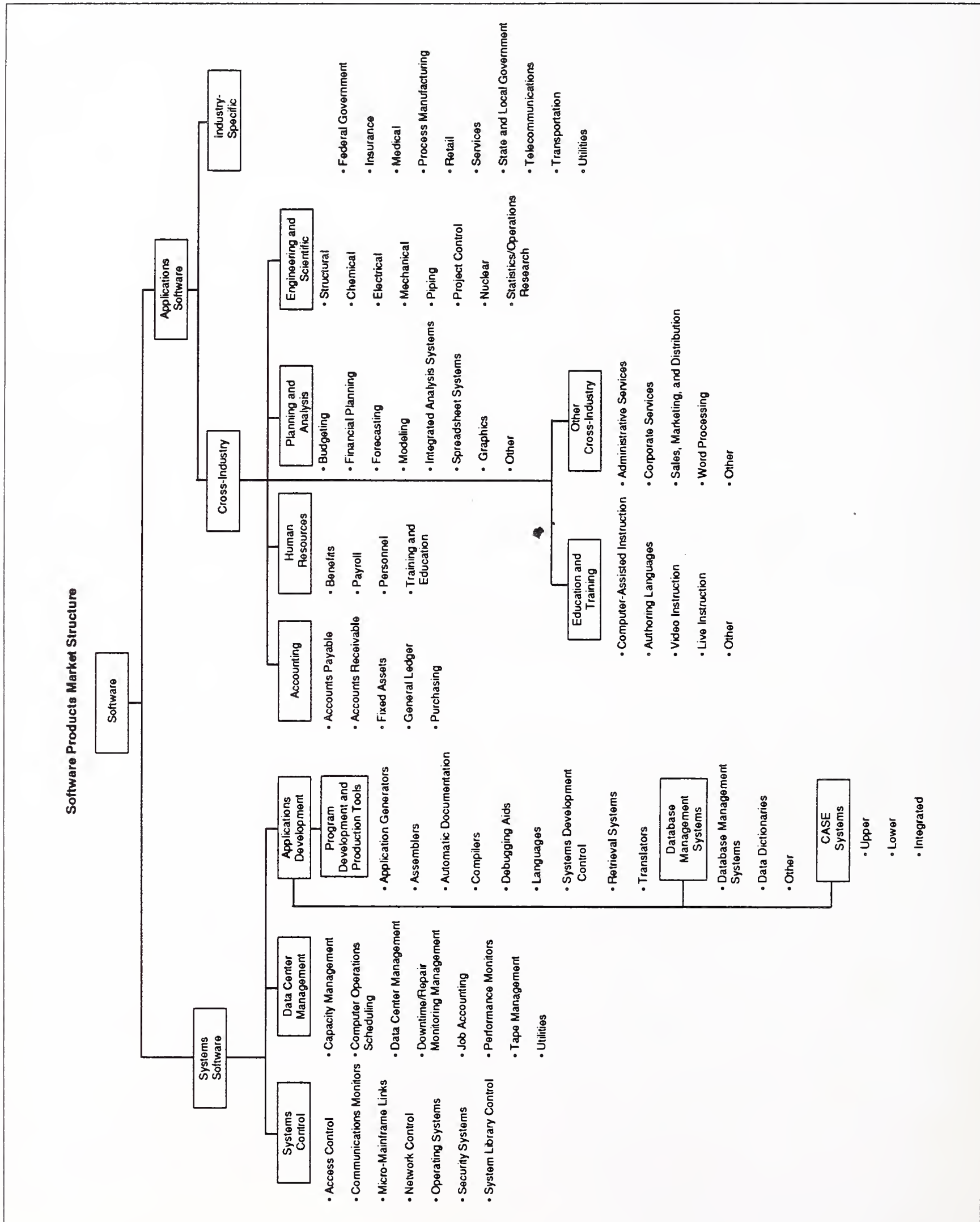


Exhibit III-2 illustrates the layered approach to categorising software products. Its tabular form shows the different layers of standard software now required for most general-purpose systems as the different rows of the table.

EXHIBIT III-2

Definitional Map of Software Classes

Software Product Category	Mainframe	Minicomputer	PC/ Workstation
Application Specific Products	A	A	A
General Business Software	A	A	A
Applications Development Tools			
- DBMS	S	S	S \ A
- Program Development	S	S	S
Operations Management Tools	S	S	S
Systems Control	S	S	S

S = System Software Products

A = Applications Software Products

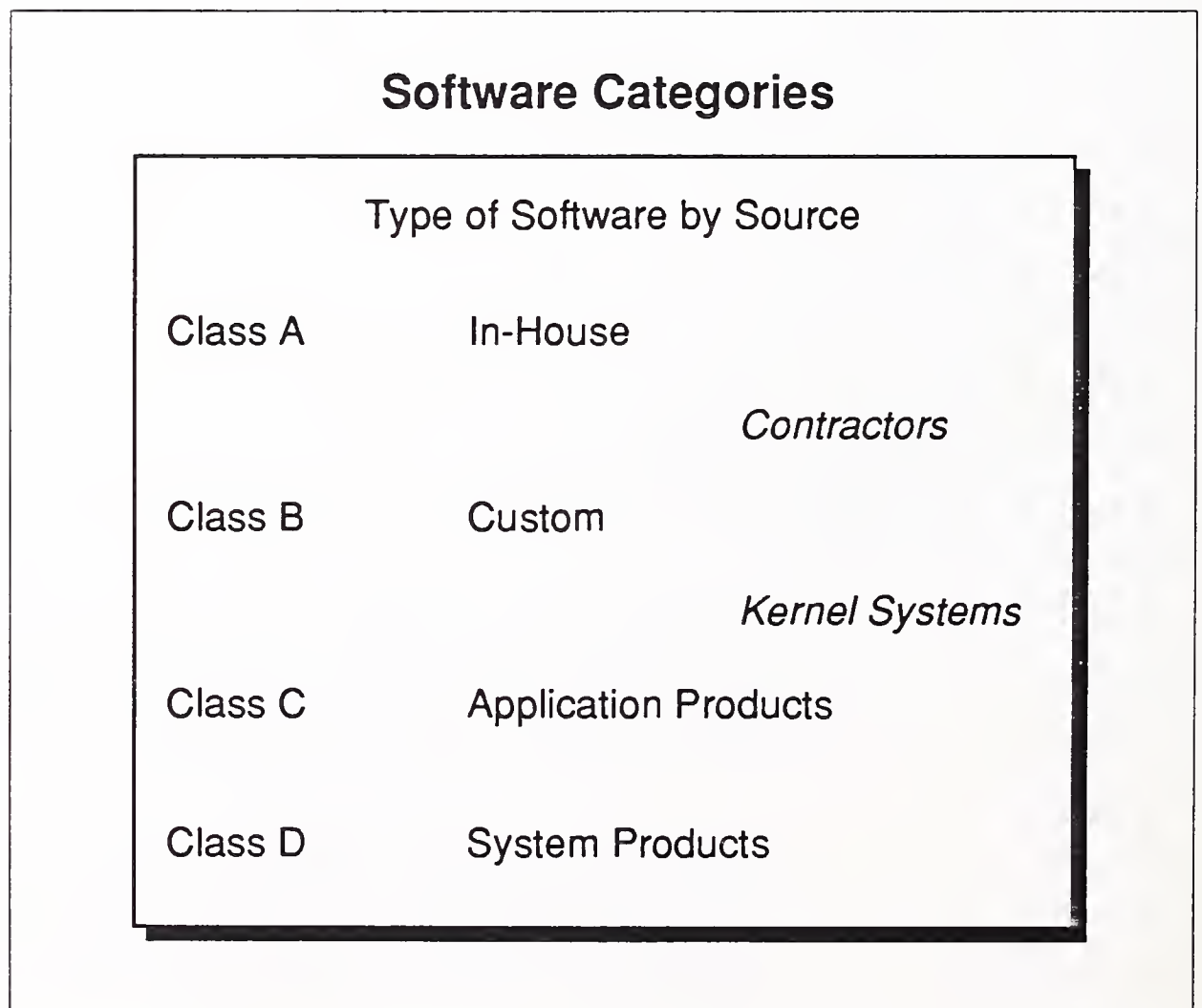
As one moves up the table, the category of software gets closer to the end-user and his application. As one moves down the table, the software type becomes more related to the equipment platform. The three columns show three distinct types of hardware platform:

- For the purposes of this report, the minicomputer category is defined to include: IBM's System 3X systems and their replacement the AS/400; Digital's MicroVAX and VAX Server ranges; and the equivalent competitive offerings from the other hardware manufacturers, including the majority of multi-user systems based on UNIX.

- The workstation and PC segment includes: both PC's and the high performance desk-top or desk-side configurations such as those from Sun Microsystems, Hewlett-Packard, Digital and IBM (RS6000). Although these latter systems can be configured either stand-alone or networked, they are distinguished from the minicomputer category by application (today technical applications still predominate over commercial) and by architectural pedigree (they were initially developed as high-performance single-user engines capable of cooperative networking).
- The line between systems and applications software is usually drawn between database management systems (DBMS) products for traditional multi-user platforms such as mainframe and minicomputer. But for PCs and Workstations the parameterised DBMS often becomes the end-user's application engine itself. Hence the dual classification of DBMS under the Workstation/PC column. The general business software category includes products like spreadsheets, word processing and office automation.

It is possible to view the software support and maintenance business in the wider context of all types of software, both product and bespoke, whether produced in-house or purchased externally.

EXHIBIT III-3



For the purposes of more clearly defining major market segments for the application software maintenance business, INPUT has adopted the categories illustrated in Exhibit III-3:

- Class A (in-house produced) refers to software developed by in-house systems teams. The vast majority of this software is not regarded by users as part of the open market for software or service provision. It is this class of software which is the primary focus of this report as a latent market opportunity for vendors of software maintenance and support services.
- Class B (external contractor) refers to all software commissioned from an external agency (such as a professional services company or VAR) to be built on a custom basis, i.e., to a particular user-defined specification. This is normally measured as part of the professional services market sector, (along with consultancy, education and training, contract staff and recruitment).
- Class C (application software products) refers to application software products and packages, as shown on the definitional map in Exhibit III-2
- Class D (system software products) is the equivalent of Class C but for system software products.

In the remainder of the report these four classes are referred to by their initials (A, B, etc.). Bridging the gaps between in-house and externally commissioned bespoke software, the chart shows the role of contract programming staff. Kernel systems, an important technique and selling tool for professional service vendors that do not market fully productised systems, plays a similar role in bridging custom and package solutions.

B

Software Product Vendors' Services

For software product vendors, INPUT's definitions of support and maintenance distinguish between:

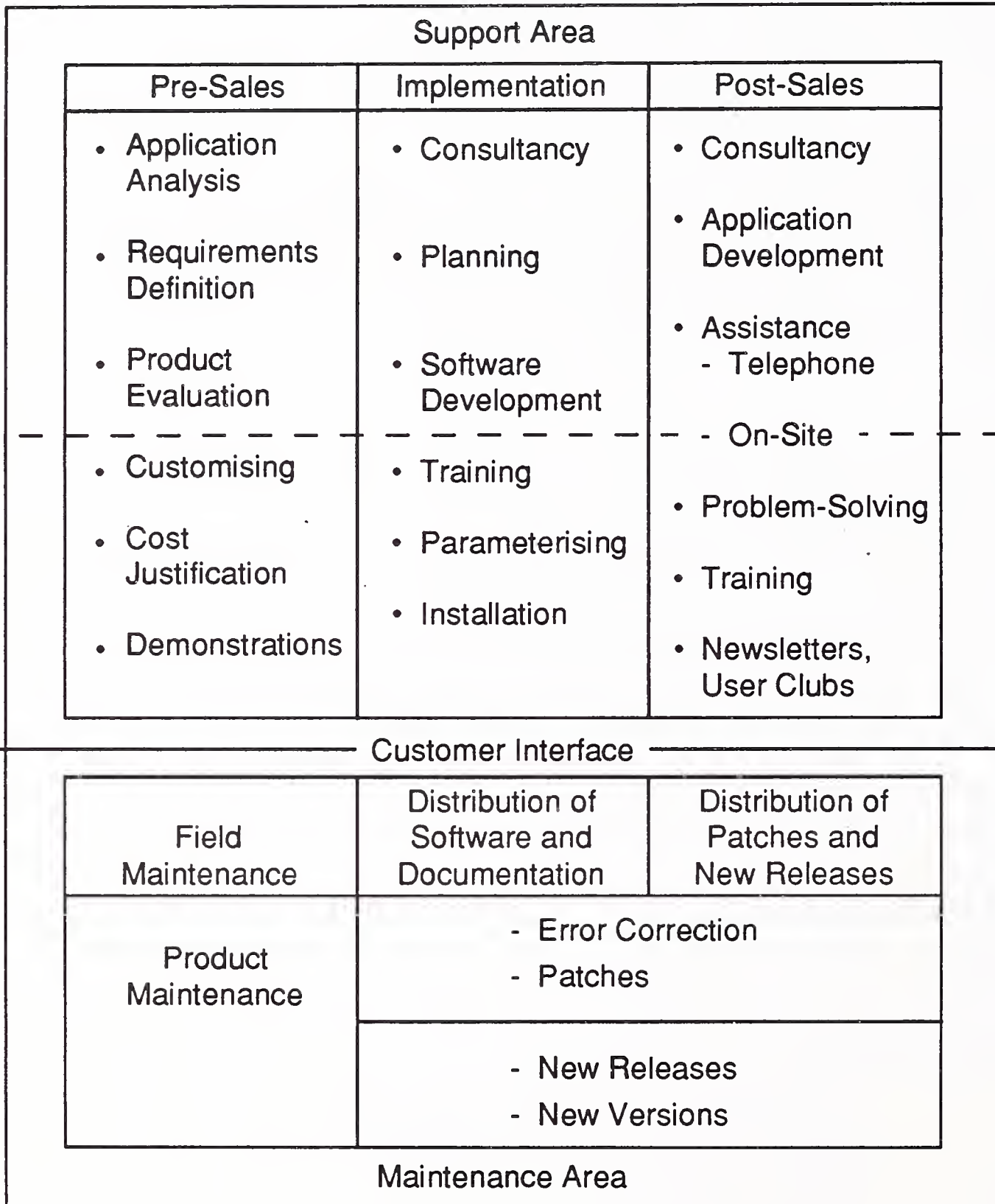
- Support - which is single customer orientated; and
- Maintenance - which is product or multi-customer orientated.

A product vendor *supports* its customers but *maintains* its products for its whole customer base.

Exhibit III-4 lists the tasks that lie on each side of the interface between the customer and the product.

EXHIBIT III-4

The Boundaries between Software Support and Maintenance



S
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Support is tied to the sale and the on-going customer relationship. It covers three stages in this relationship:

- Pre-sales - Demonstrations, requirements analysis, product evaluation and training
- At installation time - A range of tasks are required depending upon the implementation and degree of customisation for each product
- Post-sales - Problem solving and consultant assistance on an ad hoc basis either by telephone or on site, and regular information on product developments.

The peak requirements for support centre on:

- The installation period
- The time for a major upgrade.

On the other hand, maintenance is connected to a range of product orientated tasks:

- Distribution of software copies and the associated documentation
- Distribution of fixes, patches, new versions (both maintenance versions and intermediate enhancement versions) and full releases of the products
- Problem identification and correction:
 - Temporary (i.e., a fix is required to keep a user up and running)
 - Permanent (i.e., patches are distributed throughout the installed customer base).
- Development of intermediate versions, their scheduling and production
- New full releases of the software (i.e., usually distinguished from new versions by an increment in functionality and/or an improvement in the design).

Grey areas lie in between the two concepts:

- The difference between a fix and a patch can be hard to distinguish
- Identification of errors involves disentangling operator (end-user) errors from product bugs

- New releases may contain corrections to previously reported errors as well as new functionality resulting from the analysis of end-user requirements fed back to central production.

Although it is only theoretically possible to completely disentangle the two (support and maintenance), it is still a beneficial intellectual exercise, as it helps the vendor to focus on the services that can be delivered.

Support does not involve changes to a software product, but maintenance can involve changes to products at three levels:

- Enhancements, e.g., the changes to tax rules brought about by new legislation
- Intermediate software releases, e.g, mainly corrections to reported errors and modifications to improve performance or reliability, such as re-engineering portions of the code.
- New versions in which the main emphasis is on either new amounts of functionality in the product or a new design with the objective of providing both new functions and integration into an architecture to give better overall performance and reliability.

C

Software Services Vendors' Definitions

For software which is installed as a product, it is relatively easy to discriminate between the provision and maintenance of the software. With bespoke construction, this is by no means so easy, because development, enhancement and maintenance phases of the overall life cycle tend to have "fuzzy" boundaries with each other.

Software services vendors and their clients have come to accept that an on-going support and maintenance contract of some form is necessary as a follow on to the development or installation of custom software. The concept of bug-free software which anyone can use without support is still a far off dream.

In Europe the average price for software support and maintenance is around 14% of the original contract price per year. Most vendors then manage their resources to offer a satisfactory level of service encompassing all or some of:

- On-site trouble shooting—if remote resolution is not feasible
- Hot-line telephone support—problem diagnosis, resolution and reporting.
- Free enhancements—to encourage users to stay with the latest versions

- Consulting visits—to offer advise to clients
- Fault reporting only—for faults which can be worked around
- Discounted enhancements—to encourage further spend
- Remote diagnostics—through a communications link to minimise fix times
- Discounted training—good training minimises the end-user's need for support.
- Problems database—on-line access to the central log of outstanding problems
- Availability of various skilled resources—support credits not already called off under the support contract.

These services are listed in priority order according to the last INPUT user survey, which asked what probability there was of each element being included in an applications software maintenance contract. Probabilities ranged from “on-site trouble shooting” which was quoted at 82% to “problems database” quoted at 43%.

Maintenance of custom software can in this case be considered to be restricted to essential fixes required to meet the clients expectation of a reliable and performing application system. Most vendors ensure that they have a strict change control management procedure agreed with the client, which is used to agree the classification of any client or vendor generated requests for software change.

Change control management is the key to a mutually beneficial and profitable software contract. Such procedures ensure that financial responsibility for a change - whether it be a new function, a modification, or correction of an error - be correctly attributed either to the vendor or the client, or both. A clear contract for both the provision and the on-going support and maintenance are the essential foundation of such negotiations.

The terms used in such contracts are unique to each supplier, but usually define maintenance as any work necessary to make the software meet its original agreed specification. Anything else - which can include a number of mandays allocated for unplanned enhancements - is usually defined as support.

D**User Perception of Software Support and Maintenance**

Various surveys of DP departments in the past have established that “maintenance” consumes between 50% and 80% of the average department’s resources. The definition of what they mean by maintenance is not very clear, but can usually be interpreted as everything the software team do which cannot be classified as a new application project.

In other words the user/customer defines maintenance as:

“Anything the software team has to do which relates to an application already in use.”

INPUT refers to this activity as: *operational software support*.

As identified in Exhibit III-5, operational software support covers the following functions:

- Functional enhancements
- Maintenance, both preventive and fault fixing
- Modifications, to data structures or programs
- User support, training and help-desk
- Operations support
- System software
- Application software products.

Many user IS departments do not have any clear definition of:

- What software support and maintenance comprise as elements of an overall applications project
- How much is spent in-house on these activities rather than development or enhancement
- How to optimise the allocation of resources in this area.
- What level or quality of service is required or received by its end-users. This last factor is perhaps the key to success with all the others.

EXHIBIT III-5

**IS Management Definition of
Operational Software Support**

- All activity concerned with software once it is "live"
- Includes:
 - Preventive maintenance
 - Corrective maintenance
 - Modifications
 - Enhancements
- Excludes
 - New development projects
- Commonly called "Software Maintenance", but this has a very poor image

If these definitions have not been recognised as necessary, it goes some way to explaining why, according to Durham University's Centre for Software Maintenance, the top priority for most newly aware IS managers is some methodology for managing the support and maintenance functions.

"Unless you can measure it you can't start to manage it."

And until it has been measured, the vendor of a support and maintenance service cannot make a financial case in favour of the user switching from in-house support and maintenance to an external third party service.

From the end-user's point of view, rather than the IS department's, all the stages of the software life cycle merge into a single simple requirement - for an acceptable quality or level of service to the end-users from the application.

This leads to another demand for measurement - setting and meeting the quality of service required by the end-user.

A significant difference between the management of in-house development teams and the management of external contractors is the concept of financial reward or penalty for the contractor. Both of these concepts imply contractual terms whereby performance can be measured. If end-users and internal IS departments do not have such “contractual” relations then “he who shouts loudest wins”, and return on the IS investment for other end-users suffers unnecessarily.

E

Summary of Support and Maintenance Definitions

Research has shown that maintenance has a bad name in the software world. It is seen as the least glamorous of all analysis and programming occupations. Exhibit III-6 shows various definitions of *Software Maintenance*.

Many IS managers see no strong purpose served in differentiating maintenance from support. For vendors there are very good reasons for doing so.

Not least of these is the variety of skills required to offer a valued support and maintenance service for today’s complex software systems. For example software maintenance, far from being boring, is one of the most technically demanding and challenging occupations as discussed elsewhere in the report.

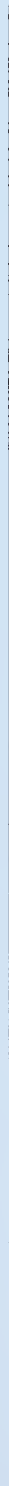
EXHIBIT III-6

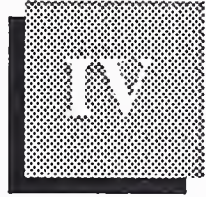
Different Definitions of Software Maintenance

- Product vendor: fixing faults in software
- Services vendor: fixes and work-arounds
- IS management: support of operational software



European Market Overview





European Market Overview

This chapter provides a numerical analysis of software market sizes across major European regions. It identifies the size of the existing markets for provision and support of both product and custom software.

A potential market size is derived for user spend on in-house software development, enhancement, support and maintenance. This is compared to the level of outsourcing occurring for support of such operational software - indicating that less than 1% of such activity is currently outsourced to third-party vendors.

A five year forecast for the period 1990-1995 gives anticipated growth rates for four different classes of software. Support and maintenance revenues are predicted to grow more rapidly than licence income where the two are unbundled from each other.

A

Software Product Support and Maintenance

Software products fall into two categories (more details are given in Chapter III on the definition of terms used):

- Class D—Systems software products such as operating systems.
- Class C—Applications software products such as payroll.

Exhibit IV-1 lists the market sizes in Europe for both the original supply or provision of the software and for the on-going support and maintenance, broken down by equipment platform type. Full reports are available from INPUT on both these markets with forecasts for each country in Europe.

Most apparent from the chart is the fact that the mainframe market represents over 50% of the total system software market, whereas the PC/workstation sector is responsible for over half of the application software market.

This reflects the heavy bias towards in-house development of applications which has been a characteristic of the mainframe market for many years.

The advent of downsizing—putting new applications onto smaller (cheaper) equipment platforms and distributing them around an organisation—is likely to exaggerate this bias even further in future.

Pricing for software maintenance and support ranges from averages of 12% to 17% across different equipment platforms and classes of software.

EXHIBIT IV-1

Software Products by Equipment Platform Western Europe, 1990

Software Product Class/Sector		\$ Billions			
		Mainframe	Mid-range	PC/ Workstation	All Platforms
Licences					
D	Systems Software	4.49	2.65	1.60	8.74
C	Applications Software	0.82	1.95	3.30	6.07
Total		5.31	4.60	4.90	14.81
Support and Maintenance					
D	Systems Software	0.92	0.47	0.22	1.61
C	Applications Software	0.13	0.32	0.37	0.82
Total		1.05	0.79	0.59	2.43
Total Provision					
D	Systems Software	5.41	3.12	1.82	10.35
C	Applications Software	0.95	2.27	3.67	6.89
Total (rounded)		6.4	5.4	5.5	17.2

To help put the expenditure on support and maintenance into context, Exhibit IV-2 shows INPUT's forecasts for user expenditure on licence fees from 1989 to 1995. Systems software shows a close correlation with equipment market trends, growing generally slower, at 14%, than the software and services market overall in Europe.

The much higher application software growth at 22% is the result of the downsizing trends - as users implement new applications on lower cost equipment platforms - and the switch from in-house development to packaged solutions.

EXHIBIT IV-2

Software Product Licence Forecast Western Europe, 1990-1995

Software Class/Segment	\$ Billions				
	1989	1990	1991	1990-1995 CAGR (Percent)	1995
Product Licences:					
D Systems Software	8.00	9.00	10.24	14	17.09
C Applications Software	5.03	6.07	7.34	22	16.39

B

Potential Markets for Software Support and Maintenance

Exhibit IV-3 shows INPUT's estimates for the size of the Class A and Class B software markets, as well as Class C and Class D:

- Class A—Software developed in-house by the user organisation.
- Class B—Software custom developed by a third party vendor.

EXHIBIT IV-3

The European Market for Providing and Supporting Software, 1990

Segment/ Country	\$ Billions				
	Custom		Products		
	Class A Operational In-house	Class B External Contractor	Class C Application Software	Class D System Software	Total Software Spend
France	10.93	4.67	1.86	2.29	19.75
Germany	13.36	1.84	1.14	2.18	18.52
United Kingdom	9.18	2.39	0.96	1.66	14.19
Italy	10.15	2.24	1.03	1.44	14.86
Scandinavia	5.46	1.20	0.63	0.91	8.20
Rest of Europe	10.40	1.91	1.27	1.87	15.45
All Europe (rounded)	60	14	7	10	91

The 1990 Class A figure for software provision and support was calculated as follows:

- Estimated figures for numbers of systems staff (both system and applications programming) were obtained from national statistical institutes and national industry surveys. Where figures were not obtainable, estimates were based on pro-rating to the country market for computing services.
- A proportion of development staff's productive time was allocated to new development and the rest to operational software support and maintenance. The results of an INPUT survey of 100 users indicated that:
 - 42% of staff time was devoted to development
 - 27% was taken up with enhancements
 - 31% was dedicated to maintenance

EXHIBIT IV-4

The European Market for Operational Software Support, 1990

Segment/ Country	\$ Billions				
	Custom		Products		
	Class A Operational In-house	Class B External Contractor	Class C Application Software	Class D System Software	Total Software Spend
France	7.11	0.82	0.25	0.36	8.54
Germany	8.68	0.32	0.16	0.34	9.50
United Kingdom	5.97	0.42	0.13	0.26	6.78
Italy	6.60	0.39	0.14	0.22	7.36
Scandinavia	3.55	0.21	0.09	0.14	3.99
Rest of Europe	6.76	0.34	0.17	0.29	7.56
All Europe	39	2.5	0.9	1.6	44

- These results correlate well with other research studies into the costs of support and maintenance activities. For the purposes of INPUT's calculations both enhancement and maintenance were counted as operational software support activity and are shown in Exhibit IV-4.
- Multiplying the proportion of time spent by the number of staff doing development or support work and again by a factor for average total cost - taken as \$52,000 per annum - yielded a range of market sizes, based upon the cost of providing in-house staff to do the work.

For example: the market for in-house operational software support = number of development staff x proportion of their time spent on software enhancement and maintenance x an average salary.

The figures for classes B through D were taken from INPUT's ongoing research during 1990/91:

- Class B from the professional services sector
- Class C from the applications software product sector
- Class D from the systems software product sector

Exhibits IV-5 through IV-9 illustrate the distribution of software activity in five major European country regions. There are variations reflecting the national characteristics. For example German preference for in-house software development shows their Class A activities totally overwhelming those of the vendors in Classes B, C and D.

EXHIBIT IV-5

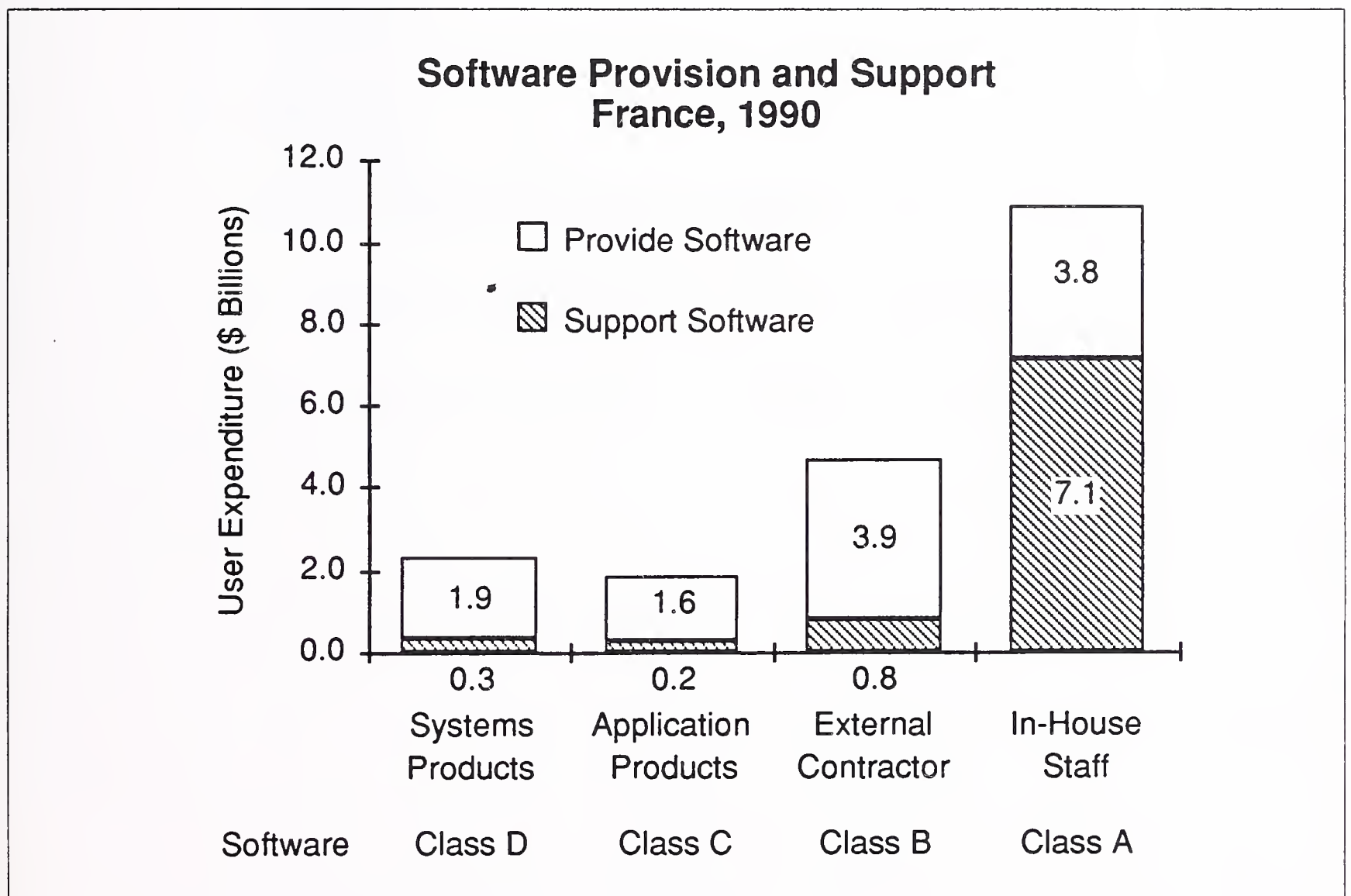


EXHIBIT IV-6

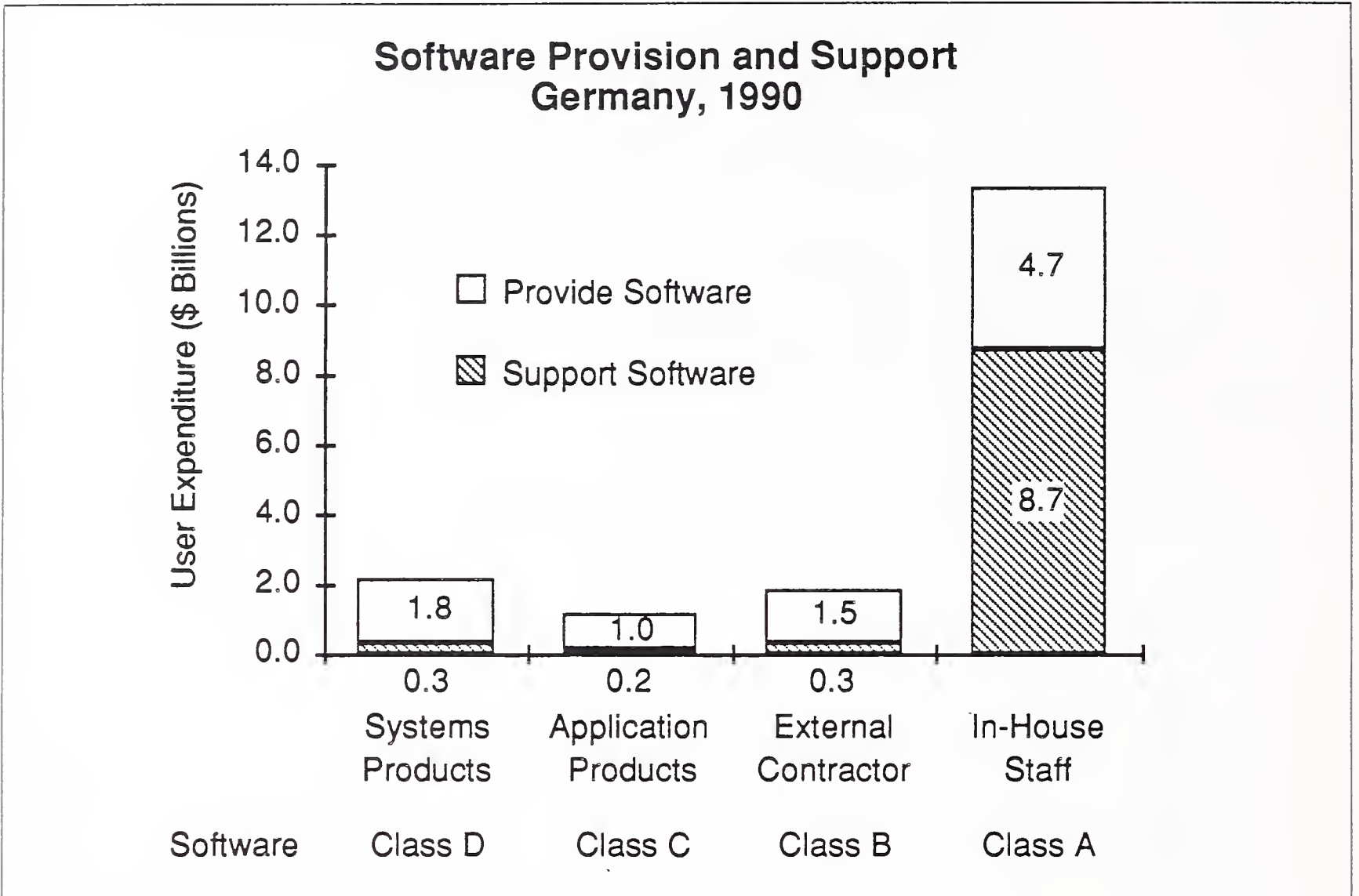


EXHIBIT IV-7

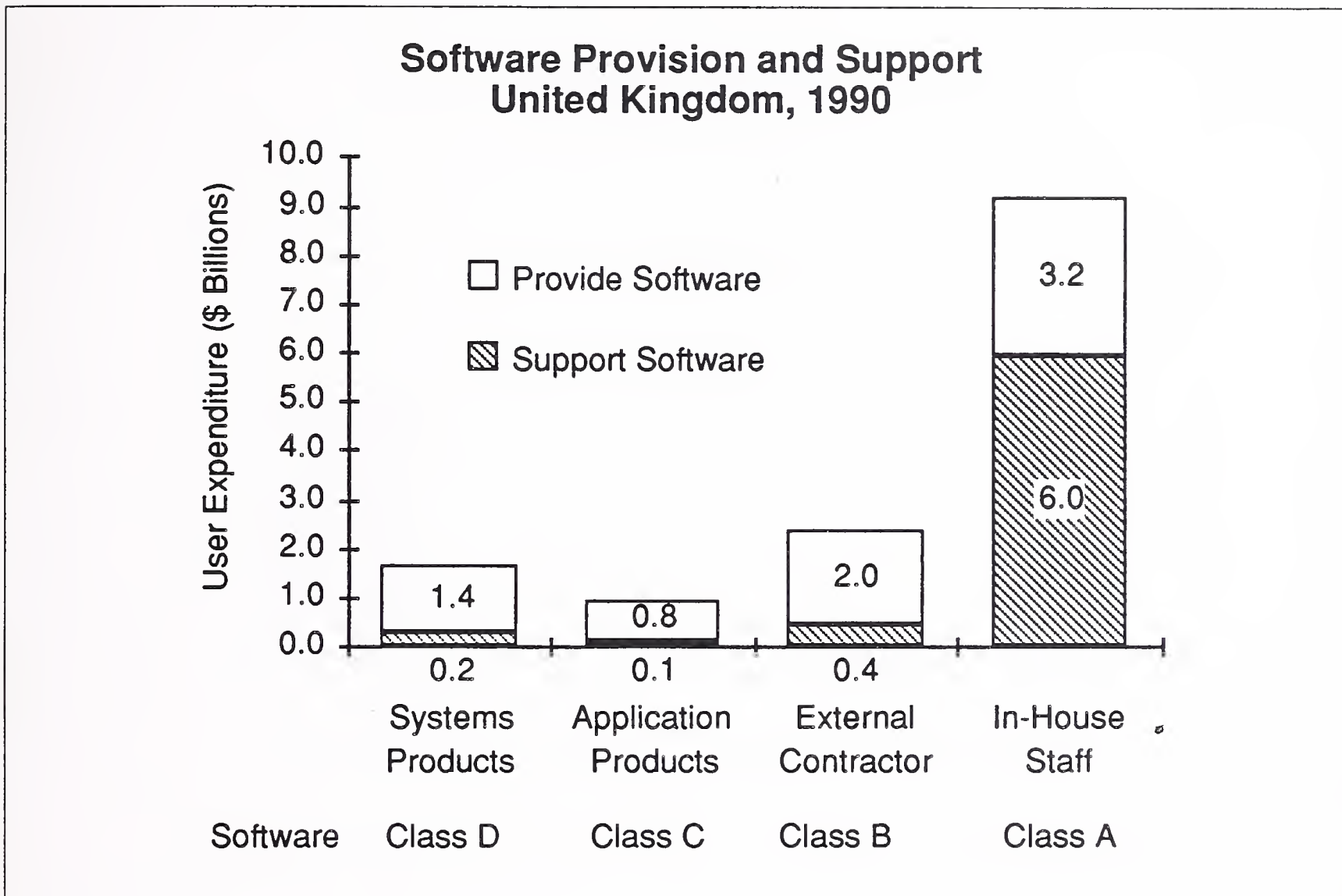


EXHIBIT IV-8

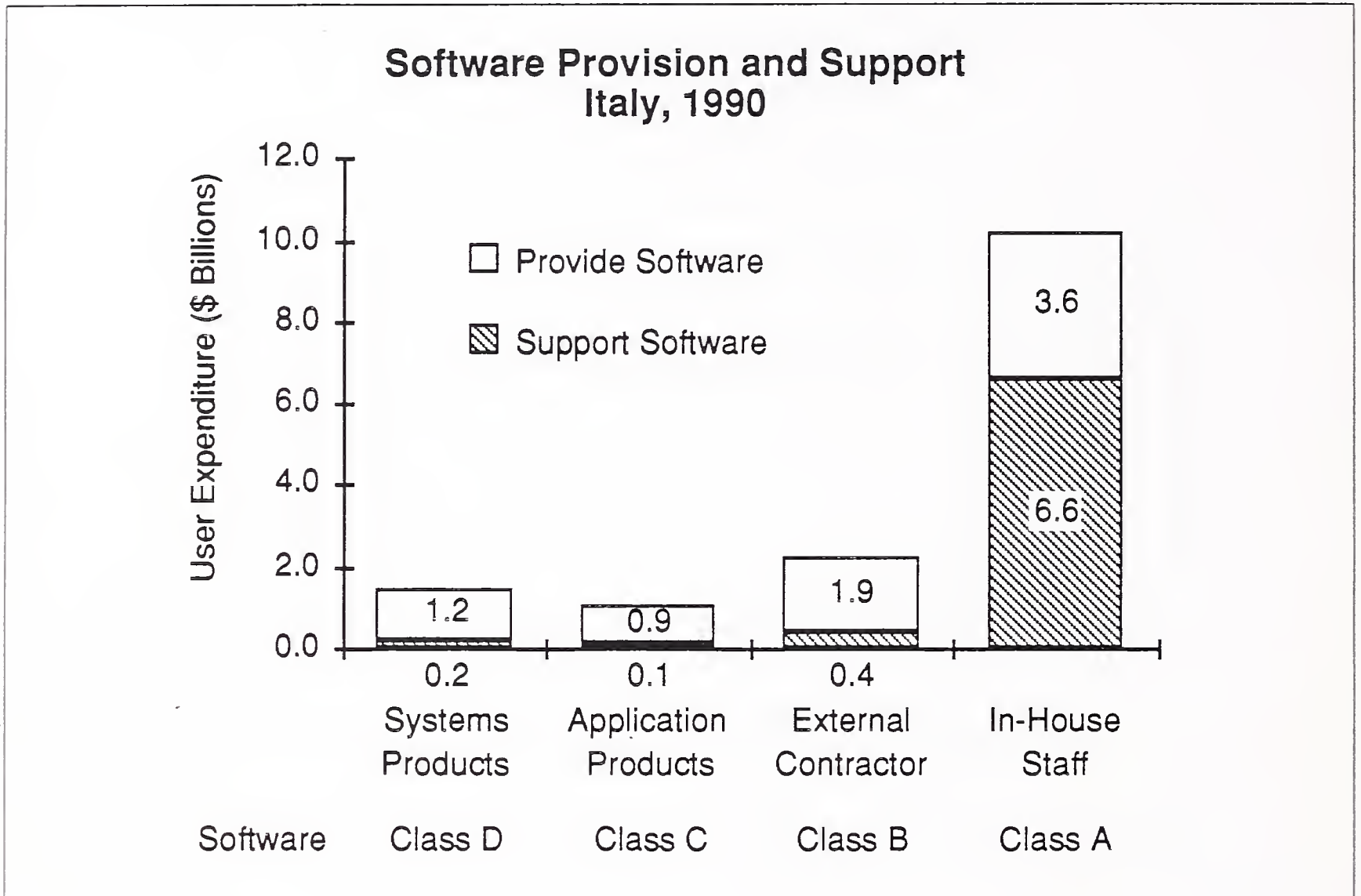
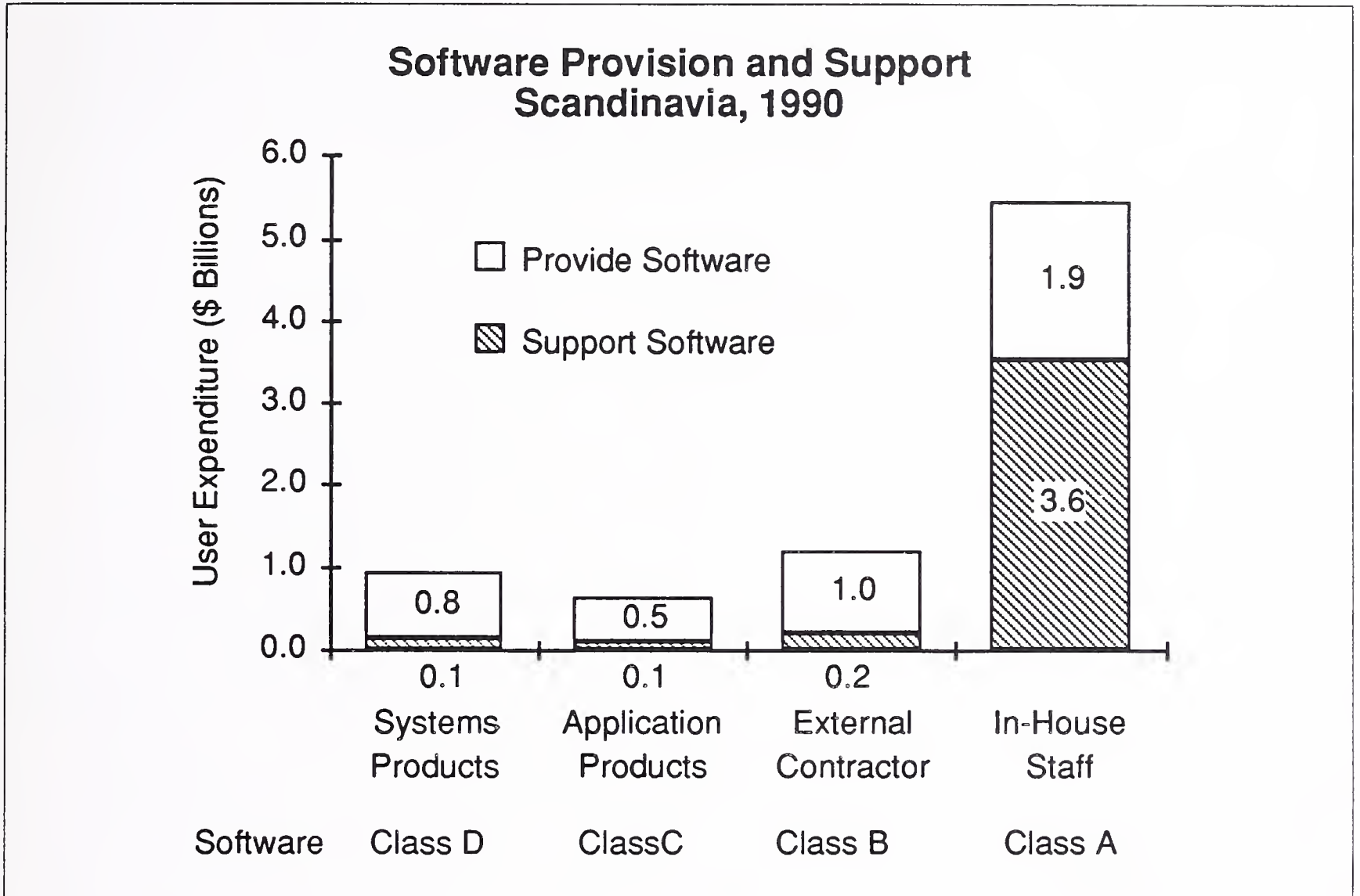


EXHIBIT IV-9



Right across Europe the expenditure on in-house staffing of software development and operational support exceeds the external expenditure on software vendors.

This is not true for new software, either purchased as product or as a custom development. Here in-house expenditure has already dropped below the outsourcing spend.

However for operational software support (software maintenance) in-house activities are overwhelmingly huge. The level of outsourcing to third parties is estimated and forecast in the next few paragraphs.

C

Market Forecast

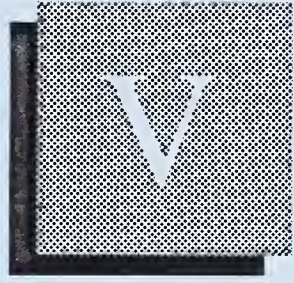
Exhibit IV-10 gives INPUT's market size forecast for each Class of outsourced vendor software support and maintenance service. All sectors exhibit healthy growth rates well above those for software licences only. This is the result of the cumulative effect of providing support over several years following the initial provision of a suite of software.

The estimates for growth in Class D operational software support should be treated as a guide line only, as the market is extremely fragmented. Market leaders are only doing \$10 to \$20 million per year of this type of business. Large numbers of vendors do less than 1% of their business in this area, mainly as an account development activity for clients who use their software development professional services.

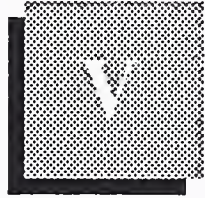
EXHIBIT IV-10

Operational Software Support and Maintenance Forecast for Western Europe, 1990-1995

Software Class/Segment		\$ Billions				
		1989	1990	1991	1990-1995 CAGR (Percent)	1995
Operational Support and Maintenance Services:						
A	3rd-Party Operational (In-house)	0.2	0.3	0.4	30	1.2
B	Contracted Custom Software	2.1	2.5	3.0	26	7.9
C	Applications Software Products	0.7	0.8	1.0	30	3.0
D	Systems Software Products	1.1	1.4	1.6	24	4.0



Issues



Issues

This chapter addresses the opinions of IS users and software service vendors on the topic of software support and maintenance.

It provides an overview of perceptions (and prejudices) among users and vendors across different countries and industry sectors.

A

User Issues

- INPUT carries out regular user surveys on third-party support and maintenance. The results of questions about the outsourcing of various service activities are analysed in the following paragraphs.

200 users were surveyed across Europe, at both manager and director level.

Exhibit V-1 shows the response to a general question about the reasons for outsourcing any professional software services. It identifies clearly the accepted driving forces for the European outsourcing phenomena.

However the perception that outsourcing offers greater efficiency, while accurate for new software projects, is not a widely held view when it comes to maintenance of in-house produced software, as will become apparent in the next pages.

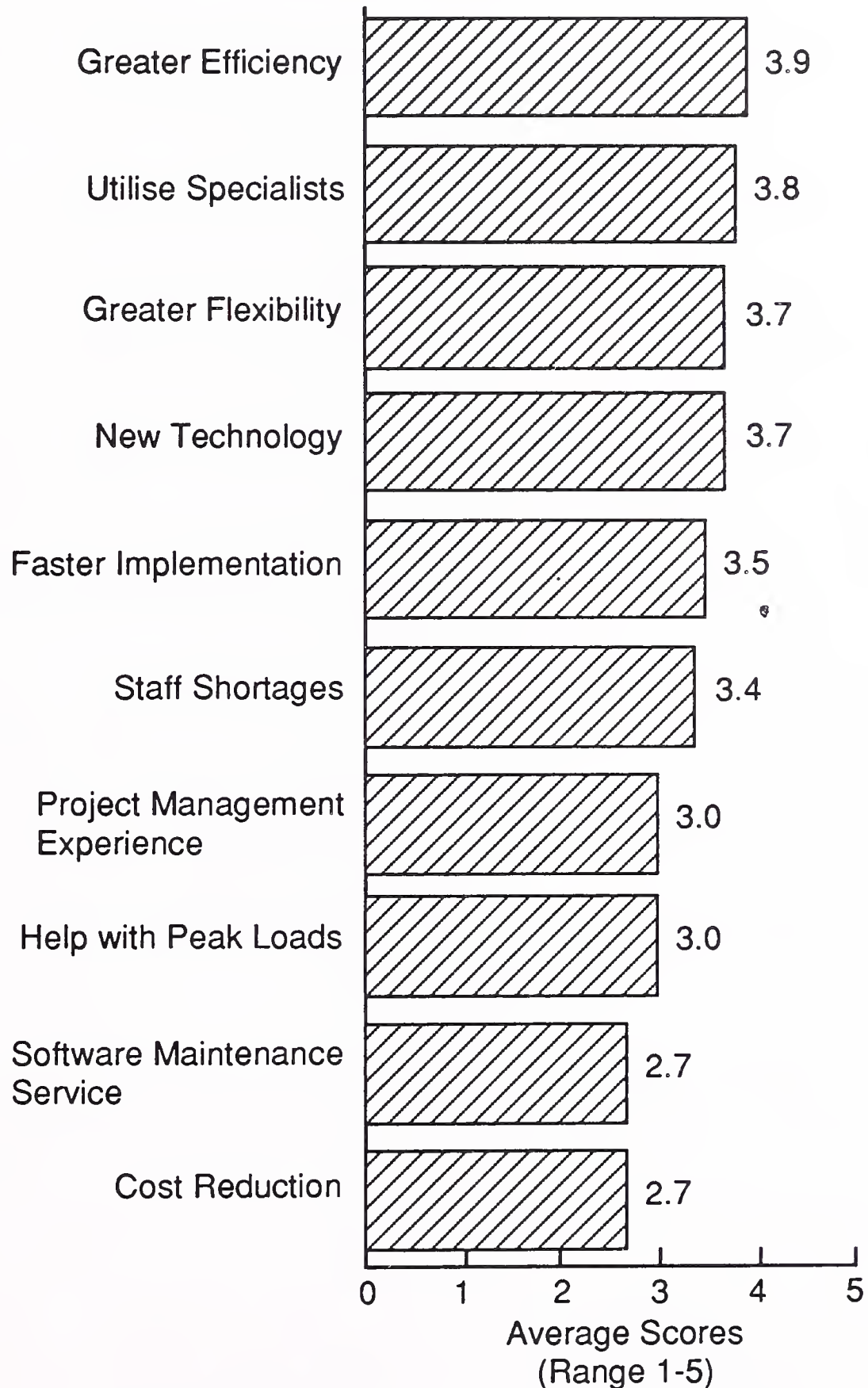
The concept of using an external vendor to provide a software maintenance service comes lowest in users priorities - equal with making a cost saving - as a reason for outsourcing.

Reasons for not contracting-out to a professional services vendor are shown in Exhibit V-2. The reasons are conventional enough, with item four - On-going Software Maintenance - figuring strongly yet again as a reason for keeping things in-house.

In both these exhibits the reasons given are a useful check-list for vendors of the perceptions which have to be overcome in order to successfully offer and win operational software support (and maintenance) services for in-house developed software.

EXHIBIT V-1

Priority User Issues Driving Professional Services Outsourcing in Western Europe

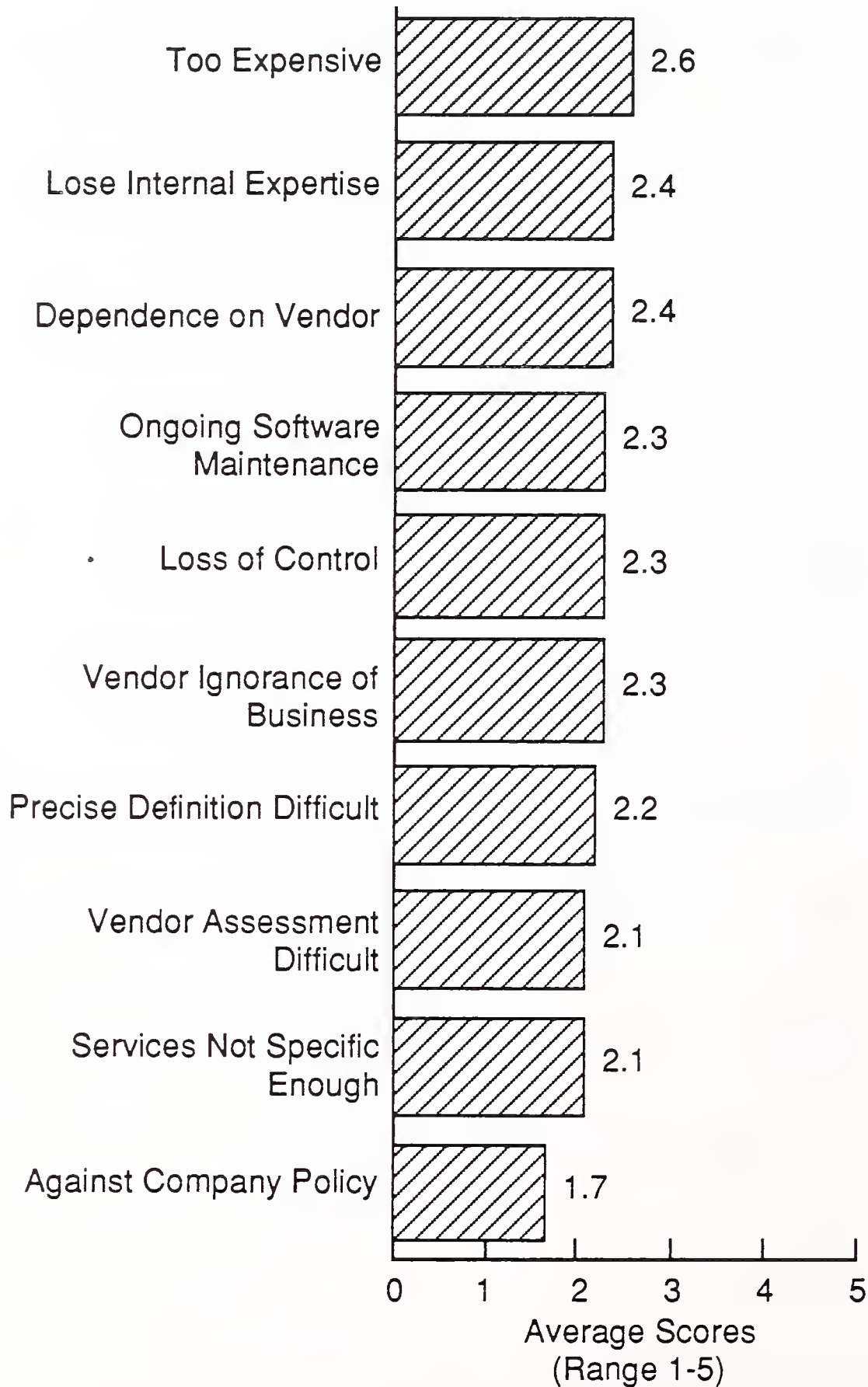


200 User Respondents. Answers to the question: How strong an issue is each factor in leading your company to use third party professional services?

Score 1 = unimportant, 5 = very important factor.

EXHIBIT V-2

Priority User Issues Inhibiting Professional Services Outsourcing in Western Europe

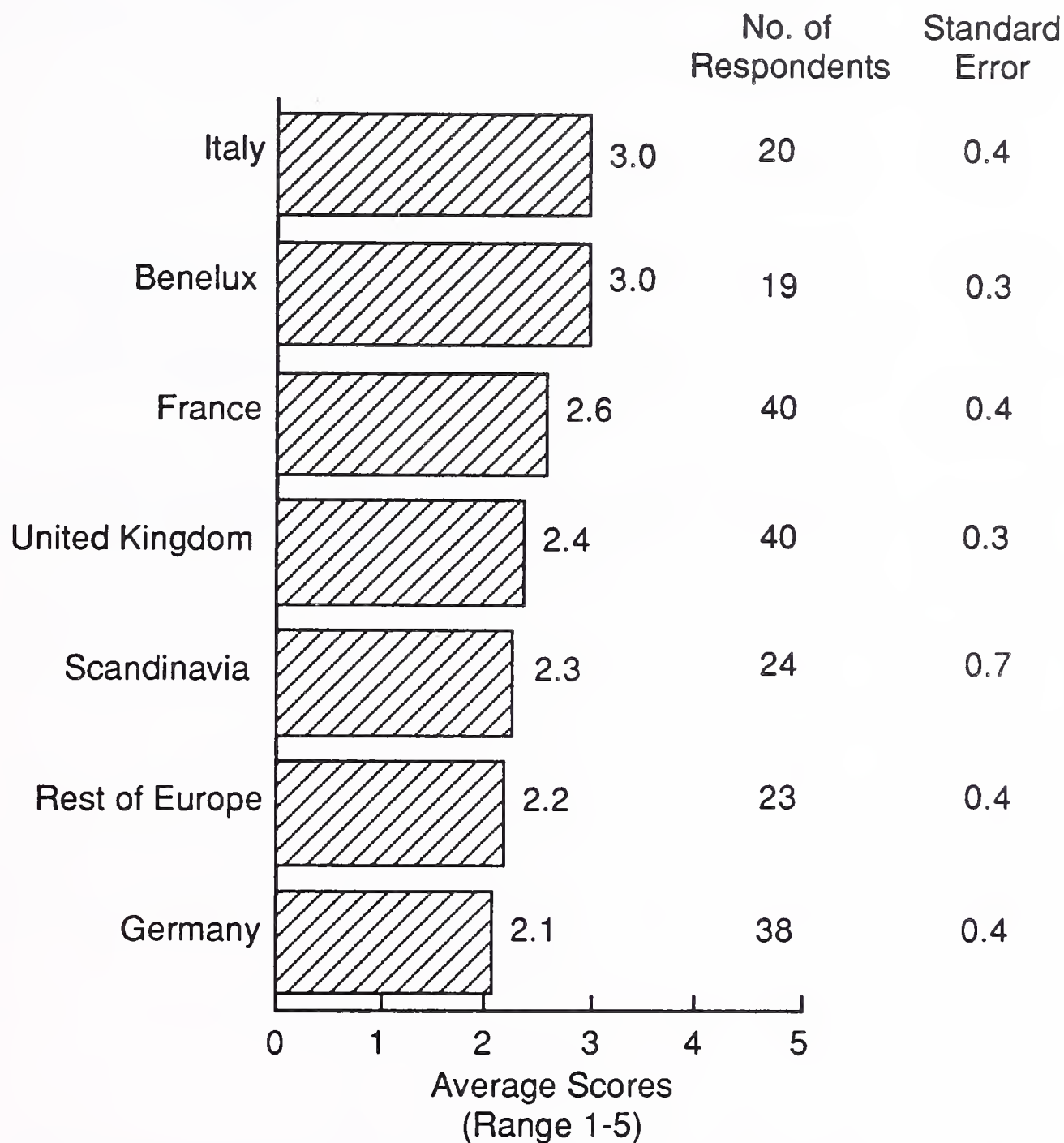


200 User Respondents. Answers to the question: How strong an issue is each factor in leading your company to use third party professional services?

Score 1 = unimportant, 5 = very important factor.

EXHIBIT V-3

Geographic Regions Most Concerned About Software Maintenance Issues



200 User Respondents. Answers to the question: How strong an issue is the provision of third party software maintenance services for in-house developed software?

Score 1 = unimportant, 5 = very important factor.

Italian respondents were the most concerned about operational software support - third party software maintenance services for in-house developed software. This probably reflects the fragmented nature of the Italian software services market, which spends significantly less as a proportion of GDP than France, U.K. or Germany.

Germany has a track record of predominantly in-house software development, and clearly our German respondents were the least concerned to use outsourced software maintenance services. Across the whole IS market German users outsource less to software service vendors, when compared to other European nations. Their preference for turnkey software system packages and in-house development minimises any consideration of outsourcing software maintenance.

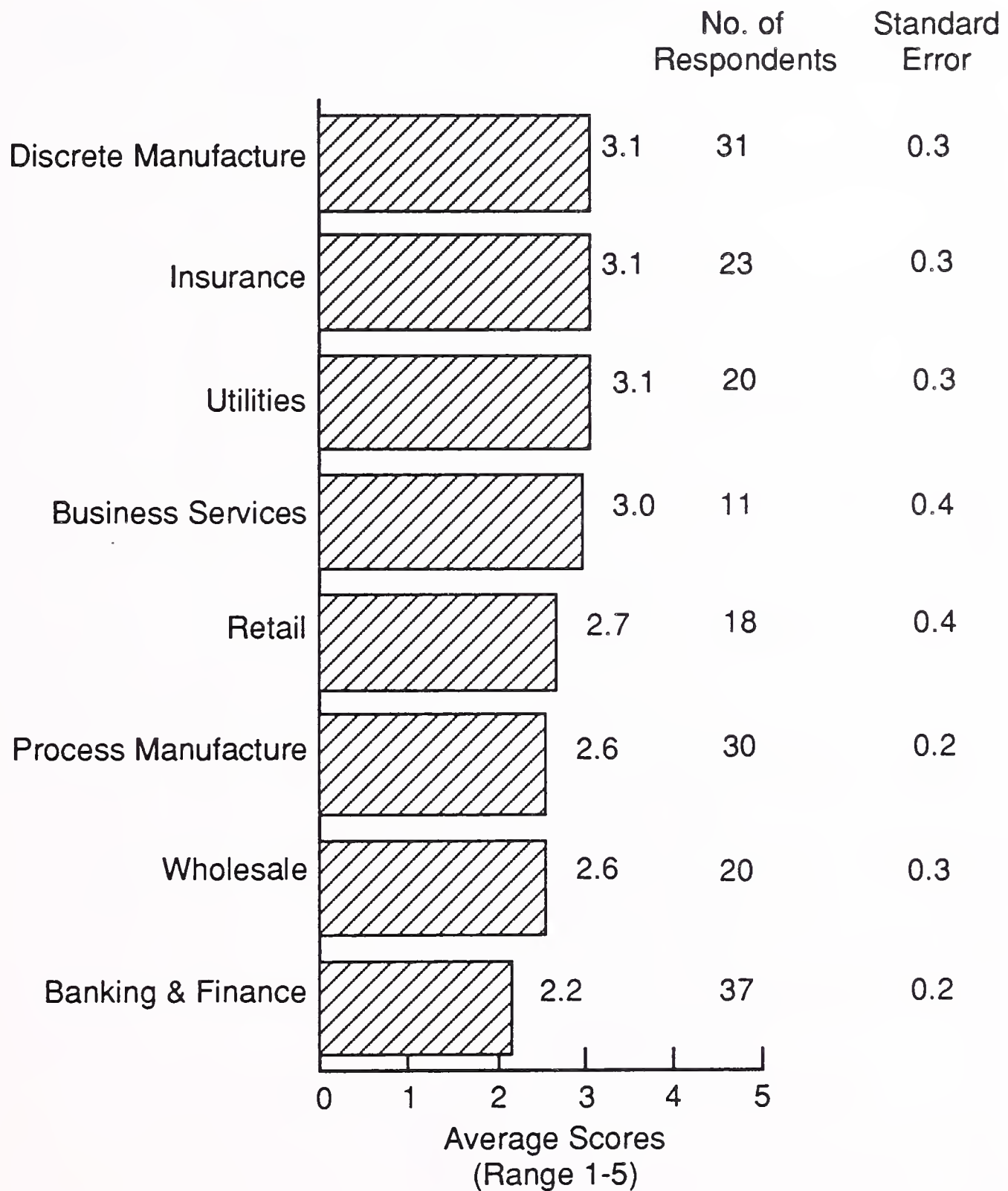
Exhibits V-4 and V-5 illustrate the most positive and negative responses analysed by industry sector across Europe as a whole.

Apart from Banking and Finance, the most positive responses seem to come from sectors which are heavily mainframe orientated. Discrete manufacture, insurance and utilities are all sectors in which mainframes have a good market share and in-house applications have been normal business practice in the past.

The strongest conclusion to be drawn from these responses is that the use of third-party operational software support and maintenance services is very low on the outsourcing priority list for IS management.

EXHIBIT V-4

Industry Sectors Most Negative about Third-Party Software Maintenance in Western Europe

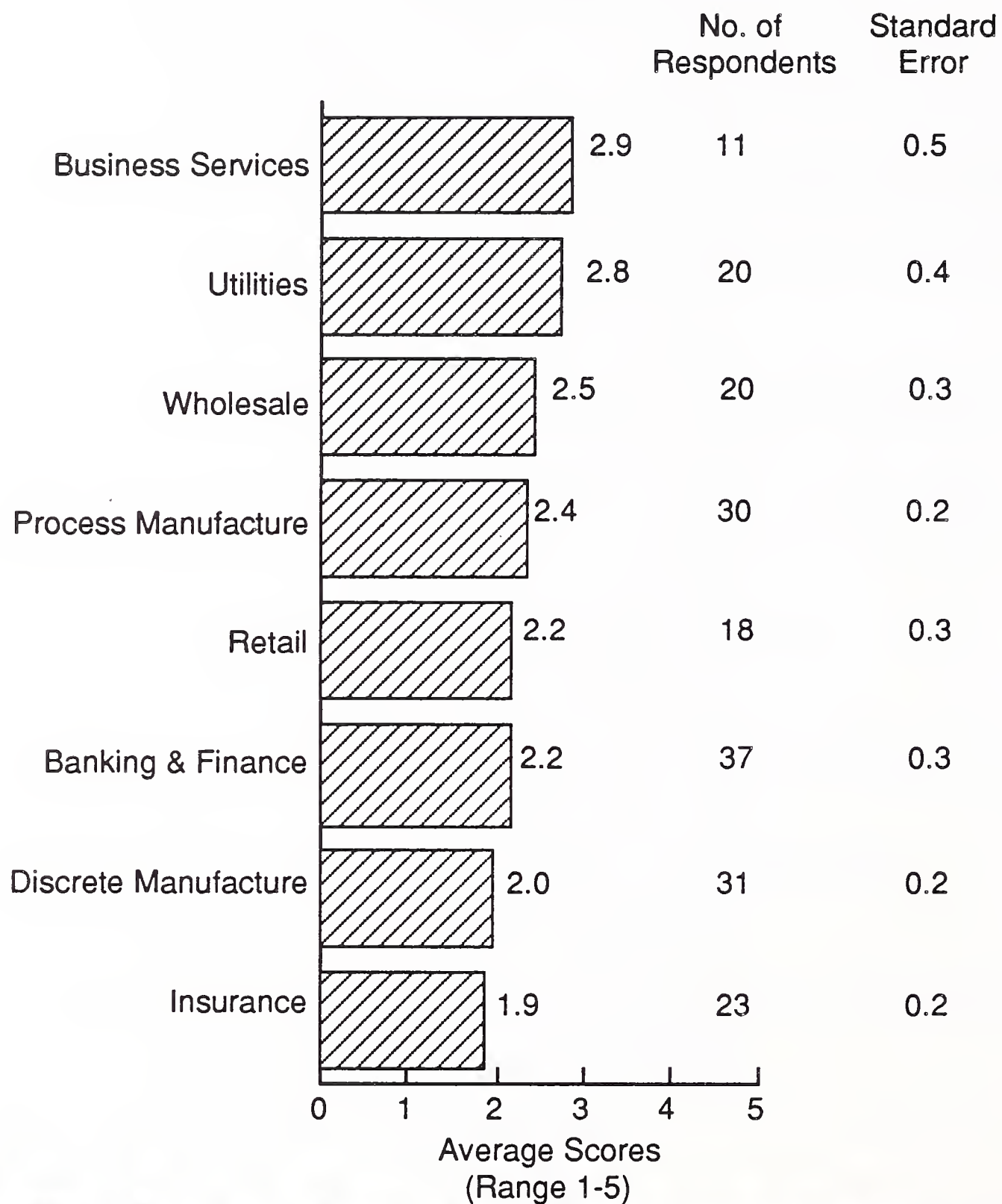


200 User Respondents. Answers to the question: What critical concern do you have about using third-party software maintenance services for in-house-developed software?

Score 1 = unimportant, 5 = very important

EXHIBIT V-5

Industry Sectors Most Positive about Software Maintenance Services in Western Europe



200 User Respondents. Answers to the question: How strong an issue is software maintenance in leading your company to use third-party services? Score 1 = unimportant, 5 = very important factor.

B**User Profiles**

Exhibits V-6 and V-7 summarise the experience of a Government department in contracting out the maintenance and support of a very old database application used for assessing the economic impact of EEC and local policy changes on a national industry.

EXHIBIT V-6

**User Case Study
Government Sector—Scenario**

- IS Objective
 - Improve user service / lower costs of economic model
- Old Age Problems
 - Plan to replace suit of applications
 - Some software 20 years old
 - Many change requests still
 - Obsolete systems hardware/software
 - Boring for staff, poorly documented
 - High security site

EXHIBIT V-7

**User Case Study
Government Sector—Outsourcing**

- Solution - Outsourcing
 - 3rd-party staff working on-site
 - Mix of time-and-materials and fixed-price
 - 3 months parallel working hand-over
 - Users interface direct with vendor
- Benefits
 - >50% cost saving on staff ~\$70K p.a.
 - 8 full-time staff replaced by 4 part-time
 - System life extended 5 years
 - Vendor handles all staffing

The objective of contracting out to a third party was to improve the service received by the end-user and to lower the costs of running the service. Some applications are over 20 years old, and although the number of code changes is small, end-users are continually requesting changes to the application parameters and database fields.

To add to the difficulties of keeping the end-users satisfied, the applications run on an old mainframe using an obsolete operating system. The support staff were poorly motivated and eager to acquire a replacement system. The site and the application are subject to high security regulations.

Three vendors were invited to tender. The solution adopted after a careful analysis by the vendors meant a hand-over period of three months, during which one or two of the eight staff remained available to train the vendors employees.

The final terms of the service were a fixed price for an agreed level of support service, plus a time and materials portion for responses to end-user special requests.

Perhaps the most interesting aspect of this example is the way the IS department passed full responsibility to the service vendor who now deals directly with the end-user department on all issues.

The potential cost of any changes is now visible to the end-user management in the form of costed quotations. This has allowed the end-user to improve his own decision making as to the cost effectiveness of changes being requested.

The exercise has been very successful, freeing eight IS staff for use on other projects, reducing the overall workload and dramatically improving the reliability of the system. This has enabled the replacement plans to be put off, freeing the budget for other uses.

The improvements in reliability are a spin-off from the vendor's strong management methods applied to the whole applications software environment. Far less time is now spent analysing and fixing problems (down to only 5%), or re-inventing solutions to problems which have occurred before. This has allowed the vendor to negotiate a lower cost service level which still satisfies the end-users needs.

The second case study is outlined in Exhibits V-8 and V-9. It concerns a large IS group within a Telecommunications PTT, where there is tremendous pressure for new applications which reflect a more customer-facing business stance. Freeing up IS staff with valuable business knowledge was the main objective of considering outsourcing some support and maintenance activities.

EXHIBIT V-8

**User Case Study
Telecommunications Sector—Scenario**

- IS Objective
 - Free-up staff & improve user service in materials management
- Problems
 - Demand for new business systems
 - Database growing out of hand
 - 5-year history of fast fixes to software
 - Bad system response times
 - 23 people - fire-fighting support

EXHIBIT V-9

**User Case Study
Telecommunications Sector—Outsourcing**

- Solution - Outsourcing
 - 3rd-party took prime responsibility
 - Mix of in-house and 3rd-party staffing
 - 6 months for knowledge transfer
 - Client's quality system
 - Planned reviews under client's direction
- Benefits
 - 19 staff released for new projects
 - Users happy - good response times
 - Call-outs reduced ten-fold
 - System reliability and life extended
 - Working practices adopted by client

The application chosen was a major inventory and warehouse management system implemented at several locations for a regionally organised end-user management.

The five-year-old system had been treated like most heavily used applications - speedy fixing of problems had taken precedence over elegant solutions. So short-cuts had been taken, resulting eventually in some response times, at peak hours, being totally out of hand.

With 23 people employed in supporting the applications, it seemed an excellent test case on which to judge the promises of the service vendor.

In this case the knowledge transfer required to release 19 of the in-house support and development staff took six months. There was also considerable spin-off in knowledge transfer to the computer operations staff, as the vendor applied improved working practices to establishing a stable and reliable software environment.

The vendor established procedures for configuration control, software testing and release, which conformed to the users own internal quality procedures and standards. In fact considerable energy was put into establishing a tight teamwork approach with shared office space and good communications at all working levels.

The results were exceptionally good, with response times down to a level at which it is going to be hard to find an adequate replacement system in the future. There is no doubt that the system's life has been extended by pro-active management - compared to its previous reactive fire-fighting status.

The original high level of end-user complaint has given way to silent satisfaction and the original 24-hour emergency service level has been reduced to a normal working hours service.

Many of the new working practices introduced by the vendor have been adopted by the IS client management.

C

Vendor Issues

The vendor research programme for this report concentrated on issues related to the development of software maintenance business. The professional services industry has traditionally lived by helping clients to tackle *new* projects. As the installed base of software systems has grown, so has the challenge for IS departments of maintaining the vast array of increasingly complex systems.

EXHIBIT V-10

Software Support and Maintenance— The Problems

- High business dependence
- Aging software tools
- Poor software documentation
- Lost skills
- Development staff motivation
- Recruiting maintenance staff

Some of the problems which arise as active software ages are listed in Exhibit V-10. By definition, if software is still in use after several years then it is probably an integral part of the business operations. Seldom does such software not require maintenance activity to keep it in step with changing needs or to fix new found problems.

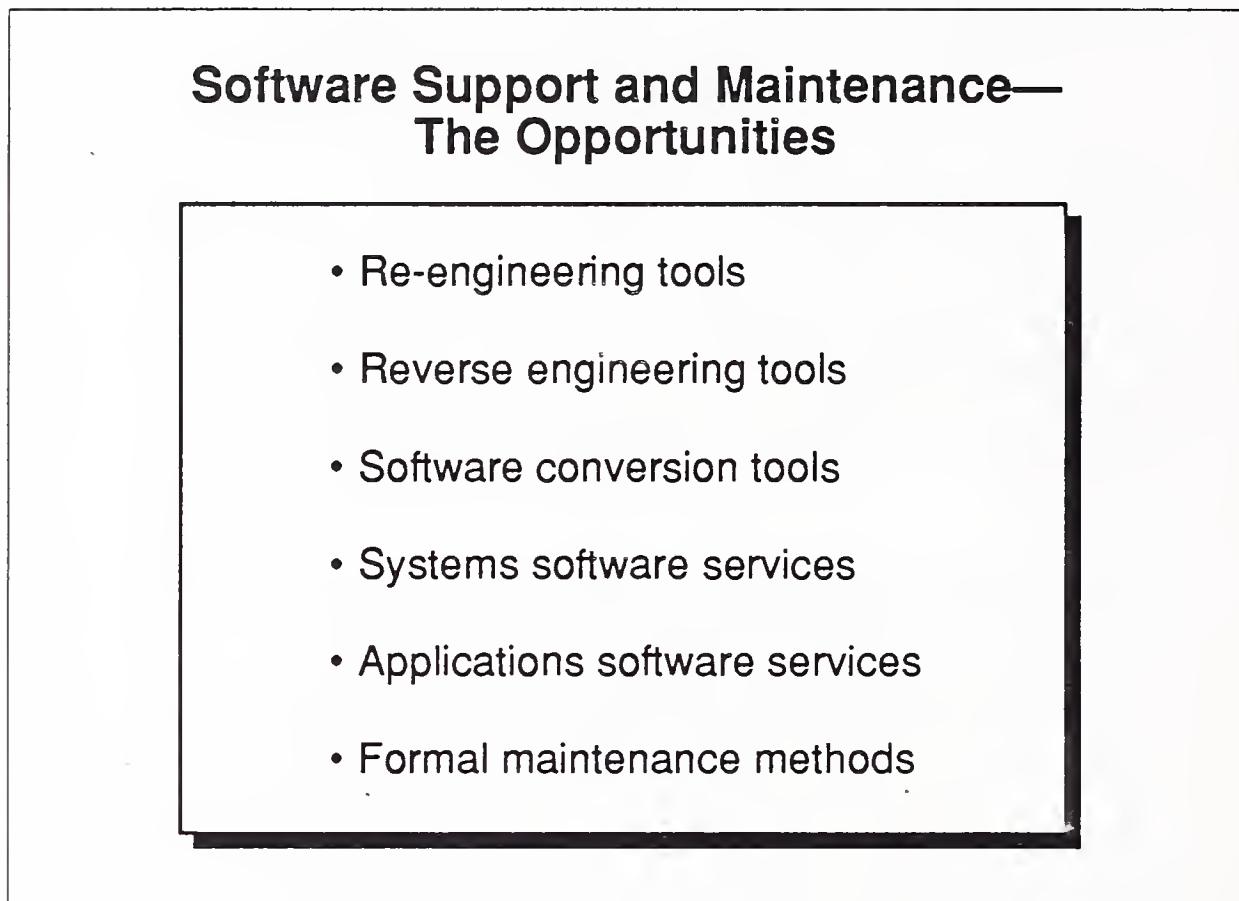
The software tools originally used to create the applications can become part of the problem, either because they have been abandoned by the vendor in favour of a new product, or because they have been enhanced and may have become incompatible with the old application. Both these issues require well defined procedures to ensure continued compatibility between inter-dependent pieces of software.

Much software documentation, which may have seemed adequate at the time of writing, is found later to be too abbreviated to be understood by new staff (or the originator!). For smaller IS departments the loss of a key member of staff can mean a complete loss of skills required for the maintenance of essential software.

The status of staff used for software maintenance tends to be low compared to those used for new developments. In fact in many organisations they are seen as being very different characters: developers being keen to innovate in the use of software and quick to move on to the latest technology; while maintainers tend to be more thorough and methodical. Motivating developers to behave like maintainers is difficult. Recruiting maintainers requires a firm management commitment to the task of software maintenance rather than a fire-fighting approach to every problem.

A variety of reports have put the expenditure on software maintenance by IS departments at well over 50% of their annual people budget. As identified in last year's INPUT report this represents a large opportunity for professional service and software product vendors. Exhibit V-11 lists some of the key areas.

EXHIBIT V-11



Re-engineering offers the opportunity to put existing applications through an analysis and documentation cycle, which for example identifies the structure of the programs, logical inconsistencies, and potential compilation difficulties. These can form the basis for improved maintenance quality, or a partial system re-write using this analysis as a specification. The results may also form the start point for conversion to a completely new system. Reverse engineering tools usually aid the move from 3rd to fourth generation languages, or from hierarchical to relational databases. Conversion tools minimise the amount of revision required by such upgrades, but often leave the maintenance of the original software just as difficult as it ever was.

There are three categories of service opportunity in software maintenance:

- maintenance of systems software such as languages, databases, networking and operations. This is the most common service according to INPUT's research.

- maintenance of applications software seems to be largely restricted at present to applications originating from the vendor. INPUT uncovered no cases where a service vendor had taken on the maintenance of a major application which had been developed independently by the client in-house.
- formal methods for managing and implementing maintenance projects seem to have been supplied to clients on an ad-hoc basis rather than as part of a grand service strategy.

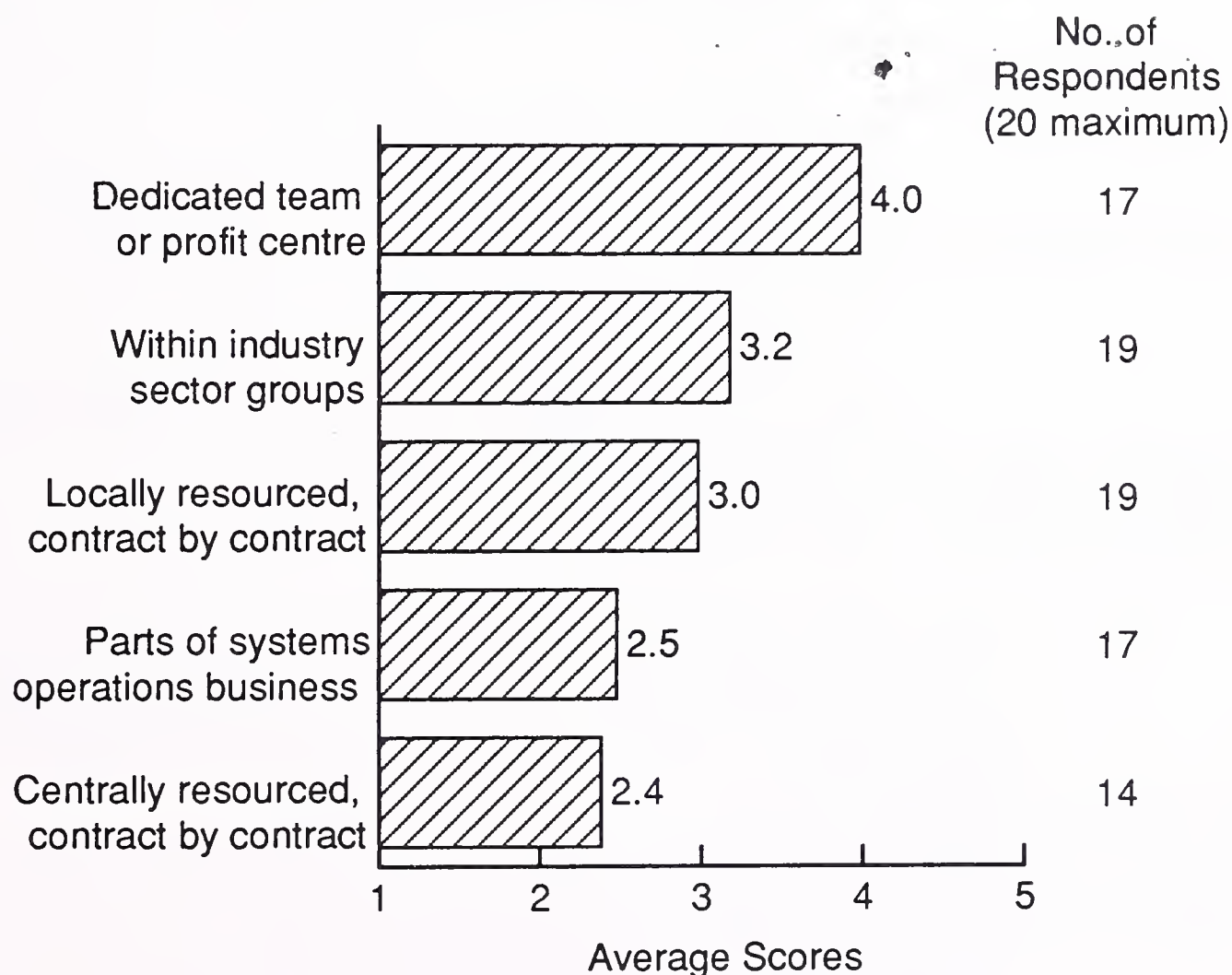
D

Vendor Approaches to Software Support and Maintenance

Software maintenance is still a very small, or non-existent part of most software and services vendor revenues in Europe. The next few pages discuss the responses of 20 vendors (to the questionnaire in Appendix B) on how they address this market sector.

EXHIBIT V-12

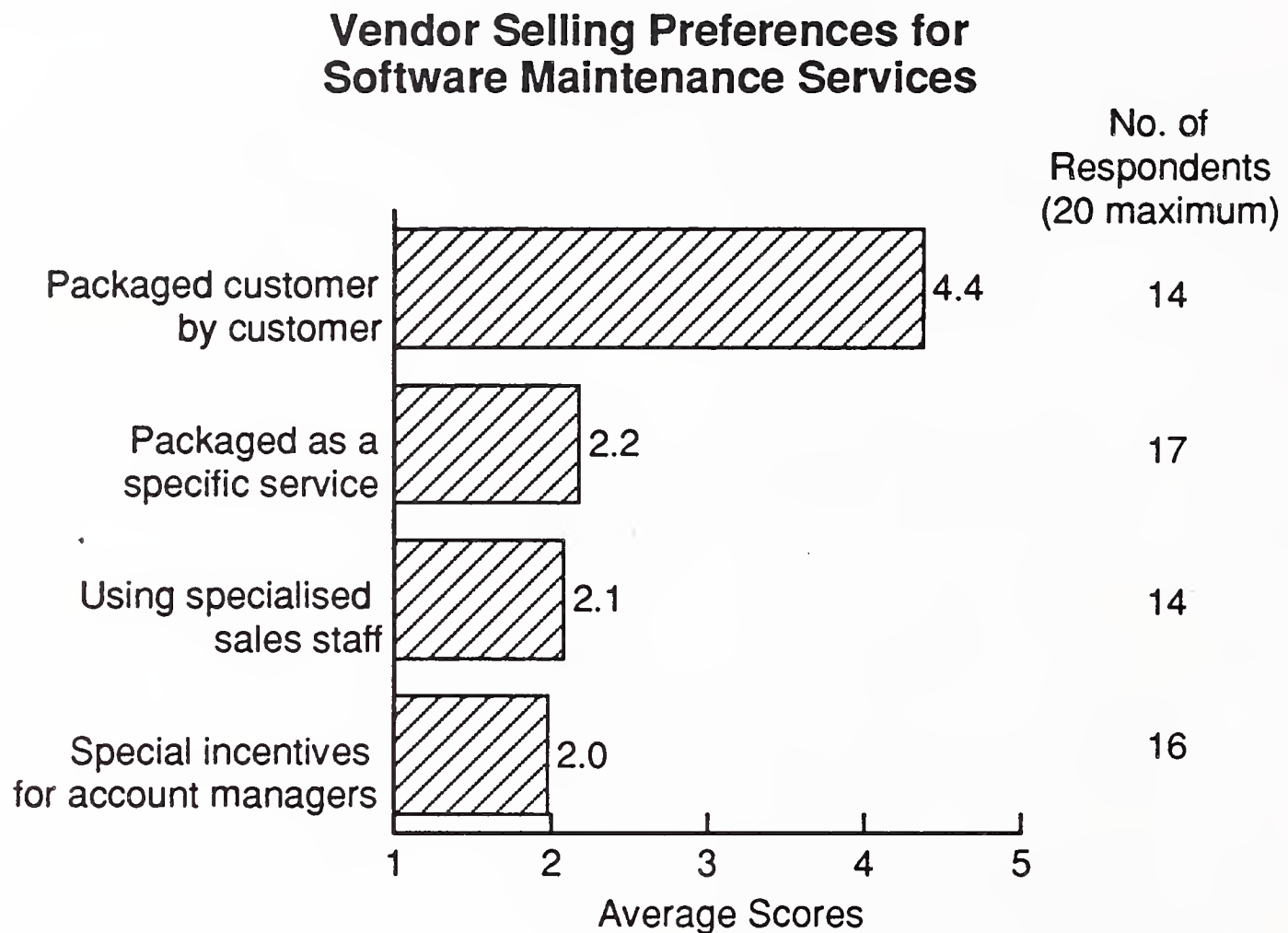
Vendor Organisation Preferences for Software Maintenance Services



Responses to the question: What is the best way to resource this business?
 Score 1 = unimportant, 5 = very important.
 Standard Error: 0.3

The majority of vendors favoured running this type of business from a dedicated profit centre. Exhibit V-12 lists their responses in priority order. The answers indicate a strong preference for profit centres organised by industry sector, with resources being arranged contract by contract and situated as close to clients as possible.

EXHIBIT V-13



Responses to the question: What is the best way to sell this service?
 Score 1 = unimportant, 5 = very important.
 Standard Error: 0.25

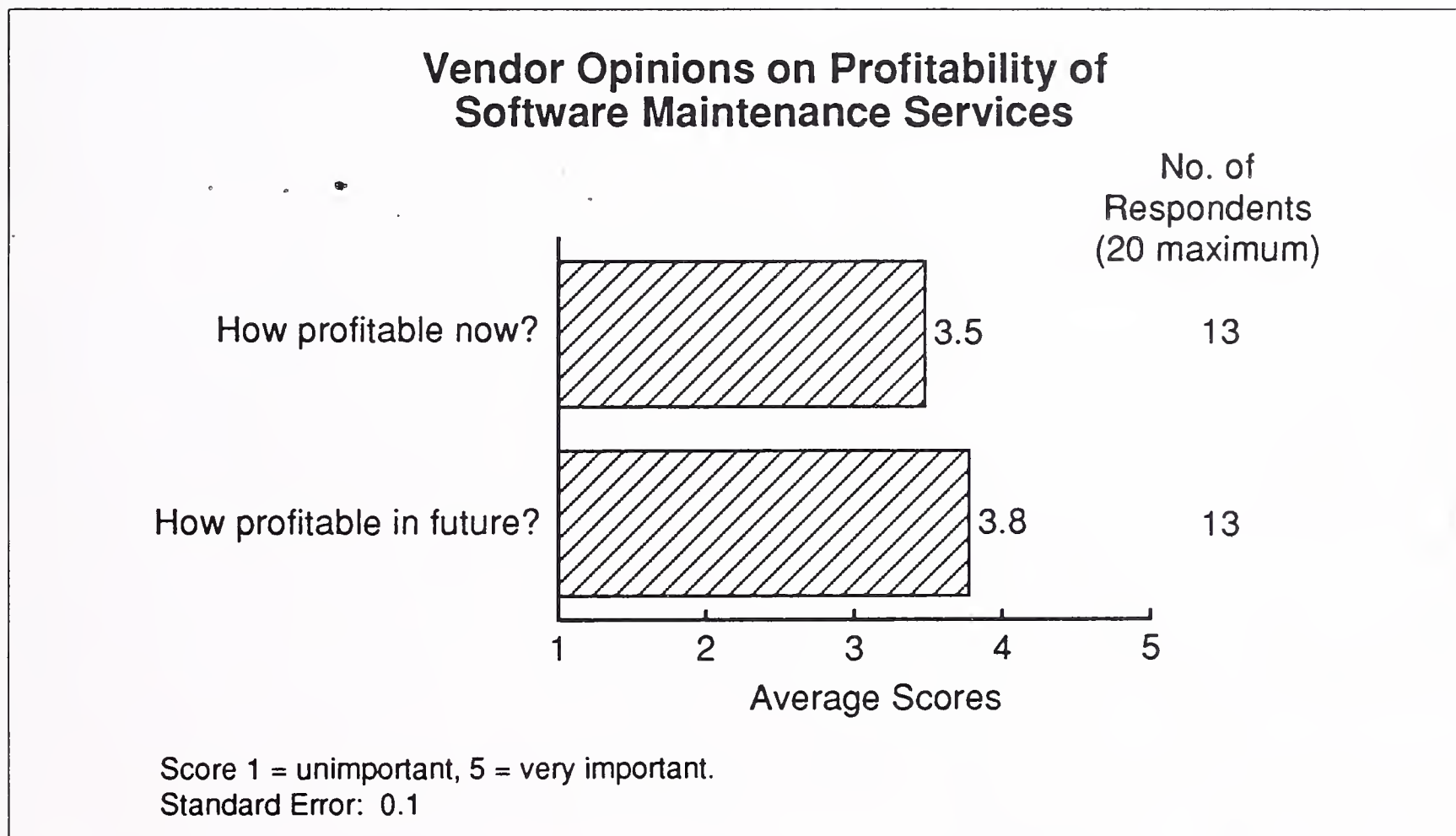
Although re-organisation of software and services businesses along industry sector lines has been a trend for several years, it does not show up as clearly as expected as the preferred method for software maintenance services.

Exhibit V-13 lists in priority order the vendor response to questions on their sales methods. The most consistent message to come out was that software maintenance services need to be custom designed for each client. Software maintenance is such a broad area that it was felt impossible to offer a range of standard services, apart from as a marketing ploy to attract attention. In reality each client would require a custom made set of services to match their unique circumstances.

Although preferring profit centres, none would dedicate their sales people to selling maintenance services only. Most at this stage offer the service as just one part of a whole range of products and services, with which to win business. It also seems that no one is using a software maintenance service to win new accounts. All respondents claim to offer it only to existing major customers. In many cases it was part of a total solution to a larger problem, for example one company offered their client this service so that the client could release staff to work on another project in which the vendor had a stake. Another was maintaining the client's old software while implementing a new replacement system for him.

When introducing software maintenance as a new service many vendors offered special incentives to staff to encourage sales and establish the business. In some cases these compensation packages reflected the full value of a contract lasting several years.

EXHIBIT V-14



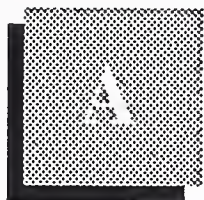
As illustrated in Exhibit V-14, many vendors felt that the service was a good contributor to profit, with several seeing this position improving further over the next few years. Most of those unable to comment on this question did not have access to the relevant information at this level of detail within their business.

Overall the European software maintenance opportunity looks relatively un-tapped. Technically this market segment is only now beginning to

have attractions as vendors develop some innovative software tools and methodologies for managing the maintenance problems, helping clients to maximise the return on their past software investments. Financially the market looks particularly attractive, with clients and vendors as willing partners in the creation of profitable business, and in-house budgets heavily biased towards support maintenance and evolution of existing systems.

Appendixes

—



Appendix: Vendor Questionnaire

Introduction

INPUT are market planning consultants, specialising in the software and services industries.

The purpose of my call is to identify the manager responsible for market planning and strategy of your software maintenance activities - areas such as systems software products, applications software products, custom applications and in-house developed applications.

Are you the right person? Who else then?

Can you spare some time to answer a few questions on the critical issues facing your business relating to the software maintenance market place?

Please confirm your name, position and address for me.

(We will be sending you a copy of the Executive summary of the report as a thank you for your contribution).

Business Mix

1. Could you indicate the size of your organisation—number of staff:

2. Total Annual Turnover in Europe:_____ Year:_____
3. Proportion from Software and Services:_____%
4. Proportion from software maintenance:_____%
5. What do you see as the most important opportunities or challenging issues facing you in the software maintenance market over the next few years? (Economic, Business, Technology, Applications, Outsourcing, etc)

6. Do you offer a service to handle your clients' software maintenance?
___Yes ___No ___Plan to

If YES or PLAN TO then:

7. What is the best way to resource this business? Score 1 to 5
8. Dedicated team/profit centre 1 2 3 4 5
9. Part of systems operations (eg FM) business 1 2 3 4 5
10. Within industry sector groups 1 2 3 4 5
11. Locally resourced contract by contract 1 2 3 4 5
12. Centrally resourced contract by contract 1 2 3 4 5
13. Other_____ 1 2 3 4 5

What is the best way to sell this service?

14. Packaged as a specific service 1 2 3 4 5
15. Packaged customer by customer 1 2 3 4 5
16. Specialised sales staff 1 2 3 4 5
17. Special incentives for account managers 1 2 3 4 5
18. Other_____ 1 2 3 4 5
19. What are your software maintenance revenues?(Currency) _____/ %pa

20. What growth rate have you experienced? _____ %pa

21. What growth rate are you planning for? _____ %pa

22. How profitable is this business today (1-5)? 1 2 3 4 5.

23. How profitable will it be in future (1-5)? 1 2 3 4 5

24. How do you address the software maintenance market?

25. Is there a fundamental benefit to the customer in dealing with you?

26. What are the major threats which might limit your success in the software maintenance market?

Internal

External

27. Where is the most profit being made out of software maintenance ? In future?

Products

Markets

28. Which industry sectors or vertical markets have been most successful for your software maintenance initiatives.

Discrete
Manufacturing

Process
Manufacturing

Retail
Distribution

Wholesale
Distribution

Transport

Utilities

Banking
& Finance

Insurance

Central
Government

Local
Government

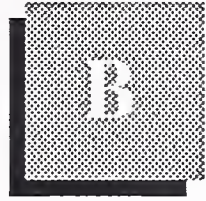
Services

Others

29. Are any other vendors particularly key to your success in the software maintenance market?

That's all I wanted to ask at this stage. Very many thanks for your time. May I call you again to clarify any point of detail? Are there any questions you'd like to put to me?

Thanks once again.



Definition of Terms

A

Overall Definitions and Analytical Framework

Information Services - Computer/telecommunications-related products and services that are oriented toward the development or use of information systems. Information services typically involve one or more of the following:

- Processing of specific applications using vendor-provided systems (called **Processing Services**)
- A combination of hardware, packaged software and associated support services which will meet a specific application processing need (called **Turnkey Systems**)
- Packaged software (called **Software Products**)
- People services that support users in developing and operating their own information systems (called **Professional Services**)
- Bundled combinations of products and services where the vendor assumes responsibility for the development of a custom solution to an information system problem (called **Systems Integration**)
- Services that provide operation and management of all or a significant part of a user's information systems functions under a long-term contract (called **Systems Operations**)
- Services associated with the delivery of information in electronic form—typically network-oriented services such as value-added networks, electronic mail and document interchange, on-line data bases, on-line news and data feeds, videotex, etc. (called **Network Services**)

In general, the market for information services does not involve providing equipment to users. The exception is where the equipment is bundled as part of an overall service offering such as a turnkey system, a systems operations contract, or a systems integration project.

The information services market also excludes pure data transport services (i.e., data or voice communications circuits). However, where information transport is associated with a network-based service (e.g., EDI or VAN services), or cannot be feasibly separated from other bundled services (e.g., some systems operations contracts), the transport costs are included as part of the services market.

The analytical framework of the **Information Services Industry** consists of the following interacting factors: overall and industry-specific business environment (trends, events and issues); technology environment; user information system requirements; size and structure of information services markets; vendors and their products, services and revenues; distribution channels, and competitive issues.

All **Information Services Market** forecasts are estimates of **User Expenditures** for information services. When questions arise about the proper place to count these expenditures, INPUT addresses them from the user's viewpoint: expenditures are categorized according to what users perceive they are buying.

By focusing on user expenditures, INPUT avoids two problems which are related to the distribution channels for various categories of services:

- Double counting, which can occur by estimating total vendor revenues when there is significant reselling within the industry (e.g., software sales to turnkey vendors for re-packaging and resale to end users)
- Missed counting, which can occur when sales to end users go through indirect channels such as mail order retailers

Market Sectors or markets, are groupings or categories of the users who purchase information services. There are three types of user markets:

- *Vertical Industry* markets, such as Banking, Transportation, Utilities, etc.
- *Functional Application* markets, such as Human Resources, Accounting, etc. These are also called "Cross-Industry" markets.
- *Generic* markets, which are neither industry- nor application-specific, such as the market for systems software.

Specific market sectors used by INPUT are defined in Section D, below.

Captive Information Services User Expenditures are expenditures for products and services provided by a vendor that is part of the same parent corporation as the user. These expenditures are not included in INPUT forecasts.

Non-captive Information Services User Expenditures are expenditures that go to vendors which have a different parent corporation than the user. It is these expenditures which constitute the information services market.

Delivery Modes are defined as specific products and services that satisfy a given user need. While *Market Sectors* specify *who* the buyer is, *Delivery Modes* specify *what* the user is buying.

Of the eight delivery modes defined by INPUT, five are considered primary products or services:

- *Processing Services*
- *Network Services*
- *Professional Services*
- *Applications Software Products*
- *Systems Software Products*

The remaining three delivery modes represent combinations of these products and services, bundled together with equipment, management and/or other services:

- *Turnkey Systems*
- *Systems Operations*
- *Systems Integration*

Section B describes the delivery modes and their structure in more detail.

Outsourcing is defined as the contracting of information systems (IS) functions to outside vendors. Outsourcing should be viewed as the opposite of *insourcing*: anything that IS management has considered feasible to do internally (e.g., data centre operations, applications development and maintenance, network management, training, etc.) is a potential candidate for outsourcing.

IS has always bought systems software, as it is infeasible for companies to develop it internally. However, all other delivery modes represent functions or products that IS management could choose to perform or develop in-house. Viewed this way, outsourcing is the result of a make-or-buy decision, and the outsourcing market covers any product or service where the vendor must compete against the client firm's own internal resources.

B**Industry Structure and Delivery Modes****1. Service Categories**

The following Exhibit B-1 presents the structure of the information services industry. Several of the delivery modes can be grouped into higher-level **Service Categories**, based on the kind of problem the user needs to solve. These categories are:

- **Business Application Solutions (BAS)** - prepackaged or standard solutions to common business applications. These applications can be either industry-specific (e.g., mortgage loan processing for a bank), cross-industry (e.g., payroll processing), or generic (e.g., utility time-sharing). In general, BAS services involve minimal customization by the vendor, and allow the user to handle a specific business application without having to develop or acquire a custom system or system resources. The following delivery modes are included under BAS:
 - Processing Services
 - Applications Software Products
 - Turnkey Systems
- **Systems Management Services (SMS)** - services which assist users in developing systems or operating/managing the information systems function. Two key elements of SMS are the customization of the service to each individual user and/or project, and the potential for the vendor to assume significant responsibility for management of at least a portion of the user's information systems function. The following delivery modes are included under SMS (research on these sectors is published in the Systems Management Programme):
 - *Systems Operations*
 - *Systems Integration*

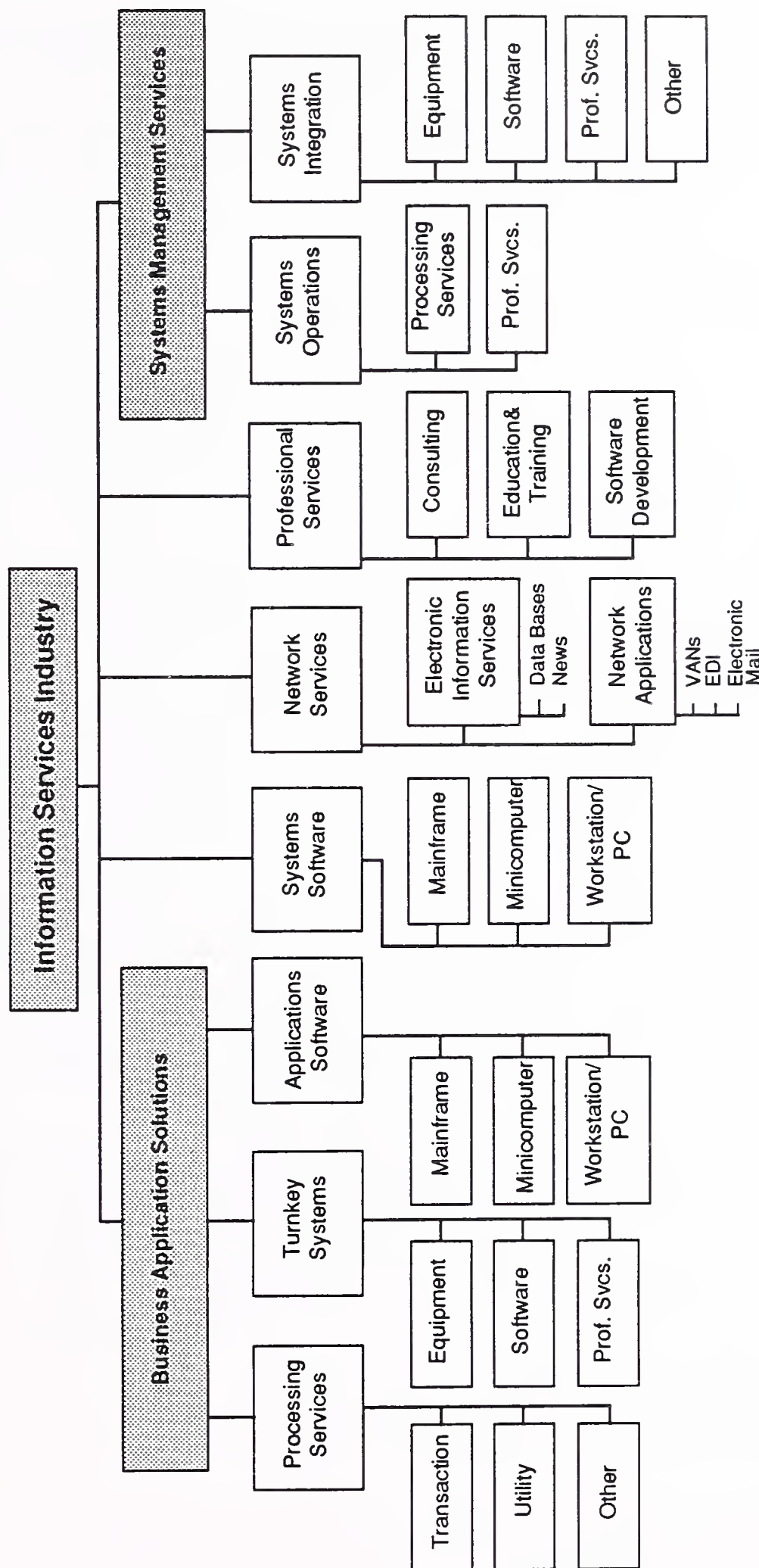
Each of the remaining three delivery modes represents a separate service category:

- *Professional Services*
- *Network Services*
- *System Software Products*

Note: These service categories were a new concept introduced in the 1990 Market Analysis Program. They are purely an aggregation of lower level delivery mode data. They do not change the underlying delivery modes or industry structure.

EXHIBIT B-1

Information Services Industry Structure—1990



Source: INPUT

2. Software Products

There are many similarities between the applications and systems software delivery modes. Both involve user purchases of software packages for in-house computer systems. Included are both lease and purchase expenditures, as well as expenditures for work performed by the vendor to implement or maintain the package at the user's sites. Vendor-provided training or support in operation and use of the package, if bundled in the software pricing, is also included here.

Expenditures for work performed by organizations other than the package vendor are counted in the category of professional services. Fees for work related to education, consulting, and/or custom modification of software products are counted as professional services, provided such fees are charged separately from the price of the software product itself.

• Systems Software Products

Systems software products enable the computer/communications system to perform basic machine-oriented or user interface functions. These products include:

- *Systems Control Products* - Software programs that function during application program execution to manage computer system resources and control the execution of the application program. These products include operating systems, emulators, network control, library control, windowing, access control, and spoolers.
- *Operations Management Tools* - Software programs used by operations personnel to manage the computer system and/or network resources and personnel more effectively. Included are performance measurement, job accounting, computer operation scheduling, disk management utilities, and capacity management.
- *Applications Development Tools* - Software programs used to prepare applications for execution by assisting in designing, programming, testing, and related functions. Included are traditional programming languages, 4GLs, data dictionaries, data base management systems, report writers, project control systems, CASE systems and other development productivity aids. Also included are system utilities (e.g., sorts) which are directly invoked by an applications program.

- **Application Software Products**

- *Industry-Specific Application Software Products* - Software products that perform functions related to solving business or organizational needs unique to a specific vertical market and sold to that market only. Examples include demand deposit accounting, MRPII, medical recordkeeping, automobile dealer parts inventory, etc.
- *Cross-Industry Application Software Products* - Software products that perform a specific function that is applicable to a wide range of industry sectors. Applications include payroll and human resource systems, accounting systems, word processing and graphics systems, spreadsheets, etc.

3. Turnkey Systems

A turnkey system is an integration of equipment (CPU, peripherals, etc.), systems software, and packaged or custom application software into a single system developed to meet a specific set of user requirements. Value added by the turnkey system vendor is primarily in the software and support services provided. Most CAD/CAM systems and many small business systems are turnkey systems. Turnkey systems utilize standard computers and do not include specialized hardware such as word processors, cash registers, process control systems, or embedded computer systems for military applications.

Hardware vendors that combine software with their own general-purpose hardware are not classified by INPUT as turnkey vendors. Their software revenues are included in the appropriate software category.

Most turnkey systems are sold through channels known as value-added resellers.

- *Value-Added Reseller (VAR)*: A VAR adds value to computer hardware and/or software and then resells it to an end user. The major value added is usually application software for a vertical or cross-industry market, but also includes many of the other components of a turnkey systems solution, such as professional services.

Turnkey systems are divided into two categories.

- *Industry-Specific Systems* - systems that serve a specific function for a given industry sector, such as automobile dealer parts inventory, medical recordkeeping, or discrete manufacturing control systems.
- *Cross-Industry Systems* - systems that provide a specific function that is applicable to a wide range of industry sectors, such as financial planning systems, payroll systems, or personnel management systems.

4. Processing Services

This category includes transaction processing, utility processing, and other processing services.

- *Transaction Processing*: - Client uses vendor-provided information systems-including hardware, software and/or data networks-at vendor site or customer site, to process transactions and update client data bases. Transactions may be entered in one of four modes:
 - *Interactive* - Characterized by the interaction of the user with the system for data entry, transaction processing, problem solving and report preparation: the user is on-line to the programs/files stored on the vendor's system.
 - *Remote Batch* - Where the user transmits batches of transaction data to the vendor's system, allowing the vendor to schedule job execution according to overall client priorities and resource requirements.
 - *Distributed Services* - Where users maintain portions of an application data base and enter or process some transaction data at their own site, while also being connected through communications networks to the vendor's central systems for processing other parts of the application.
 - *Carry-in Batch* - Where users physically deliver work to a processing services vendor.
- *Utility Processing*: Vendor provides basic software tools (language compilers, assemblers, DBMSs, graphics packages, mathematical models, scientific library routines, etc.), generic applications programs and or data bases, enabling clients to develop their own programs or process data on vendor's system.
- *Other Processing Services*: Vendor provides services-usually at vendor site-such as scanning and other data entry services, laser printing, computer output microfilm (COM), CD preparation and other data output services, backup and disaster recovery, etc.

5. Systems Operations

Systems operations involves the operation and management of all or a significant part of the user's information systems functions under a long-term contract. These services can be provided in either of two distinct submodes:

- *Professional Services*: The vendor provides personnel to operate client-supplied equipment. Prior to 1990, this was a submode of the Professional Services delivery mode.

- *Processing Services*: The vendor provides personnel, equipment and (optionally) facilities. Prior to 1990, this was a submode of the Processing Services delivery mode.

Systems operations vendors now provide a wide variety of services in support of existing information systems. The vendor can plan, control, provide, operate, maintain and manage any or all components of the user's information systems (equipment, networks, systems and/or application software), either at the client's site or the vendor's site. Systems operations can also be referred to as "resource management" or "facilities management."

There are two general levels of systems operations:

- *Platform/network operations* - where the vendor operates the computer system and/or network without taking responsibility for the applications
- *Application operations* - where the vendor takes responsibility for the complete system, including equipment, associated telecommunications networks, and applications software

Note: Systems Operations is a relatively new delivery mode introduced in the 1990 Systems Management Programme—Europe. It was created by taking the Systems Operations submode out of both Processing Services and Professional Services. No other change has been made to the delivery mode definitions, and the total forecast expenditures for these three delivery modes are identical to the total forecast expenditures of the two original modes before the breakout of Systems Operations.

6. Systems Integration (SI)

Systems Integration is a business offering that provides a complete solution to an information system, networking or automation requirement through the custom selection and implementation of a variety of information system products and services. A systems integrator is responsible for the overall management of a systems integration contract and is the single point of contact and responsibility to the buyer for the delivery of the specified system function, on schedule and at the contracted price.

To be included in the information services market, systems integration projects must involve some application processing component. In addition, the majority of cost must be associated with information systems products and/or services. The SI sector is fully analysed and reported in INPUT's Systems Management Programme.

The systems integrator will perform, or manage others who perform, most or all of the following functions:

- Program management, including subcontractor management
- Needs analysis
- Specification development
- Conceptual and detailed systems design and architecture
- System component selection, modification, integration and customization
- Custom software design and development
- Custom hardware design and development
- Systems implementation, including testing, conversion and post-implementation evaluation and tuning
- Life cycle support, including
 - System documentation and user training
 - Systems operations during development
 - Systems maintenance
- Financing

7. Professional Services

This category includes consulting, education and training, and software development.

- *Consulting*: Services include management consulting (related to information systems), information systems consulting, feasibility analysis and cost-effectiveness studies, and project management assistance. Services may be related to any aspect of information systems, including equipment, software, networks and systems operations.
- *Education and Training*: Products and services related to information systems and services for the professional and end user, including computer-aided instruction, computer-based education, and vendor instruction of user personnel in operations, design, programming, and documentation.
- *Software Development*: Services include user requirements definition, systems design, contract programming, documentation and implementation of software performed on a custom basis. Conversion and maintenance services are also included.

8. Network Services

Network services typically include a wide variety of network-based functions and operations. Their common thread is that most of these functions could not be performed without network involvement. Network services is divided into two major segments: *Electronic Information Services*, which involve selling information to the user, and *Network*

Applications, which involve providing some form of enhanced transport service in support of a user's information processing needs.

- *Electronic Information Services*

Electronic information services are data bases that provide specific information via terminal- or computer-based inquiry, including items such as stock prices, legal precedents, economic indicators, periodical literature, medical diagnosis, airline schedules, automobile valuations, etc. The terminals used may be computers themselves, such as communications servers or personal computers. Users typically inquire into and extract information from the data bases. Although users may load extracted data into their own computer systems, the electronic information vendor provides no data processing or manipulation capability and the users cannot update the vendor's data bases.

The two kinds of electronic information services are:

- *On-line Data Bases* - Structured, primarily numerical data on economic and demographic trends, financial instruments, companies, products, materials, etc.
- *News Services* - Unstructured, primarily textual information on people, companies, events, etc.

While electronic information services have traditionally been delivered via networks, there is a growing trend toward the use of CD ROM optical disks to support or supplant on-line services, and these optical disk-based systems are included in the definition of this delivery mode.

- *Network Applications*

- *Value-Added Network Services (VAN Services)* - VAN services are enhanced transport services which involve adding such functions as automatic error detection and correction, protocol conversion, and store-and-forward message switching to the provision of basic network circuits.

While VAN services were originally provided only by specialized VAN carriers (Tymnet, Telenet, etc.), today these services are also offered by traditional common carriers (AT&T, Sprint, etc.). Meanwhile, the VAN carriers have also branched into the traditional common carriers' markets and are offering unenhanced basic network circuits as well.

INPUT's market definition covers VAN services only, but includes the VAN revenues of all types of carriers.

- *Electronic Data Interchange (EDI)* - Application-to-application exchange of standardized business documents between trade partners or facilitators. This exchange is commonly performed using VAN services. Specialized translation software is typically employed to convert data from organizations' internal file formats to EDI interchange standards; this software may be provided as part of the VAN service, or may be resident on the organization's own computers.
- *Electronic Information Exchange (EIE)* - Also known as Electronic Mail (E-Mail), EIE involves the transmission of messages across an electronic network managed by a services vendor, including facsimile transmission (FAX), voice mail, voice messaging, and access to Telex, TWX, and other messaging services. This also includes bulletin board services.
- *Other Network Services* - This segment contains videotex and pure network management services. Videotex is actually more a delivery mode than an application. Its prime focus is on the individual as a consumer or in business. These services provide interactive access to data bases and offer the inquirer the capability to send as well as receive information for such purposes as home shopping, home banking, travel reservations, and more.

Network management services included here must involve the vendor's network and network management systems as well as people. People-only services, or services that involve the management of networks as part of the broader task of managing a user's information processing functions are included in Systems Operations.

Network Services research is fully reported in INPUT's Network Services Programme.

C

Vendor Revenue and User Expenditure Conversion

The size of the information services market may be viewed from two perspectives: vendor (producer) revenues, and user expenditures. While the primary data for INPUT's research is vendor interviews, INPUT defines and forecasts the information services market in terms of end-user expenditures. End-user expenditures reflect the markup in producer sales when a product such as software is delivered through indirect distribution channels, such as original equipment manufacturers (OEMs), retailers and distributors. The focus on end-user expenditure also eliminates the double counting of revenues which would occur if sales were tabulated for both producer (e.g., Lotus) and distributor (e.g., BusinessLand).

For most delivery modes, vendor revenues and user expenditures are fairly close. However, there are some significant areas of difference. Many microcomputer software products, for example, are marketed

through indirect distribution channels. To capture the valued added through these indirect distribution channels, adjustment factors which incorporate industry discount ratios are used to convert estimated information services vendor revenues to end-user expenditures.

For some delivery modes, including software products, systems integration and turnkey systems, there is a significant volume of intra-industry sales. For example, systems integrators purchase software and subcontract the services of other professional services vendors. Turnkey vendors incorporate purchased software into the systems which they sell to end users.

D

Sector Definitions and Delivery Mode Reporting

1. Industry Sector Definitions (Vertical Markets)

INPUT has structured the information services market into 16 generic industry sectors, such as process manufacturing, insurance, transportation, etc. The definitions of these sectors are based on the 1987 revision of the Standard Industrial Classification (SIC) Code system. The specific industries (and their SIC Codes) included under these generic industry sectors are detailed in the following table.

Sector:	Discrete Manufacturing
SIC Code	Market sub-sector description
23XX	Apparel and other finished products
25XX	Furniture and fixtures
27XX	Printing, publishing and allied industries
31XX	Leather goods
34XX	Fabricated metal products except machines
35XX	Industrial and commercial machines and computer
36XX	Electronic and electrical equipment except computer
37XX	Transportation equipment
38XX	Instruments; photo/med/opt goods; watches/clocks
39XX	Miscellaneous
Sector:	Process Manufacturing
10XX	Metal mining
12XX	Coal mining
13XX	Oil and gas extraction
14XX	Mining non-metallic minerals
20XX	Food products
21XX	Tobacco products
22XX	Textile mill products
24XX	Lumber and wood products except furniture
26XX	Paper and allied products
28XX	Chemicals and allied products
29XX	Petroleum refined and related industries

30XX	Rubber and miscellaneous plastic products
32XX	Stone, clay, glass and concrete products
33XX	Primary metal industries
Sector:	Distribution
50XX	Wholesale trade - durable goods
51XX	Wholesale trade - nondurable goods
52XX	Retail - building materials
53XX	Retail - general merchandise stores
54XX	Retail - food stores
55XX	Retail - automotive dealers, gas stations
56XX	Retail - apparel and accessory stores
57XX	Retail - home furniture, furnishings and accessories
58XX	Retail - eating and drinking places
59XX	Retail - Miscellaneous
Sector:	Banking and Finance
SIC Code	Market Sub-Sector Description
60XX	Depository institutions
61XX	Nondepository institutions
62XX	Security and commodity brokers, dealers and exchanges
67XX	Holding and other investment offices
Sector:	Insurance
63XX	Insurance carriers
64XX	Insurance agents, brokers and services
SIC Code	Other Sectors
	Miscellaneous Industries
01XX	Agricultural production - crops
02XX	Agricultural production - livestock
07XX	Agricultural services
08XX	Forestry
09XX	Fishing, hunting and trapping
15XX	Building construction - general contractors
16XX	Heavy construction - contractors
17XX	Construction - special trade contractors
	Transportation Services
40XX	Rail transport
41XX	Public transit/transport
42XX	Motor freight transport/warehousing
43XX	Postal services
44XX	Water transportation
45XX	Air transportation except airline reservation
46XX	Pipelines except natural gas
47XX	Transportation services except travel agents

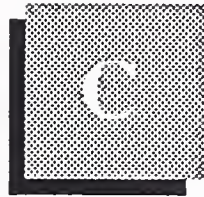
	Utilities
49XX	Electric, gas and sanitary services
48XX	Telecommunications
80XX	Health services
82XX	Educational services
	Business and Technical Services
65XX	Real estate
73XX	Business services
81XX	Legal services
87XX	Engineering, accounting, research, management services
89XX	Miscellaneous services
9XXX	Government
	Personal/Consumer Services
4512X	Airline reservation services
472X	Travel agents
70XX	Hotels, rooming houses, camps and lodgings
72XX	Personal services
7389X	Hotel reservation services
75XX	Automotive repair services and parking
76XX	Miscellaneous repair services
78XX	Motion pictures
79XX	Amusement and recreation services
83XX	Social services
84XX	Museums, art galleries and botanical gardens
86XX	Membership organisations
88XX	Private households

2. Cross-Industry Sector Definitions (Horizontal Markets)

In addition to these vertical industry sectors, INPUT has also identified seven cross-industry or horizontal market sectors. These sectors or markets involve multi-industry applications such as human resource systems, accounting systems, etc. In order to be included in an industry sector, the service or product delivered must be specific to that sector only. If a service or product is used in more than one industry sector, it is counted as cross-industry. The seven cross-industry markets are:

- *Human Resource Systems*
- *Education and Training*
- *Office Systems*
- *Accounting Systems*
- *Engineering and Scientific Applications*

- *Planning and Analysis Systems*
- *Other Applications (including telemarketing, sales management and electronic publishing)*



Appendix: Economic Assumptions

There follow some notes on the methodology INPUT use in making forecasts and judging of how reasonable they are.

INPUT reports are based principally on three strands of research activity conducted throughout the year:

- A vendor research programme with more than 300 interviews with prominent software and services vendors across Europe. This research assesses their attributable revenues in each country by delivery made and, where possible by industry sector. INPUT consultants use their own judgement in many cases to categorise revenues into sub-sectors. In particular INPUT excludes revenues considered captive, such as those from a vendor's parent company.
- Several hundred vendor and user interviews across all European market sectors to determine trends and opinions. These interviews are part of the research that INPUT carries out in specific sectors of the software and services market. In 1990 for example INPUT produced reports on over 20 different software and services market sectors.
- Additionally INPUT maintains an extensive library and data-base of information relating to the software and services industry. This covers for example INPUT's customer services programme data: results of INPUT's research into the hardware maintenance market which includes its diversification into the software and services market.

All the forecasts from these activities are produced in local currency for each country, then consolidated with common economic and exchange rate data to produce a top level forecast. This is done for software and services in each country and in Europe as a whole. At each stage it is examined for reasonableness and consistency and if necessary revisited. For example we satisfactorily tested the question: Will predicted user budgets for information systems support the predicted high growth rates in software and services?

The forecasts also benefit from assignments for and feedback from INPUT clients, who include over 100 of the leading vendors of software and services around the world. For example: INPUT supplied an economic model to a market leading client on the potential effect of rising oil prices on forecast software and services growth rates. In summary this showed that falling real growth was largely counterbalanced by increases in inflation, resulting in continued high dollar growth forecasts for the market.

In order to consolidate INPUT's forecasts and vendor data into a consistent set of European analyses each year, it is essential to use a standard set of economic factors. The following pages show the inflation and exchange rates currently in use.

A

European Exchange Rates

The following table, Exhibit C-1, shows the standard exchange rates used throughout the 1991 programme to consolidate country market data for overall Western European forecasts and vendor market shares.

Exhibit C-2 shows the standard exchange rates used throughout the 1990 programme to consolidate country market data for overall Western European forecasts and vendor market shares.

EXHIBIT C-1

U.S. Dollar and ECU Exchange Rates, 1991

Country	Currency	U.S. Dollar Exchange Rate	ECU Exchange Rate
France	FF	5.65	7.74
Germany	DM	1.68	2.30
United Kingdom	£	0.515	0.704
Italy	Lira	1,233.0	1,689.0
Sweden	Sek	5.61	7.69
Denmark	DK	6.39	8.75
Norway	NK	6.49	8.89
Finland	FM	3.96	5.43
Netherlands	Dfl	1.69	2.32
Belgium	BF	34.60	47.40
Switzerland	SF	1.27	1.74
Austria	Sch	11.80	16.17
Spain	Ptas	95.0	130.12
Rest of Europe	\$	1	1.37

Source: Barclays Bank (Q4 1990)

EXHIBIT C-2

U.S. Dollar and ECU Exchange Rates, 1990

Country	Currency	U.S. Dollar Exchange Rate	ECU Exchange Rate
France	FF	6.17	6.87
Germany	DM	1.81	2.05
United Kingdom	£	0.631	0.74
Italy	Lira	1,336	1,502
Sweden	Sek	6.39	7.41
Denmark	DK	7.05	7.8
Norway	NK	6.85	7.94
Finland	FM	4.21	4.84
Netherlands	Dfl	2.05	2.3
Belgium	BF	38.06	42.29
Switzerland	SF	1.61	1.8
Austria	Sch	12.77	14.39
Spain	Ptas	115.8	129.7
Rest of Europe	\$	1	1.20

Source: Barclays Bank (Q4 1990)

B**European Inflation Rates**

Exhibit C-3 shows the average five-year inflation assumptions for each reported country and the changes from those used in reports produced in the previous year. All INPUT forecasts include the effects of inflation as well as natural market growth rates. For consistency, the same inflation rates are used throughout all the different market sector research and analysis during a calendar year.

Exhibit C-4 shows the inflation assumptions for both the 1989 and 1990 programmes.

EXHIBIT C-3

Inflation Assumptions 1990 and 1991

Country	Assumption 1990-1995	Assumption 1991-1996	Change
France	4.5	3.0	-1.5
Germany	4	2.7	-1.3
United Kingdom	7	4.8	-2.2
Italy	7	4.4	-2.6
Sweden	7	6.3	-0.7
Denmark	5	2.7	-2.3
Norway	5	4.9	-0.1
Finland	6	5.0	-1.0
Netherlands	3	2.4	-0.6
Belgium	4	3.3	-0.7
Switzerland	5	3.3	-1.7
Austria	4	2.6	-1.3
Spain	6.5	4.7	-1.8
Rest of Europe	10	7.7	-2.5
European Average	5.5	+1.0	

Sources: OECD 1991 Forecast
IMF (average rates for fourth quarter 1989)

EXHIBIT C-4

Inflation Assumptions 1989 and 1990

Country	Assumption 1989-1994	Assumption 1990-1995	Change
France	4	4.5	+0.5
Germany	2.5	4	+1.5
United Kingdom	5.5	7	+1.5
Italy	6	7	+1.0
Sweden	6	7	+1.0
Denmark	6	5	-1.0
Norway	4	5	+1.0
Finland	6	6	0.0
Netherlands	2	3	+1.0
Belgium	3.5	4	+0.5
Switzerland	2.5	5	+2.5
Austria	3	4	+1.0
Spain	5.5	6.5	+1.0
Rest of Europe	8	10	+2.0
European Average	4.5	5.5	+1.0

Source: IMF (average rates for fourth quarter 1989)

