APPLICATIONS SOLUTIONS OPPORTUNITIES

WESTERN EUROPE

1990 - 1995

INPUT

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APRIL 1991

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Market Analysis Programme in Europe

Applications Solutions Opportunities—Western Europe, 1990-1995

MEAOE • 519 • 1990

Abstract

This report provides an analysis of the opportunities for software and services firms in the Western European market for application solutions. Specifically this report addresses two delivery modes for application solutions:

- Application Software Products
- Turnkey Systems

The market for application solutions provided via the processing services delivery mode is discussed in a separate INPUT report—*Processing Services Markets—Western Europe 1990-1995*. INPUT defines Turnkey Systems as those application solutions which comprise the equipment as well as system software, standard application software and the necessary professional services required for implementing the system.

The report provides market estimates for 1990 and forecasts to 1995 for each of these delivery modes for Western Europe and for the major European country economies. Leading applications solution vendors are identified for each of these countries. The report discusses the key competitive and environmental forces in the European market of the 1990s and the implications of these for vendors.

Table of Contents

Table of Contents (Continued)

Exhibits

Exhibits (Continued)

Exhibits (Continued)

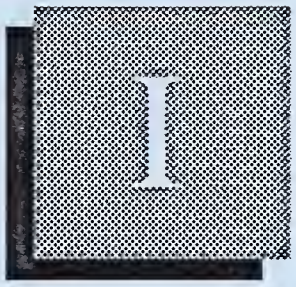
Exhibits (Continued)

C

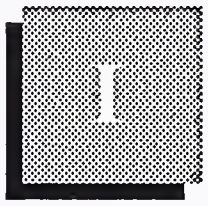
Exhibits (Continued)

D

Exhibits (Continued)



Introduction



Introduction

A

Objectives

This report has been produced as part of INPUT's Western European Market Analysis Programme for the computer software and services industry. The report analyses the markets for two delivery modes for applications solutions:

- Applications Software Products
- Turnkey Systems

The primary objectives of this report are to:

- Describe the overall size of the market and its growth potential to 1995.
- Analyse the major forces shaping the applications solutions market and the resulting implications for vendors.
- Identify the current competitive structure of the market.

B

Scope

The two service delivery modes covered in this report are classified as business applications solutions as is shown in Exhibit I-1, which shows INPUT's overall structuring of the software and services industry. Processing Services, also classified as a business application solution, is covered by a separate report *Processing Services Markets —Western Europe 1990-1995*.

INPUT defines application software products as those products that perform a specific function directly related to solving a business or organisational need. These may be specific to a particular industry or provided to organisations in many different sectors. Software applications products are thus referred to respectively as industry-specific or cross-industry applications software products.

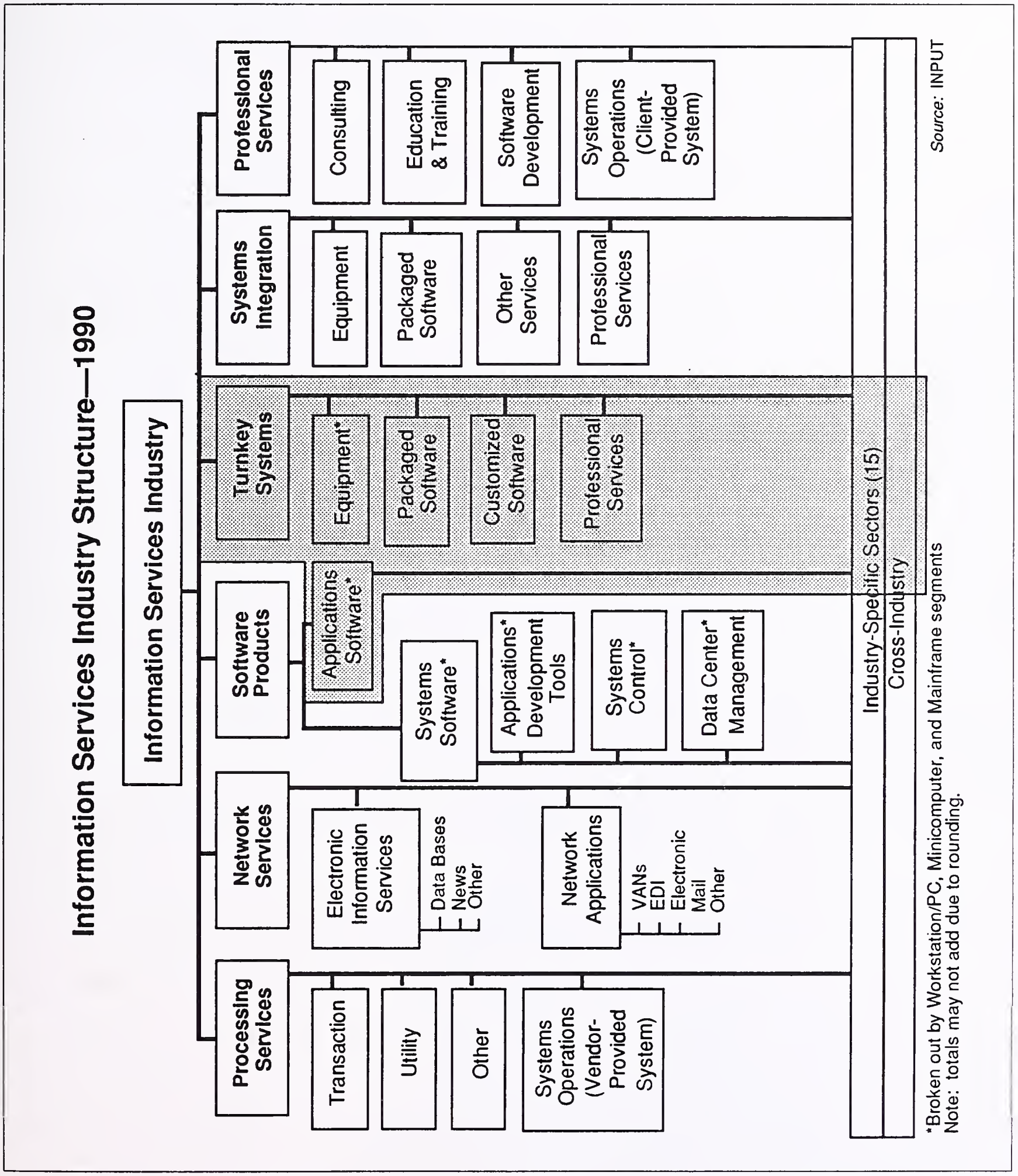
The turnkey systems delivery mode fundamentally comprises four principal elements combined by the vendor and provided to the user as a complete packaged application solution, these are:

- Information systems equipment
- Systems software products
- Standard applications software products (plus maintenance and support)
- Professional services (elements of customisation of applications software, training, consultancy).

The essential nature of applications software products and turnkey systems is that they provide standard packaged information solutions that require minimal customisation.

The geographic scope of this report is all Western European countries. Market size and forecast data is provided for each individual country with the exception of Greece, Portugal and the Republic of Ireland which are treated as a group for the purpose of analysis. Germany is now considered to cover the two geographic areas previously described as West Germany and East Germany.

EXHIBIT I-1



C

Methodology

The research that contributed to this study was derived from the following sources:

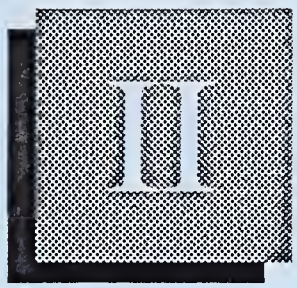
- INPUT's ongoing research of the Western European software and services market which includes the collection of revenue and product information from over 300 vendors annually.
- Interviews with over 20 senior managers of independent software application product companies.
- Interviews with representatives of 10 users of application products.
- The use of INPUT's extensive library facilities which include vendor literature and press releases as well as trade press, newspaper and magazine articles and previous INPUT reports relevant to the applications solutions market sector.

D

Report Structure

The remaining chapters of this report are organised as follows:

- Chapter II contains an executive overview of the key points within the report. It is designed for the reader who wishes to quickly identify the salient messages in the report without having to read the report in its entirety.
- Chapter III provides a market analysis and forecast for the applications software products and turnkey systems markets for the period 1990-1995.
- Chapter IV provides the detailed market forecast and competitive data for each country market.
- Chapter V discusses the specific areas of opportunity for application solution products, both industry-specific and cross-industry applications.
- The appendixes include definitions of terms, the detailed forecast database and a reconciliation between this year's and last year's market forecast as well as the exchange rates and inflation assumptions used.



Executive Overview

II

Executive Overview

A

Integrated Pan-European Application Products—The Vendor Challenge

Users are increasingly demanding that application software products are capable of being integrated together and supported by a pan-European support organisation. Vendors are responding to this challenge by strengthening their competitive position by means of acquisitions and partnering activities. Faced with the increasing costs and risks of developing customised applications, users are buying more standard applications solutions in a market expected to exceed $40 billion annually by 1995.

The applications solutions market analysed in this report is defined by INPUT as comprising two major sectors, application software products and turnkey systems. Turnkey systems are defined as complete systems that combine the equipment platform and the applications software products together with any necessary professional services for customisation and installation support. The forecast for these two delivery modes in Western Europe is shown in Exhibit II-1.

Users are being driven away from customised applications development and towards the use of standard packaged solutions for the following key reasons:

- Risk reduction. Developing a customised application incurs risks in respect of the overall cost and time required. Using an existing, preferably tried and tested, product reduces the risk of overruns.

- The cost of a standard application solution will be lower than that of developing a completely new system.

- Implementation of a standard application can considerably reduce the elapsed time-scale required to achieve an operational system.

- The increased availability of standard package solutions appropriate to a client's needs encourages their use. Historically many users had no choice but to develop their own systems; increasingly that choice is available. It is further enhanced by the greater levels of integration available between application packages.

EXHIBIT II-1

Applications Solutions
Western Europe

Sector	User Expenditures ($ Billions)		
	1990	1990-1995 CAGR (Percent)	1995
Application Software Products	6.9	23	19.4
Turnkey Systems	9.7	18	22.7

B

Applications Software Products

Exhibit II-2 shows the analysis of the applications software products market by equipment platform type. It is clear from this analysis that a much greater opportunity exists for smaller systems, both in respect of relative size and relative growth rates. This forecast is clearly based on an expectation of continued downsizing by users, namely the utilisation of smaller systems, AS/400s instead of 3090s for example, and a continued trend towards distributed processing systems. The increasing costs and shortages of skilled programmers and the increasing need for speedier applications implementation reinforce the rationale for selecting application software products in preference to adopting the luxury of custom written systems. The lower cost profile of smaller systems emphasises this trend.

A number of other factors are of significance in supporting the different growth expectations for different types of equipment platform. These include:

- Strong growth in manufacturing applications software products based on minicomputer systems.

- The continued drive towards open systems standards creating a more stable environment for application software product development on minicomputer and workstation/PC platforms.

- Increasing use of graphical end-user interfaces that widen the market potential for application software products on powerful low cost systems.

Overall the emphasis on downsizing to smaller systems is a direct reflection of the price/performance discontinuities between the three major classes of equipment platform. Increasing populations of computer systems in any one category offer application software product developers a more and more attractive target market. As the potential user population increases so can development costs be spread more widely, thus allowing a product price to be balanced profitably on the demand/supply curve.

A factor of particular relevance in Europe is the increasing use of kernel software, or re-usable software modules that allow vendors to prepare different versions of applications for different markets. These modules can be produced for different country environments or different industry sectors. This type of approach significantly reduces the investment needed to offer applications software products within the diverse national environments of Europe.

EXHIBIT II-2

Equipment Platform Analysis
Applications Software Products
Western Europe

	User Expenditures ($ Billions)		
Subsector	1990	1990-1995 CAGR (Percent)	1995
Mainframe	1.0	9	1.5
Minicomputer	2.3	19	5.6
Workstation/PC	3.7	27	12.4

Within Western Europe the largest individual country market is France, which accounts for approximately one quarter of the entire market. The U.K. is the second-largest market representing about one-fifth of the total. Germany has a relatively low market share (17%) in comparison to the size of its economy; this can largely be attributed to the German preference for the turnkey system delivery mode for an application solution. Over the next five years high growth is expected for applications software products in both the Italian and Spanish markets.

C

Application Product Vendors

The fragmented nature of the European environment for application software products has hampered the development of indigenous vendors at the expense of U.S.-based competitors. This can clearly be seen in the list of leading application software product vendors shown in Exhibit II-3 where four of the five are well known "brand name" U.S.-based companies with only the German vendor SAP representing a European-based company.

Essentially the application software product vendors can be analysed into three distinct groups:

- Equipment vendors.
- Pan-European independent vendors.
- Small independent vendors.

The equipment market is one area generally assessed as being pan-European in nature. Consequently the equipment vendors operate on a pan-European basis and this influences their applications software product activities. Nearly all the equipment vendors have some involvement in the applications product market—an increasing requirement, as the emphasis switches from the technical features of an equipment platform to the application needs of the user.

Although many equipment vendors also utilise the turnkey systems delivery mode, applications software products represent a significant opportunity and requirement for them. IBM, the largest applications software products vendor in Europe has a range of offerings developed both internally and through third-party arrangements. IBM's sheer market size and presence ensures its commanding position in the market overall. In comparison Digital is not well represented in this market sector, relying generally on third-party independent vendors to meet its clients' application product needs, notably in the manufacturing sector.

The pan-European independent vendors are, as has already been pointed out, largely U.S. owned. Leading examples within this category are Lotus, which has a dominating position in the spreadsheet market and Computer Associates (CA), which is the largest independent vendor in the world for both applications and systems software products. SAP is the only example of a European based company in the leading group. SAP has grown rapidly in the area of IBM platform applications for the manufacturing sector and has benefited from its relationships with Andersen Consulting and CAP Gemini Sogeti. SAP is now operating on a wider basis in Europe, whereas hitherto its activities have been fundamentally focussed on the German market.

The small independent vendor group covers, in general, the European owned companies that have found it difficult or undesirable to move outside their own home national market. Given a general concentration on specific applications where national differences within Europe are a major obstacle to market development, these vendors have been content to continue to serve their chosen areas of expertise. Different language requirements, local laws and practices have all conspired to make the task of operating on a pan-European basis extremely difficult. Sligos and Concept in addition to SAP, have a desire to operate on a pan-European basis. Sligos, for example, acquired Actis to gain access to the German market, and Concept has rapidly developed a European multinational network. However, Concept has recently become considerably overextended financially in its attempts to do this.

EXHIBIT II-3

Leading Vendors Western European Applications Products

- IBM
- Lotus
- SAP
- Computer Associates
- Microsoft

D

Turnkey Systems

Exhibit II-4 shows the market analysis and forecast for the Western European turnkey systems sector. It is anticipated that improving cost/performance of equipment platforms will depress the equipment proportion of turnkey systems overall. The increasing power of workstations/PCs in particular will have the effect of driving this sector of the market at the highest rate. This is clearly shown in Exhibit II-5 which shows the equipment platform analysis. In contrast the mainframe market is not of great importance in the turnkey sector and will grow at the slowest rate of all equipment sectors as a result of the downsizing of equipment platforms driven by improving cost/performance of computer systems.

To date, equipment manufacturers have not controlled the PC channel as directly as that for minicomputer systems for reasons of scale and sales potential. Workstations/PCs represent an attractive vehicle for many independent application solution vendors to exploit the opportunity for turnkey systems for those clients wanting complete packaged solutions. This represents a potential challenge for the original equipment vendor in terms of optimising market share.

Another important influence on the turnkey systems market is the impact of UNIX. Polarisation of the minicomputer market around the de facto standards of IBM AS/400, Digital VMS and UNIX has made the latter a must for virtually all equipment vendors. The user appeal of UNIX is being increased by the introduction of more advanced facilities and the acceptance of open systems concepts. Increasing availability of UNIX-based applications supports this trend.

The customisation element of turnkey systems is being driven by the need for delivering specific client benefits, albeit based upon a standard applications product. Strong demand is also expected for additional professional services like consultancy and education and training, vital to secure successful implementation of the system in the user environment.

The largest single country market within Europe is Germany (30% of the total) followed by the United Kingdom (22% of the total). The appeal of the turnkey systems delivery mode varies between different European countries; notably Italian users have preferred custom solutions. These attitudes are likely to change as the cost penalty for an entirely custom built system increases. Customised adaptation of a standard applications product represents an attractive alternative.

EXHIBIT II-4

Turnkey Systems
Western Europe

	User Expenditures ($ Billions)		
Subsector	1990	1990-1995 CAGR (Percent)	1995
Equipment	5.1	14	10.0
Software Products	3.1	22	8.4
Professional Services	1.5	23	4.3

EXHIBIT II-5

Equipment Platform Analysis
Turnkey Systems

	User Expenditures ($ Billions)		
Subsector	1990	1990-1995 CAGR (Percent)	1995
Mainframe	0.4	11	0.7
Minicomputer	5.5	18	12.8
Workstation/PC	3.8	20	9.3

E

Turnkey Systems Vendors

Exhibit II-6 lists the leading turnkey systems vendors in Western Europe. As is apparent from this list equipment vendors figure strongly in this market, particularly those marketing CAD/CAM systems, for example Prime, McDonnell Douglas and Intergraph. IBM also has a significant position in this market, being ranked behind Intergraph in Western Europe. Nixdorf's position as the market leader has been consolidated by its absorption into SNI (Siemens Nixdorf International) during 1990.

The other major competitive group in this market is that of independent vendors, mostly smaller companies that do not gain representation amongst the leaders. The independent vendors considered as a group represent just under half of the total market but are experiencing, on average, higher growth than the equipment vendors (20% vs 17% per annum).

EXHIBIT II-6

Leading Vendors Western European Turnkey Systems

- Nixdorf
- Prime
- Mannesmann Kienzle
- McDonnell Douglas
- Intergraph

F

Industry-Specific Opportunities

INPUT classifies the applications solutions product market into two broad opportunity areas, that of industry-specific applications, and that of cross-industry applications. Cross-industry applications are addressed in Section G below.

The overall market forecast for industry-specific applications is shown in Exhibit II-7. Industry-specific applications are those that relate to the business of a particular industry or sector, for example Banking and Finance or Manufacturing. The cost penalty of developing unique custom built systems continues to increase. Key opportunity areas within the industry-specific sector include:

- Banking and Finance.
- Insurance.
- Distribution.
- Manufacturing.

Some important application areas within Banking and Finance are back-office systems and artificial intelligence applications for securities firms, complete banking systems for small to medium-sized banks and customer terminal applications.

Two key turnkey system markets are branch office systems for retail banks and EI (Electronic Information) systems for securities traders. Nixdorf the leading European turnkey systems vendor is the most important vendor in the banking and finance sector.

Many types of application software products are available to the insurance industry, for example, systems that handle policies, claims administration, billing, actuarial and investment analysis etc. The insurance industry has been relatively slow to use standard packages in comparison with other industries, but the more competitive environment that exists in the build-up to the single European market is focussing on the need for more client oriented services. This is creating new opportunity areas, for example integrated front office solutions.

The movement towards a single European market is also affecting the distribution sector and driving the need to put in place state-of-the-art systems in order to be able to compete effectively in a more open market. New technology is also a potent factor leading to the need for applications solutions in such areas as warehouse automation, vehicle scheduling and merchandising support. One of the largest untapped opportunities in the distribution sector lies in offering small shopkeepers and supply chain middle-men easy-to-use software products for managing their business.

In the past there has been a tendency for applications to be adapted to the organisation, rather than the other way about. Since many new applications—like DRP (Distribution Resource Planning)—reflect more up-to-date business practices, users can see the sense in changing the "way things are done here" to get full benefit from their IS investment.

The two principal application areas in the discrete manufacturing sector are production management and CAD/CAM. Shopfloor data collection and control and production engineering are however, increasing in importance. Within this sector growth is much higher for workstation/PC and minicomputer based products than it is for mainframes. One particular sector showing strong growth is that for AS/400 based production management systems, a clear manifestation of downsizing. There is also considerable demand for minicomputer based production management systems. In the turnkey systems sector considerable emphasis is being placed on shopfloor data collection and control (SFDCC) an increasingly integral part of MRPII systems.

For the process manufacturing sector important application areas are again production management, shop floor control and data acquisition (SCADA), quality and maintenance management systems. The latter applications area is well penetrated; key growth opportunities are considered to lie in SCADA systems and for process operations management systems (POMS). IBM, for example, launched a POMS systems in 1990.

EXHIBIT II-7

Industry-Specific Product Opportunities
Western Europe

Sector	User Expenditures ($ Billions)		
	1990	1990-1995 CAGR (Percent)	1995
Application Software Products	4.8	23	13.4
Turnkey Systems	6.7	18	15.3

G

Cross-Industry Opportunities

Cross-industry application products, for which the market forecast is shown in Exhibit II-8, are defined as software products that perform specific functions applicable across a wide range of industry sectors. Of particular importance are the areas of accounting, human resources and planning and analysis. Growth in this sector will possibly be impacted by the relatively high saturation level within the mainframe sector and the impact of downsizing on application product pricing.

The most significant trend in the accounting area has been the trend away from batch processing towards on-line transaction-based software products. Users now want computerised accounting systems that can be used as a tool for managing their business. The systems must satisfy their needs for both management accounting and management reporting. This development has led to increasing demand for fully integrated systems provided by a single vendor. Another factor of particular importance in Europe is the need for common systems to be available for use across all divisions and subsidiaries within the European market place.

Within the human resources area, the payroll sector is relatively saturated, but opportunities are developing for related applications like manpower planning and forecasting.

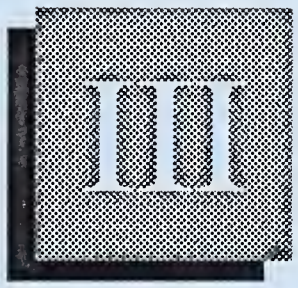
Planning and analysis applications are primarily provided through the applications product delivery mode. Two of the most important types of applications are spreadsheets on PC based systems and the developing opportunity for executive information systems (EIS). Spreadsheets are now rapidly being spread to both minicomputer and mainframe systems. For example Lotus, the dominant market leader with an estimated 70% worldwide market share, has recently introduced versions of 1-2-3 for both mini and mainframe computers.

Executive information systems (EIS) have had a relatively short life, first taking shape around the mid 1980s. INPUT anticipates EIS evolving from an application to a specialised development tool kit and beyond that to a generalised development tool kit. EIS technology may not replace the common user interface for data input and collection, but it will impact the reporting and presentation of operational systems and applications analysis.

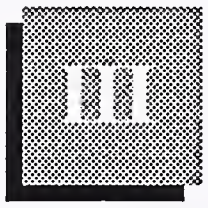
EXHIBIT II-8

Cross-Industry Product Opportunities Western Europe

	User Expenditures ($ Billions)		
Sector	1990	1990-1995 CAGR (Percent)	1995
Application Software Products	2.1	24	6.0
Turnkey Systems	3.0	20	7.4



Market Analysis and Forecast



Market Analysis and Forecast

A

Market Overview and Definitions

This report analyses the Western European market for two of INPUT's software and service delivery modes, Applications Software Products and Turnkey Systems. The market application solutions provided via the processing services delivery mode is discussed in a separate INPUT report—*Processing Services Markets Western Europe, 1990-1995*.

1. Application Software Products

INPUT defines the software applications product market as comprising two types of products:

- Industry-Specific Application Software Products - Software products that perform functions related to solving business or organisational needs unique to a specific vertical market and sold to that market only. Examples include demand deposit accounting, MRPII, medical record-keeping, automobile dealer parts inventory, etc.

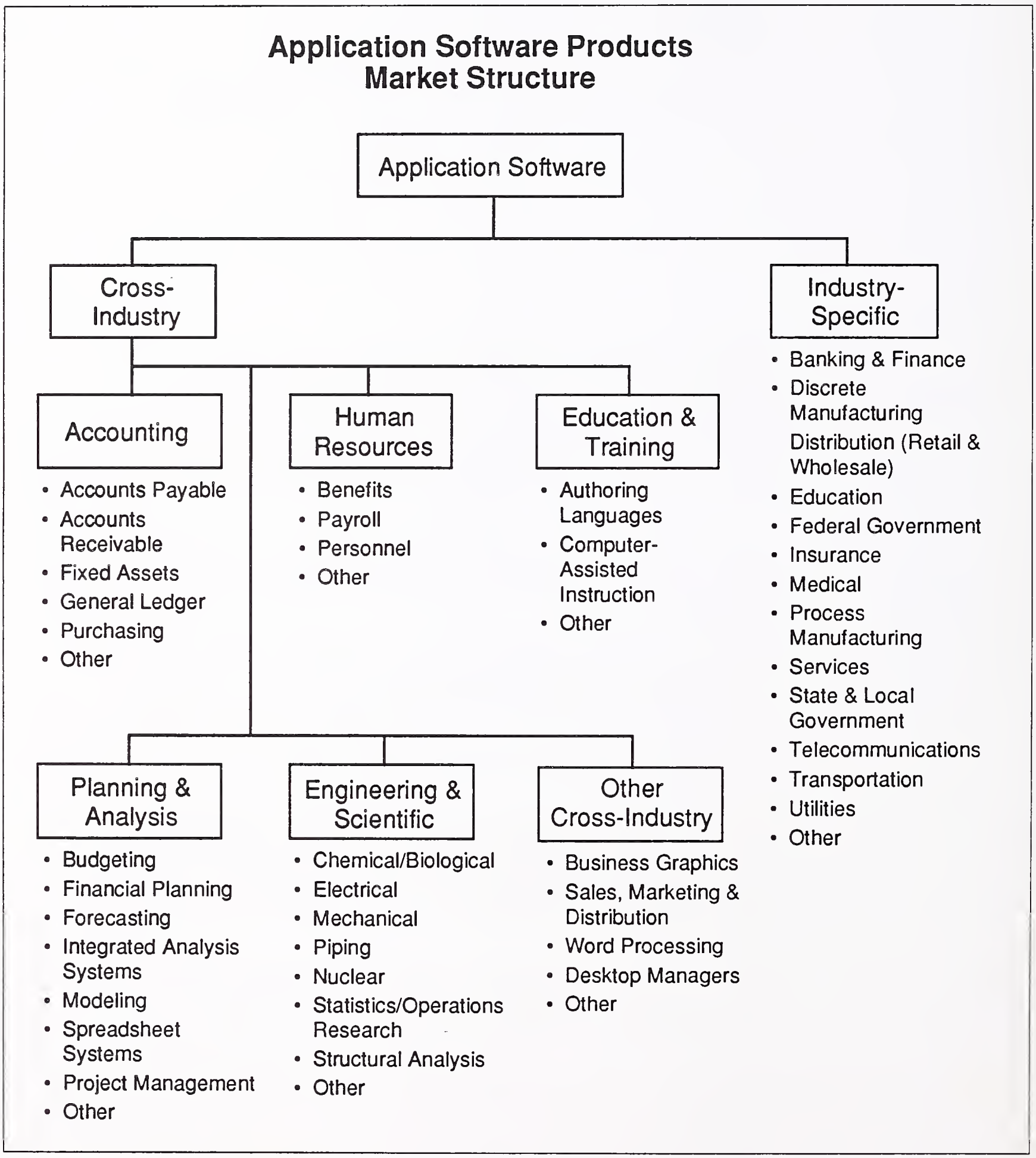
- Cross-Industry Application Software Products - Software products that perform a specific function that is applicable to a wide range of industry sectors. Applications include payroll and human resource systems, accounting systems, word processing and graphics systems, spreadsheets, etc.

Exhibit III-1 shows the applications software products market structured by the principal categories and types of product covered.

INPUT's market sizing and forecasts for applications software products are based on end user purchases or license fees for application software products for use on in-house computer systems. Where installation and support is handled by the software products vendor, INPUT includes this revenue in the software products delivery mode. When work on packages is carried out by third parties independently under a separate contract, this revenue is allowed for in the professional services delivery mode.

EXHIBIT III-1

Application Software Products Market Structure



The distinctions made between systems and applications software products on different equipment platforms, defined by INPUT into the three categories of mainframe, minicomputer and workstation/PC, are further defined in Exhibit III-2. This exhibit illustrates a layered approach to categorising software products. It shows the different layers of standard software required to run and support general-purpose computer systems. Moving down the various categories of software listed on the left-hand side of the table indicates a closer and closer relationship of the software category to the user and the application. In contrast, moving in the opposite direction indicates the closer relationship of the software category to the equipment platform.

Exhibit III-2 illustrates that it is only in the PC platform area where data base management systems are classified as applications; for all other product categories they are categorised as systems software. The line between system and application software products is usually drawn between database management systems (DBMS) products for all platforms except the PC, where the parameterised DBMS often becomes the application engine itself.

The distinction is also made in Exhibit III-2 between the following two categories of applications.

- Business software products: generic applications such as graphics, spreadsheet and word processing and office automation products.

- Applications software products: both industry-specific and cross-industry application packages.

The overall result of this classification in respect of the PC sector is that expenditures for Lotus are primarily listed in the applications products sector whereas the expenditures for Microsoft are listed primarily in the systems software products sector. The system software products market is described in a separate INPUT report *Systems Software Products Markets—Western Europe, 1990-1995*.

The software products sector (both systems and applications) has shown remarkable growth over the last decade. However that situation has now changed and we are witnessing a period when the market for software products is expected to grow at a markedly slower rate. That perspective is illustrated in Exhibit III-3.

EXHIBIT III-2

Definitional Map of Software Classes

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

S = System Software Products
A = Applications Software Products

EXHIBIT III-3

Western European Software Products Markets Comparative Growth

Sector	User Expenditures ($ Millions)				
	1979	1979-1989 CAGR (Percent)	1989	1989-1995 CAGR (Percent)	1995
System Software Products	530	33	9,140	15	21,100
Application Software Products	275	35	5,700	23	19,400
Total Software and Services Industry	7,000	22	52,060	18	142,600

This relative slowdown is caused by a number of factors of which the most significant are:

- Economic environment slowdown

- Downsizing and its impact on software product pricing.

The general slowdown in the rate of growth of equipment sales can partly be attributed to the expected recession in the overall economy. However, a far more significant factor is that of the downsizing phenomenon. Downsizing, users selecting smaller, lower cost equipment platforms to replace larger systems, is fundamentally driven by the price/performance discontinuity between, at one extreme mainframes, and at the other workstations and PCs. This price performance discontinuity, of the order 200 times, combined with open software standards, leads to totally new system architecture possibilities that are radically altering the market for system software products.

2. 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 specialised equipment such as word processors, cash registers, process control systems, or embedded computer systems for military applications.

Turnkey systems are often marketed through channels known as value-added resellers.

Value-Added Resellers (VAR) add value to computer equipment and/or software and then resell it to an end user. The major value added is usually application software for an industry 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 record-keeping, 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.

Turnkey systems may be thought of as four layers of product and service packages provided and maintained by the same vendor:

- Information systems equipment
- Systems software products (plus maintenance and support)
- Standard applications software products (plus maintenance and support)
- Professional services (customisation of applications software, training and consultancy).

The range of total solutions from third parties is illustrated in Exhibit III-4. It shows that the degree of customisation can vary from nothing to total customisation. The distinction between systems integration and turnkey systems is that systems integration is a very large, totally unique project contracted by a single customer. Turnkey systems are those where vendors have developed standard applications and sell them to as wide a customer base as possible, adding customisation where necessary.

Turnkey systems are sold on full ranges of equipment. The degree of customisation and the price of the complete system increases with the power of the equipment platform. Exhibit III-5 illustrates this and indicates that turnkey systems on PCs start at around $5,000 in price and go up to $50,000, including equipment. Systems on minis start at around $20,000 and can go up to $1 million. Mainframe systems mostly start at around $500,000 and can go well above $1 million.

Most turnkey systems are sold on workstation/PCs and minicomputers. Mainframe systems tend to have a high degree of customisation and so, in general, fall outside the INPUT definition of turnkey systems.

EXHIBIT III-4

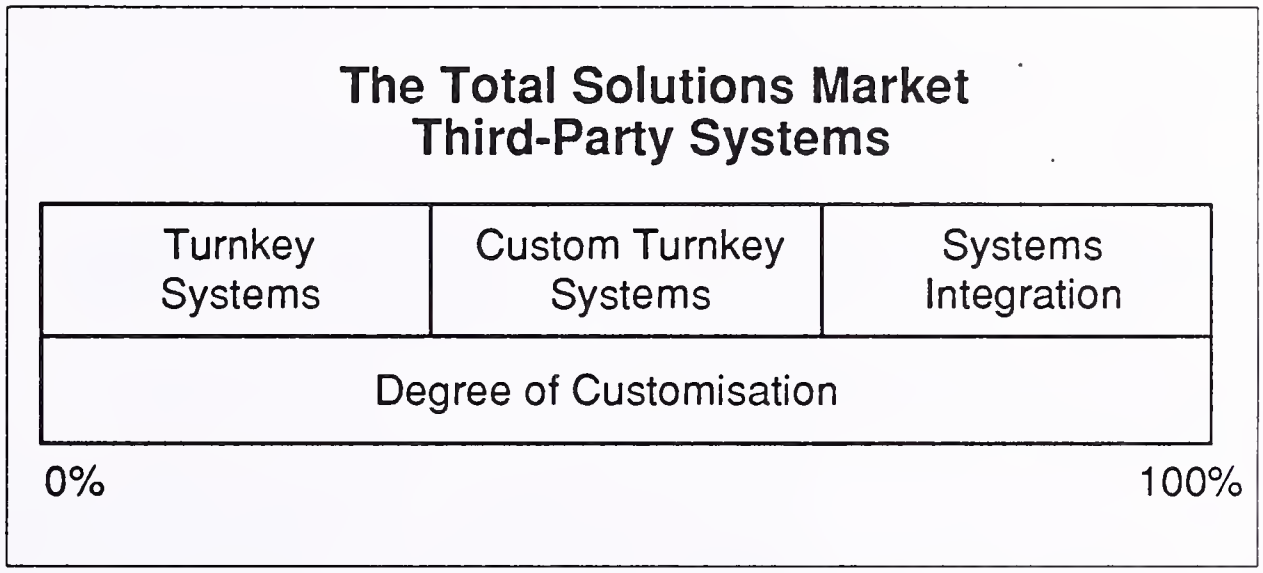
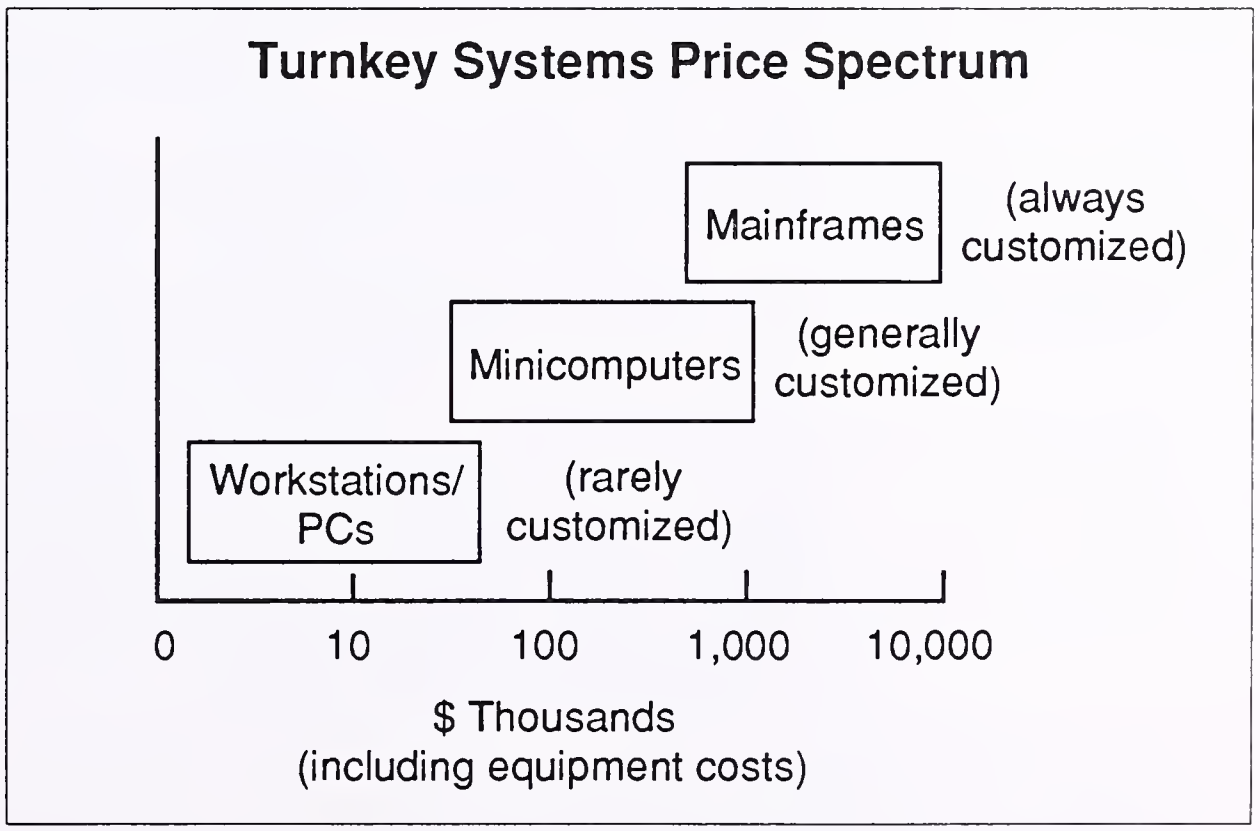


EXHIBIT III-5



Turnkey systems vendors generally have developed the applications software in-house, although there are instances where they licence application products from other vendors to market and sell themselves. To sell a complete turnkey system, they take title to the equipment from the equipment vendor, and then deliver, install and support it. Alternatively, the turnkey systems vendor could be an OEM who buys the equipment, relabels it and packages it up with his own application software products.

For minicomputer systems, turnkey system vendors will generally have formal agreements with one or more equipment vendors by which they can take title to the equipment. In so doing, they act as value-added resellers (VARs). For workstation/PC systems, the vendor may have an agreement with a distributor of the equipment rather than the equipment vendor.

Turnkey systems vendors will generally concentrate on a small range of equipment in order not to over-extend their support capabilities. Equally, it is in the interest of the equipment vendor to limit the better VARs to just their own line of equipment. This is done through formal agreements, which will probably be part of a carefully defined VAR programme.

Particularly for minicomputer and mainframe systems, many independent software vendors sell competing packages to turnkey systems, but without taking title to the equipment. The delivered solution to the end user has all the same components as in turnkey systems, but the equipment vendor takes responsibility to contract, install and maintain the equipment. INPUT defines and monitors such sales by their component elements—software products, plus related professional services. In this report, these sales are referred to as software product solutions, and the wider market encompassing both turnkey systems and software product solutions as the packaged total solutions market.

In many areas of continental Europe, the word turnkey (in French "cle en main", in Italian "sistemi chiavi in mano") is used for both systems integration and for software product solutions. In addition, southern European users, Italians in particular, prefer buying solutions that are unique. Many have an aversion to buying mass-marketed products which could very well be sold to the competitor next door. In these markets, vendors have to package their solutions to look like bespoke solutions, even if in reality they are custom turnkey or software product solutions. Often vendors call their systems "turnkey", even though they are selling them as bespoke systems.

Readers should be careful to differentiate between the general use of the term "turnkey" and the specific way INPUT defines and uses the term "turnkey systems".

The PC market has become a high-volume sales market, and equipment vendors have accepted that they have to use a range of third-party sales channels. In so doing they have lost control over the end user. The same is not the case for minicomputer and mainframe systems, and equipment vendors still prefer to retain title to their equipment and so retain knowledge of who the end user is. For this reason, VARs often do not take title to the equipment, and deliver their application software as software product solutions rather than turnkey systems.

With software product solutions, the independent software products vendor will, in all probability, make the sale. As with turnkey systems, it will have a formal, commissioned relationship with one or more equipment vendor. The end user will receive a complete solution, but will have two contracts—one from the software products vendors, and one from the equipment vendor. The equipment vendor will be responsible for installing and maintaining the equipment. Either the software products vendor or the equipment vendor can deliver and maintain the systems software. The software products vendor will deliver and maintain the application software products, plus any additional services, such as customisation, training, consultancy, etc.

The software products vendor will normally work with one or more equipment vendors as a VAR. The formal agreement will be different from that for turnkey systems, as, in this case, the VAR will not take title to the equipment. Exhibit III-6 illustrates how the total revenue is broken down for turnkey systems and software product solutions.

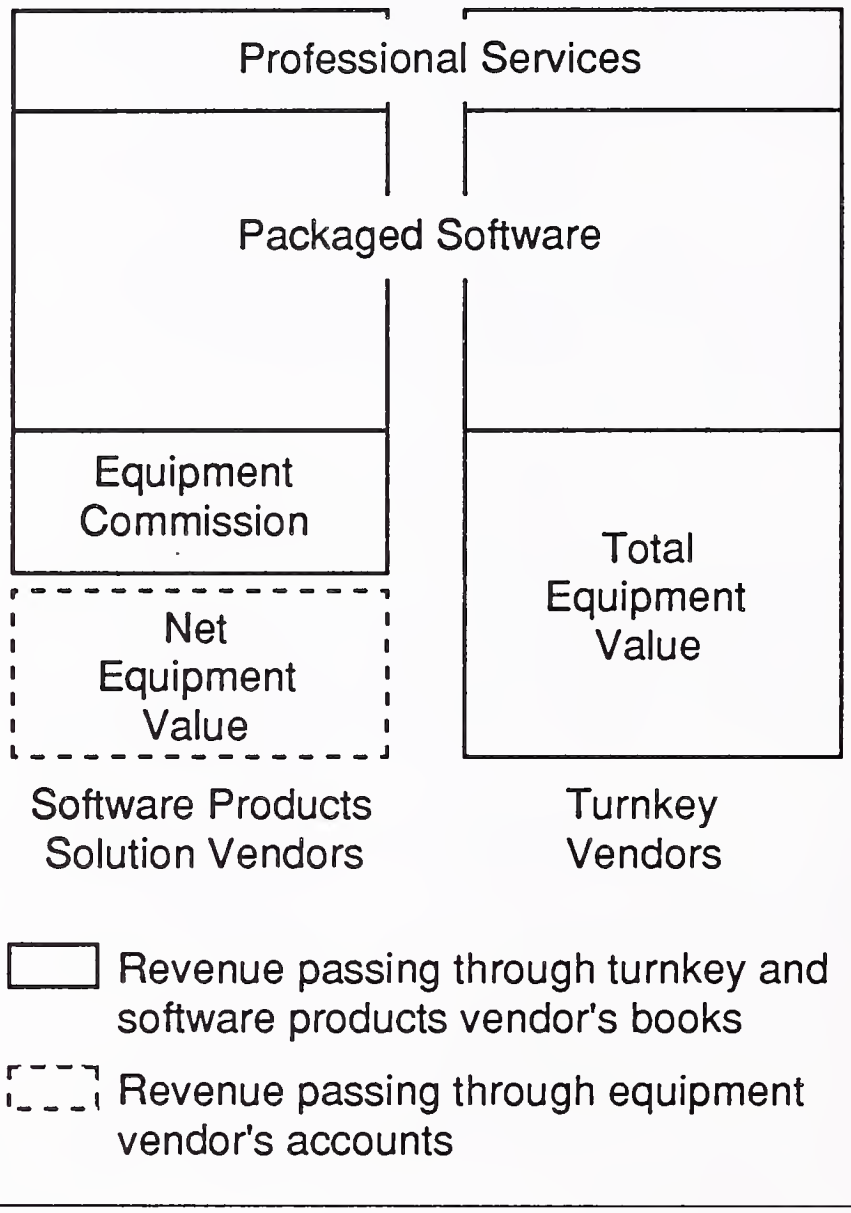
For end users, the question of whether one or two vendors deliver the packaged total solution is not important. Many of the key issues facing VARs are, therefore, the same whether they are delivering their systems as turnkey, or as components. With user research, INPUT has, therefore, not tried to differentiate between these two types of delivery modes.

In many instances, VARs who sell turnkey systems also sell software product solutions, but on different equipment. Typical examples are Metier and Software Sciences. Metier sells turnkey systems on Hewlett-Packard equipment, and software product solutions on IBM. Software Sciences sell turnkey systems on Data General equipment, and software product solutions on IBM, Tandem and Stratus equipment.

The fact that VARs sell turnkey on different equipment from that on which they sell software product solutions is often due to the attitude of specific equipment vendors. IBM in particular, and to a lesser degree Digital, try to maintain control over end users by retaining title to their

EXHIBIT III-6

Revenue Breakdown for Different Types of Packaged Total Solutions Vendors



equipment. Their strength in the minicomputer market and success in this strategy is directly reflected in the low penetration of turnkey systems and the high penetration of software product solutions in the European minicomputer market.

There are several examples of VARs that only sell software product solutions on minicomputers. SAP of West Germany sells packages on IBM and Siemens equipment in manufacturing and banking. The Australian-owned Paxus Group is a market leader with insurance systems sold on IBM platforms. SD-Scicon of the U.K. sells plant maintenance systems on IBM mainframes and Digital and Hewlett-Packard minicomputers.

B

Market Size and Growth

1. Forecast Assumptions

The market assessments and forecasts provided in this report cover the period 1989 through to 1995 and assess end-user expenditure for applications solutions products. Market sizes are assessed in local currency and converted into U.S. dollars for aggregation and comparative purposes. The exchange rates used for this purpose are listed in Appendix B.

Forecasts are calculated in actual monetary terms and therefore include allowances for inflation; the inflation assumptions used for each European country forecast are also listed in Appendix B.

2. Market Forecast

The forecast for the total Western European market for the applications software products and turnkey systems is shown in Exhibit III-7.

The turnkey systems market itself is analysed into two primary components: equipment sales, which represents about $5 billion in the 1990 market, mainly consisting of PC and minicomputer systems, and the software component comprising software product applications, customisation and other professional services. The latter two subcomponents are included within the applications software products sector where a user contracts for these services as part of the software product sale. However, where customisation and professional services are contracted separately they are included in the professional services market sector. This separate market sector is discussed in a separate INPUT report *The Western European Market for Professional Services, 1990-1995*.

As shown in Exhibit III-7 the combined opportunity in these two market sectors is expected to exceed $40 billion in end user expenditures by 1995, representing compound annual growth of around 20%. It can be seen that the applications software products segment is expected to grow at the fastest rate and that it is the continuing decline in unit equipment costs that are impacting the overall growth rate of the turnkey systems sector.

Four major factors are driving the market towards increasing acceptance of application solutions delivered either as applications software products or turnkey systems:

- The reduction in risk associated with the implementation of tried and tested standard software products. Risk reduction is important in the areas of cost and implementation time.

- The reduction in cost for the initial implementation and subsequent maintenance.
- The increased speed of implementation.
- The increased availability of standard package solutions appropriate to a client's application needs and the increasing availability of complete systems or modules that allow integration between applications.

EXHIBIT III-7

Application Software Products and Turnkey Systems
Western Europe

Sector	User Expenditures ($ Millions)				
	1989	1990	1991	1990-1995 CAGR (Percent)	1995
Application Software Products	5,700	6,885	8,370	23	19,400
Turnkey Systems	8,300	9,670	11,440	18	22,700

C

Applications Software Products

1. Applications Software Products

The total applications software products market is analysed into three subsectors related to equipment platforms: mainframe, mini and workstation/PC. This analysis is illustrated in Exhibit III-8, and shows the forecast growth rates for each of these sectors.

Exhibit III-8 clearly indicates the much greater opportunity available for smaller systems, both in respect of relative size and relative growth rates. The higher growth rates expected for smaller systems, notably the workstation/PC sector can be attributed to the general trend towards downsizing systems. Additionally the cost level of smaller systems emphasises the need to utilise standard applications package products rather than to implement costly custom written systems. These trends are reinforced by the increasing costs and shortages of skilled programmers and by the need to implement applications more quickly.

EXHIBIT III-8

Applications Software Products Market
Western Europe

Subsector	User Expenditures ($ Millions)				
	1989	1990	1991	1990-1995 CAGR (Percent)	1995
Mainframe	870	945	1,020	9	1,460
Minicomputer	1,920	2,270	2,710	19	5,550
Workstation/PC	2,910	3,670	4,640	27	12,400
Total	5,700	6,885	8,370	23	19,410

The different growth rates projected for the three major equipment platform categories will have a significant impact on their relative proportions of the total application product market. This is clearly shown in Exhibit III-9.

Additional factors determining these different growth rates include:

- Strong predicted growth in manufacturing applications software products based primarily on minicomputer systems.
- The movement towards international standards, open systems that in effect provide a more stable environment within which software developers can operate.
- The trend towards the use of graphical end-user interfaces, making it easier for software developers to market standard applications.

The growing importance of the workstation/PC is a direct reflection of the continuing improvements being made in the power/performance of this type of equipment platform. The Intel 486 chip today allows equipment vendors to sell desktop PCs that are as powerful as minis were a few years ago. These machines can run on a variety of operating systems—MS/DOS, OS/2 or UNIX. End users have much greater flexibility and can choose between single tasking/single user environments under MS/DOS or multitasking/multiuser environments under UNIX.

The increasing use of kernel software, or reusable software modules, that allow vendors to prepare different versions of applications for the countries of Western Europe or for different user environments is also a general growth factor for applications software within the market.

An industry sector analysis of the applications software products market is provided in Chapter V. Exhibit III-10 shows the country analysis of the Western European market. The largest individual country market is France, representing one quarter of the entire market in 1990; Germany is the second-largest country market, accounting for some 17% of the Western European total. The relatively low market share for Germany is witness to the strong turnkey systems market there which represents the favoured delivery mode for applications solutions. The two country markets expected to show the highest growth rate are Italy and Spain.

EXHIBIT III-9

Equipment Platform Trends
Western Europe

Subsector	Proportion of Total Market (Percent)	
	1990	1995
Mainframes	14	8
Minicomputer	33	28
Workstation/PC	53	64

EXHIBIT III-10

Applications Software Products
Comparative Country Markets

Market	Market Forecast ($ Millions)				
	1989	1990	1991	1990-1995 CAGR (Percent)	1995
France	1,490	1,860	2,300	25	5,600
Germany	970	1,140	1,360	23	3,200
United Kingdom	830	960	1,160	22	2,600
Italy	860	1,030	1,260	22	2,850
Sweden	175	215	265	23	600
Denmark	130	155	185	22	430
Norway	105	130	160	22	350
Finland	110	135	160	20	340
Netherlands	355	425	520	22	1,170
Belgium	210	250	300	21	640
Switzerland	165	200	235	21	520
Austria	85	105	130	22	280
Spain	170	210	260	25	630
Rest of Europe	50	60	75	22	170
Total (rounded)	5,700	6,880	8,370	23	19,400

2. Competitive Analysis

The leading application software product vendors in Western Europe are listed in Exhibit III-11. United States owned software product companies are strongly represented in this list with six in the leading ten. These U.S.-owned companies tend to have a relatively strong position in a

number of European countries in contrast to the European vendors who tend to have a significant market only in their own national home base. There are no European multinational application software product vendors on the scale of IBM, Lotus or Computer Associates.

This situation is reflected in the relatively fragmented nature of the market, the leading ten vendors only accounting for some 20% of the total market as is shown in Exhibit III-11.

Exhibit III-12 shows an analysis of the market into the two groups of equipment and independent vendors. The equipment vendor group is expected to grow at a slightly higher rate than that of the independent group, thus marginally increasing their market share over the next five years.

a. Equipment Vendors

Nearly all equipment vendors operating in Europe have some involvement in the applications products market, in line with the increasing emphasis on the application of information systems rather than their technical features.

As was seen in Exhibit III-11, IBM is by far the largest equipment vendor represented in this market. IBM has a range of applications software products developed both internally and by third parties. Digital, despite its position as the second largest equipment vendor to IBM, is not well represented in the applications software products market. Digital's primary application products are cross-industry office based products, for example DECCalc (a spreadsheet) and DECWord (a word processing package). In most industry-specific areas Digital utilises third-party independent vendors to supply applications products; this is notable in the manufacturing sector. In addition IBM has embarked on a policy of taking minority shareholdings in a number of application software product vendors, for example, PAXUS, to extend its marketing of application solutions.

The other equipment vendors listed in Exhibit III-11, include Siemens, Unisys, Bull, Olivetti and ICL. The significant point about this group is that they operate largely on a pan-European basis albeit that companies like ICL and Olivetti have particular strength in their own national markets.

b. Independent Vendors

This group of vendors can be further subdivided into two groups:

- The pan-European independent software application vendors.

- Other independent vendors, generally European owned companies serving primarily their own national market.

EXHIBIT III-11

Leading Application Software Product Vendors Western Europe

Rank	Company	Market Share (Percent)	Estimated Revenues 1989 ($ Millions)
1	IBM	5	310
2	Lotus	4	215
3	SAP	2	140
4	Computer Associates	2	135
5	Microsoft	2	95
6	Dun & Bradstreet	2	90
7	Siemens	1	85
8	Ashton-Tate	1	80
9	Concept	1	70
10	GSI	1	55
	Others	80	4,505
	Total	100	5,700

EXHIBIT III-12

Vendor Type Analysis Application Software Western Europe

Vendor Type	User Expenditures ($ Billions)		
	1990	1990-1995 CAGR (Percent)	1995
Equipment Vendors	0.9	25	2.7
Independent Vendors	6.0	23	16.7
Total Market	6.9	23	19.4

The leading pan-European independent software application vendors are largely U.S. owned—for example, Lotus, which is reputed to hold 70% of the world market for spreadsheet application products, and Computer Associates (CA) which is the largest independent vendor of both applications and systems software products on a worldwide scale. In Europe systems software products account for almost two-thirds of CA's entire revenues. CA has a strong market position in Europe serving a variety of application areas and providing software products across all of IBM's equipment platforms. Perhaps a significant advantage to CA is its ability to supply both systems and applications products at a computer system installation.

Dun & Bradstreet, after its acquisition of Management Sciences America (MSA), is now the sixth-largest application software products supplier in Western Europe. It is estimated that Dun & Bradstreet's revenue totals $137 million for Europe in this sector and is spread across primarily financial and manufacturing applications.

Two U.S. independents that have experienced growth well ahead of the market are the PC software suppliers Microsoft and WordPerfect. Microsoft is estimated to have had European revenues from applications software worth $95 million in 1989. Their key application products are MS Word, Excel and the integrated package named Works. For Microsoft, applications software product sales are growing faster than systems software products; applications products now account for more than 45% of their total revenues. Whereas Microsoft holds a strong position in the PC word processing market in France and Germany, WordPerfect holds a dominant position in the U.K., the Benelux countries and the Nordic countries.

In contrast to this group of U.S. owned companies, the European owned application product companies have found it difficult to move outside their home markets and become pan-European suppliers. This can largely be attributed to the different nature of the products that they have been able to develop. U.S. owned companies that have established worldwide positions, including being pan-European, have achieved it on the basis of cross-industry products with universal appeal developed within the largest single market for software products in the world. European vendors have always had to contend with the immediate problems of language translation within Europe and thus have not had the scale economies of U.S.-owned vendors operating in their own home market.

European owned applications products vendors that are operating on a pan-European basis include Concept, Sligos and SAP.

Concept, in its quest to support multinationals now has subsidiaries in Italy (CDS and Fienco), Switzerland (AKER), Belgium (Concept Benelux), Spain (Concept Iberica) and Portugal (SiFi). Concept is active in the Netherlands, the U.K. and Germany as Holland Automation International. A geographic analysis of Concept's 1989 revenues indicates, however, that around 70-75% were derived from France leaving only one quarter derived from the rest of Europe.

Both Sligos and SAP are relatively limited in their coverage of the whole of Europe. Sligos acquired Actis, a German vendor to obtain access to the German market. SAP derived approximately 65% of its 1989 revenues from within Germany. SAP does not market directly outside Germany but attempts to penetrate foreign subsidiaries of German companies through contacts with the parent organisation.

In contrast to this group of vendors, which is targeting pan-European presence, exists another group of vendors which could be termed the "national independent" application product vendors. These companies typically see sufficient opportunities in their own domestic markets where their own area of specialisation is considered to be impenetrable by foreign owned companies.

D

Turnkey Systems

1. Market Analysis

The market analysis and forecast for the turnkey systems market in western Europe is shown in Exhibit III-13. The system equipment sector is expected to show markedly slower growth than that for software products and other services provided as part of the overall turnkey system contract. As is shown in exhibit III-14 this slower growth rate will have a significant impact on the relative proportions of the two main sectors, placing software products and other services into the ascendancy. This change is driven by the overall tendency towards lower equipment costs for any given level of required performance.

The increasing power of the workstation/PC means that more turnkey systems can be packaged up on workstation/PC platforms rather than on minicomputers. Apart from shifting the importance of the equipment platform for turnkey systems towards the workstation/PC, this trend is likely to effect radically the way independents sell their standard application software.

The main reasons that so many independent vendors do not sell their standard applications as turnkey systems in the midrange equipment market is that both IBM and Digital, the leading minicomputer vendors in Western Europe, prefer to retain control over the title to their equipment. Independents working as VARs with these companies generally sell their total solutions via the applications product channel, rather than as turnkey systems. Through this strategy, IBM and Digital retain contact with the end user. The companies themselves, not the VARs, install and support the equipment with the end user.

In the PC market, equipment vendors have to rely heavily on third-party sales channels. This has created a layer between the equipment sales and the application sale. Equipment vendors therefore cannot control their VARs in the PC market in the way that they still can in the minicomputer market.

Independent vendors have far more freedom in how they sell their applications in the PC market and which equipment to package into their total solutions. Therefore turnkey systems is the predominant marketing channel for independents in the PC market, as opposed to the application product channel as it is in the minicomputer market.

As PCs continue to take over from minicomputers in this market, independents will become freer from the control of equipment vendors. The likelihood is that they will elect to sell their applications as turnkey systems, when they are free to make the choice. As a result, equipment vendors will increasingly see that they are losing control over the marketing channel.

Other important factors that will affect the overall development of the turnkey systems market in the 1990s include:

- UNIX and the drive in Western Europe towards open systems.
- The Single European Act and the gradual evolution of pan-European markets for specific industrial sectors during the 1990s.

EXHIBIT III-13

Turnkey Systems Market Forecast, 1990-1995
Western Europe

Subsector	User Expenditures ($ Millions)				
	1989	1990	1991	1990-1995 CAGR (Percent)	1995
System Equipment	4,560	5,140	5,870	14	10,000
Software and Other Charges	3,740	4,530	5,570	23	12,700
Total	8,300	9,670	11,440	18	22,700

EXHIBIT III-14

Turnkey System Subsector Trends
Western Europe

Sector	Proportion of Total Market (Percent)	
	1990	1995
System Equipment	53	44
Software and Other Charges	47	56

The market for UNIX-based application software products is another important factor in the turnkey system market. The principal reason for the rapid growth of UNIX systems has been its de facto adoption as an operating system standard by equipment vendors, notably by those vendors with a limited share of the overall market. The economics of software development has led to a polarisation (amongst midrange systems) around:

- IBM systems.
- Digital VMS systems.
- UNIX systems.

The introduction of more advanced facilities under UNIX and a widening acceptance of open systems concepts has in turn encouraged application software product vendors to develop UNIX based products. As more products become available so UNIX systems become more attractive to users and a virtuous circle of market forces operates.

The effect of the Single European Act on the turnkey systems market will be to gradually open up specific vertical or niche markets and make them more pan-European. For the turnkey systems vendor, this will lead to greater opportunities to sell standard solutions to wider markets.

Many vendors are looking closely at the likely impact of the Single European Act on specific industrial sectors and on their related software and services markets. There will be considerable competition in those markets positively affected by the Single European Act legislation. The larger independents will seek to take over those national independent vendors currently specialising in these areas.

Exhibit III-15 provides a more detailed analysis of the turnkey systems market components in Western Europe. The professional services elements are forecast to exhibit high growth with considerable demand arising for consultancy and education and training services (i.e., other professional services) as turnkey systems become more customised and more integrated into the end-user environment. The software development, or customisation, element is forecast also to grow strongly, driven by the need to seek specific benefits within the client environment based upon the standard application software product.

Exhibit III-16 shows an analysis of the Western European turnkey systems market by equipment platform type. The most important equipment market in 1990 was that for minicomputers, accounting for nearly 60% of the total market. The second largest sector was that for worksta-

tion/PCs, taking just under 40% of the total market, with mainframes only accounting for some 4% of the market. The highest growth is anticipated in the workstation/PC sector. An industry sector analysis of the turnkey systems market is provided in Chapter V.

EXHIBIT III-15

Turnkey Systems Components

Subsectors	Western European User Expenditures ($ Billions)		
	1990	1990-1995 CAGR (Percent)	1995
System Equipment	5.1	14	10.0
Software Products	3.1	22	8.4
Customisation	0.8	21	2.1
Other Professional Services	0.7	26	2.2
Total	9.7	18	22.7

EXHIBIT III-16

Equipment Platform Analysis Turnkey Systems, 1990-1995

Subsectors	Western European User Expenditures ($ Billions)		
	1990	1990-1995 CAGR (Percent)	1995
Mainframe	0.4	11	0.7
Minicomputer	5.5	18	12.8
Workstation/PC	3.8	20	9.3

Exhibit III-17 shows the country market analysis for Western Europe. Turnkey systems do not have the same appeal throughout Europe. In the Mediterranean countries, end users tend to prefer bespoke systems, rather than standard applications packaged up as turnkey systems. With the cost of turnkey systems significantly less than equivalent bespoke systems this attitude is likely to gradually change during the 1990s as these areas of Europe gain exposure to foreign vendors.

EXHIBIT III-17

Turnkey Systems—Comparative Country Markets Western Europe

Country	Market Forecast ($ Millions)				
	1989	1990	1991	1990-1995 CAGR (Percent)	1995
France	1,330	1,555	1,830	18	3,570
Germany	2,500	2,920	3,450	18	6,800
United Kingdom	1,700	1,930	2,260	18	4,440
Italy	565	650	770	18	1,500
Sweden	260	310	365	20	750
Denmark	200	240	285	18	550
Norway	145	175	210	20	440
Finland	140	165	200	20	400
Netherlands	340	400	480	22	975
Belgium	170	200	240	19	480
Switzerland	360	435	530	21	1,120
Austria	180	210	250	20	515
Spain	290	350	415	20	865
Rest of Europe	100	120	140	20	295
Total (rounded)	8,300	9,670	11,440	18	22,700

The largest single country market is that of Germany (30%) followed by the United Kingdom (22%). As has already been pointed out, the French market has a relative preference for applications solutions delivered as applications software products rather than turnkey systems. Consequently, France only accounts for around 16% of the total European turnkey systems market.

2. Competitive Analysis

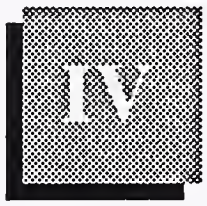
The leading turnkey system vendors in Western Europe in 1989 are listed in Exhibit III-18. Companies marketing CAD/CAM systems figure strongly, notably Prime, McDonnell Douglas, Intergraph and IBM. During 1990 the merger of the computer interests of Siemens and Nixdorf to create SNI (Siemens Nixdorf Informationssysteme AG) consolidated leadership of this particular market. The strength of the German turnkey system market is evidenced by the presence of three German companies in the list of ten leading vendors. Of these equipment manufacturers Nixdorf and Mannesman Kienzle (now partly owned by Digital) together with the two leading Scandinavian companies Nokia Data and Norsk Data (1989 turnkey system revenues $90 million) all use turnkey systems as their prime delivery mode.

EXHIBIT III-18

Leading Turnkey System Vendors, 1989 Western Europe

Rank	Company	Estimated Revenues 1989 ($ Millions)	Market Share (Percent)
1	Nixdorf	1,100	13
2	Prime	500	6
3	Mannesmann Kienzle	400	5
4	McDonnell Douglas	310	4
5	Intergraph	250	3
6	IBM	185	2
7	Unisys	150	2
8	Nokia Data	115	1
9	Siemens	110	1
10	ICL	110	1
	Others	5,070	62
	Total	8,300	100

Country Market Analysis



Country Market Analysis

A

France

The market analysis and forecast for the French applications software products market and turnkey systems markets are shown in Exhibits IV-1 and IV-2 respectively.

Concept was the leading vendor of application software products in France in 1989 as is shown in Exhibit IV-3. In particular Concept has a leading position in the design and development of financial software products available on PCs. Concept also sells turnkey systems on PC platforms which are developed by Technic Informatique, a subsidiary company. Concept is currently in financial difficulties following heavy borrowings to finance an ambitious acquisition programme.

EXHIBIT IV-1

Application Software Products Market
France

Subsector	User Expenditures (FF Millions)				
	1989	1990	1991	1990-1995 CAGR (Percent)	1995
Mainframe	1,050	1,200	1,250	5	1,500
Minicomputer	3,650	4,400	5,300	20	10,900
Workstation/PC	4,500	5,900	7,600	30	22,200
Total	9,200	11,500	14,150	25	34,600

Sligos is active in both the applications software products market as well as the turnkey system market as can be seen in Exhibit IV-4. Although Bull is only ranked in tenth place in the leading group, many smaller French VARs use Bull equipment. Sinorg, for example, specialises in local government with software applications products for finance, elections and healthcare.

EXHIBIT IV-2

Turnkey Systems Market
France

Subsector	User Expenditures (FF Millions)				
	1989	1990	1991	1990-1995 CAGR (Percent)	1995
Systems Equipment	4,500	5,100	5,850	14	9,900
Software and Other Charges	3,700	4,500	5,450	22	12,100
Total	8,200	9,600	11,300	18	22,000

EXHIBIT IV-3

Leading Application Software Product Vendors
France

Rank	Vendor	Estimated Market Share (Percent Rounded)	Estimated Revenues 1989 (FF Millions)
1	Concept	4	370
2	IBM	3	300
3	Lotus	3	280
4	GSI	3	250
5	Computer Associates	3	240
6	Dun & Bradstreet	2	175
7	Sligos	2	170
8	CdF Informatique	1	130
9	Microsoft	1	125
10	Syseca	1	120
	Others	77	7,060
	Total Market	100	9,200

EXHIBIT IV-4

Leading Turnkey Systems Vendors
France

Rank	Vendor	Estimated Market Share (Percent Rounded)	Estimated Revenues 1989 (FF Millions)
1	Nixdorf	8	620
2	Prime	6	530
3	Sligos	6	500
4	Mannesmann Kienzle	3	250
5	Intergraph	3	230
6 =	McDonnell Douglas	3	220
6 =	Alcatel	3	220
6 =	IBM	3	220
9	Unisys	2	180
10	Bull	2	150
	Others	61	5,080
	Total Market	100	8,200

B

Germany

Exhibits IV-5 and IV-6 show respectively the market analysis and forecast for the applications products and turnkey systems markets in Germany. The favoured delivery mode for applications solutions in Germany is undoubtedly the turnkey system approach. In 1990 approximately 70% of user expenditure on applications solutions was spent on turnkey systems making Germany the largest national market for this delivery mode in Europe. The leading vendors in the two applications solutions markets are listed in Exhibits IV-7 and IV-8.

One of the factors that has supported the development of a strong turnkey market in Germany is the strength of the manufacturing sector in its use of CAD/CAM and CAE systems. Both Nixdorf and Mannesmann Kienzle offer a range of industrial systems as well as financial and general business turnkey systems. Norsk Data, the Norwegian equipment vendor, developed its turnkey CAD/CAM package, Technovision, in Germany so that it could specifically compete in this market. Another German company Taylorix sells turnkey systems based on PCs from IBM, Siemens and Toshiba.

Although there is a preference to buy from German vendors, users are very particular about the technical capabilities of their systems. Consequently a number of U.S. owned vendors have a strong showing in this market, for example, Prime and Intergraph.

EXHIBIT IV-5

Applications Software Products Market
Germany

Subsector	User Expenditures (DM Millions)				
	1989	1990	1991	1990-1995 CAGR (Percent)	1995
Mainframe	350	370	400	9	570
Minicomputer	550	650	770	20	1,600
Workstation/PC	850	1,050	1,300	28	3,630
Total	1,750	2,070	2,470	23	5,800

EXHIBIT IV-6

Turnkey Systems Market
Germany

Subsector	User Expenditures (DM Millions)				
	1989	1990	1991	1990-1995 CAGR (Percent)	1995
Systems Equipment	2,490	2,800	3,200	14	5,450
Software and Other Charges	2,040	2,480	3,050	23	6,850
Total	4,530	5,280	6,250	18	12,300

EXHIBIT IV-7

Leading Application Software Product Vendors
Germany

Rank	Vendor	Estimated Market Share (Percent Rounded)	Estimated Revenues 1989 (DM Millions)
1	SAP	10	180
2	IBM	7	120
3	Siemens	5	90
4	Datev	5	85
5	Lotus	4	75
6	Straessle	3	55
7	CA	3	50
8	Microsoft	3	45
9	Ashton-Tate	2	30
10	Dun & Bradstreet	1	25
	Other	57	995
	Total Market	100	1,750

EXHIBIT IV-8

Leading Turnkey Systems Vendors
Germany

Rank	Vendor	Estimated Market Share (Percent Rounded)	Estimated Revenues 1989 (DM Millions)
1	Nixdorf	26	1,170
2	Mannesmann Kienzle	8	350
3	Prime	8	340
4	Intergraph	4	180
5	Siemens	4	160
6	Taylorix	3	135
7 =	IBM	2	80
7 =	McDonnell Douglas	2	80
9	GEI	1	60
10	Krupp Atlas	1	50
	Others	41	1,925
	Total Market	100	4,530

C

United Kingdom

The market analysis and forecast for the applications products and turnkey systems markets are shown in Exhibits IV-9 and IV-10. The United Kingdom is one of the most competitive markets for applications solutions in Europe due to a very high representation of U.S. owned vendors who view the U.K. as an excellent entry point for Europe and a convenient location for their European headquarters. The leading vendors in the applications products and turnkey systems markets in the United Kingdom are shown in Exhibits IV-11 and IV-12.

The influence of the CAD/CAM suppliers in the market is clearly shown with Prime and McDonnell Douglas in market leadership positions. The U.K. is the largest European market for McDonnell Douglas which, in addition to CAD/CAM, specialises in local government systems for the police and ambulance services and in the healthcare sector.

ICL, now majority owned by Fujitsu, is a leading turnkey vendor in the minicomputer sector. Hoskyns, now part of the CAP Gemini Sogeti group, is the leading independent turnkey system vendor with a range of systems based on IBM, Digital and Hewlett-Packard platforms. Kalamazoo is an important vendor of commercial systems for small businesses based on PCs.

EXHIBIT IV-9

Applications Software Products Market
United Kingdom

Subsector	User Expenditures (£ Millions)				
	1989	1990	1991	1990-1995 CAGR (Percent)	1995
Mainframe	75	80	85	8	115
Minicomputer	170	190	225	20	465
Workstation/PC	275	335	425	26	1,070
Total	520	605	735	22	1,650

EXHIBIT IV-10

Turnkey Systems Market
United Kingdom

Subsector	User Expenditures (£ Millions)				
	1989	1990	1991	1990-1995 CAGR (Percent)	1995
Systems Equipment	590	650	735	14	1,250
Software and Other Charges	485	570	690	22	1,550
Total	1,075	1,220	1,425	18	2,800

EXHIBIT IV-11

Leading Application Software Product Vendors
United Kingdom

Rank	Vendor	Estimated Market Share (Percent Rounded)	Estimated Revenues 1989 (£ Millions)
1	IBM	8	40
2	Lotus	6	30
3	CA	4	20
4	Dun & Bradstreet	3	17
5 =	Thorn EMI	3	15
5 =	ICL	3	15
5 =	BIS	3	15
5 =	SD-Scicon	3	15
9	PAXUS	2	12
10	Kewill	2	10
	Others	63	331
	Total Market	100	520

EXHIBIT IV-12

Leading Turnkey Systems Vendors
United Kingdom

Rank	Vendor	Estimated Market Share (Percent Rounded)	Estimated Revenues 1989 (£ Millions)
1	Prime	11	120
2	McDonnell Douglas	11	115
3	ICL	5	55
4 =	Mannesmann Kienzle	3	35
4 =	Hoskyns	3	35
6 =	Nixdorf	3	30
6 =	Kalamazoo	3	30
8	Intergraph	2	25
9 =	Unisys	2	20
9 =	BIS	2	20
	Others	55	590
	Total Market	100	1,075

D

Italy

The market analysis and forecast for the Italian applications software product market is shown in Exhibit IV-13, and that for the Italian turnkey systems market in exhibit IV-14. The Italian market has a relatively low penetration for packaged applications solutions and generally demonstrates a preference for custom developed system. Generally turnkey systems need to be sold with a customised element to convince the client of the uniqueness of the offering. Nevertheless the economics of software development are causing users to consider more packaged solutions and in consequence the applications solution market in Italy is forecast to grow faster than any other European country, with the exception of Spain.

The government is a key factor in the Italian market and wields considerable buying power with control over significant areas of industry and commerce, notably banking. This situation tends to favour larger software and services vendors with smaller vendors largely restricted to the private sector.

Leading competitors in the Italian applications solutions market are listed in Exhibits IV-15 and IV-16.

Major applications software vendors in Italy are Computer Associates (following absorption of Cullinet) and IBM. Olivetti is the only leading Italian software vendor with a presence outside Italy due to its equipment based activities. Most Italian owned applications vendors are relatively small and limited to niche sectors within their domestic market. These companies will face increasing competition as a single European market develops. In terms of industry opportunities, the restructuring of the manufacturing sector is likely to offer the best medium term prospects.

EXHIBIT IV-13

Applications Software Products Market
Italy

Subsector	User Expenditures (Lira Billions)				
	1989	1990	1991	1990-1995 CAGR (Percent)	1995
Mainframe	160	170	180	7	240
Minicomputer	370	435	520	19	1,040
Workstation/PC	620	775	980	27	2,520
Total	1,150	1,380	1,680	22	3,800

EXHIBIT IV-14

Turnkey Systems Market
Italy

Subsector	User Expenditures (Lira Billions)				
	1989	1990	1991	1990-1995 CAGR (Percent)	1995
Systems Equipment	415	460	520	13	855
Software and Other Charges	340	410	505	23	1,165
Total	755	870	1,025	18	2,020

EXHIBIT IV-15

Leading Application Software Product Vendors
Italy

Rank	Vendor	Estimated Market Share (Percent Rounded)	Estimated Revenues 1989 (Lira Billions)
1	IBM	6	65
2	Syntax	5	55
3	Data Management	3	35
4	Finsiel	2	25
5	CA	1	15
6	Engineering	1	13
7	Lombardia Informatica	1	10
8	SYS-DAT	1	9
9	CDS	1	8
10	Praxis Calcolo	1	7
	Others	78	908
	Total Market	100	1,150

EXHIBIT IV-16

Leading Turnkey Systems Vendors
Italy

Rank	Vendor	Estimated Market Share (Percent Rounded)	Estimated Revenues 1989 (Lira Billions)
1	Olivetti	8	60
2 =	Nixdorf	7	55
2 =	Sicit	7	55
4 =	Sopin	6	45
4 =	IBM	6	45
6	Prime	5	40
7	Mannesmann Kienzle	3	25
8 =	Elsi	3	20
8 =	Intergraph	3	20
8 =	Hewlett-Packard	3	20
	Others	49	370
	Total Market	100	755

E

Spain

The Spanish market, although still relatively small, is forecast to grow more rapidly than any other country over the next five years. Exhibits IV-17 and IV-18 provide the market analysis and forecast for the application product and turnkey systems respectively.

Without indigenous equipment vendors or major software services firms the Spanish market is not surprisingly dominated by foreign multinationals, primarily the major equipment vendors. Significant local applications solutions vendors include:

- Centro de Calculo
- Logic Control

- Ibermatica
- Central Informatica
- Asicom.

Considerable applications solutions business has been generated by a booming market for PCs and a relatively high level of merger and acquisition activity. Commercial restructuring drives the need for new application solutions. UNIX has a significant profile in Spain partly as a result of pressure from the Spanish government. It is estimated that approximately 60% of all new systems by installed value are UNIX based.

EXHIBIT IV-17

Application Software Products Market Spain

Subsector	User Expenditures (Ptas Millions)				
	1989	1990	1991	1990-1995 CAGR (Percent)	1995
Mainframe	2,800	3,000	3,250	8	4,400
Minicomputer	6,400	7,700	9,300	21	19,900
Workstation/PC	10,700	13,700	17,650	29	48,900
Total	19,900	24,400	30,200	25	73,200

EXHIBIT IV-18

Turnkey Systems Market Spain

Subsector	User Expenditures (Ptas Millions)				
	1989	1990	1991	1990-1995 CAGR (Percent)	1995
Systems Equipment	18,650	21,300	24,500	15	42,800
Software and Other Charges	15,250	19,000	23,700	25	57,700
Total	33,900	40,300	48,200	20	100,500

F

Other European Countries

Market analysis and forecast data for the remaining European countries is provided in the following Exhibits:

- Sweden Exhibits IV-19 and IV-20

EXHIBIT IV-19

Application Software Products Market
Sweden

Subsector	User Expenditures (SK Millions)				
	1989	1990	1991	1990-1995 CAGR (Percent)	1995
Mainframe	165	175	185	7	245
Minicomputer	335	400	490	21	1,045
Workstation/PC	625	790	1,020	27	2,610
Total	1,125	1,365	1,695	23	3,900

EXHIBIT IV-20

Turnkey Systems Market
Sweden

Subsector	User Expenditures (SK Millions)				
	1989	1990	1991	1990-1995 CAGR (Percent)	1995
Systems Equipment	910	1,050	1,200	15	2,100
Software and Other Charges	745	915	1,140	24	2,700
Total	1,655	1,965	2,340	20	4,800

- Denmark Exhibits IV-21 and IV-22

EXHIBIT IV-21

Application Software Products Market
Denmark

Subsector	User Expenditures (DK Millions)				
	1989	1990	1991	1990-1995 CAGR (Percent)	1995
Mainframe	95	100	105	34	430
Minicomputer	320	380	440	17	830
Workstation/PC	495	620	770	23	1,740
Total	910	1,100	1,315	22	3,000

EXHIBIT IV-22

Turnkey Systems Market
Denmark

Subsector	User Expenditures (DK Millions)				
	1989	1990	1991	1990-1995 CAGR (Percent)	1995
Systems Equipment	780	900	1,050	14	1,750
Software and Other Charges	640	790	960	22	2,150
Total	1,420	1,690	2,010	18	3,900

- Norway Exhibits IV-23 and IV-24

EXHIBIT IV-23

Application Software Products Market
Norway

Subsector	User Expenditures (NK Millions)				
	1989	1990	1991	1990-1995 CAGR (Percent)	1995
Mainframe	100	105	115	7	150
Minicomputer	235	280	345	21	730
Workstation/PC	345	495	625	25	1,520
Total	680	880	1,085	22	2,400

EXHIBIT IV-24

Turnkey Systems Market
Norway

Subsector	User Expenditures (NK Millions)				
	1989	1990	1991	1990-1995 CAGR (Percent)	1995
Systems Equipment	555	640	750	15	1,260
Software and Other Charges	455	565	705	25	1,740
Total	1,010	1,205	1,455	20	3,000

- Finland Exhibits IV-25 and IV-26

EXHIBIT IV-25

Application Software Products Market
Finland

Subsector	User Expenditures (FM Millions)				
	1989	1990	1991	1990-1995 CAGR (Percent)	1995
Mainframe	65	70	75	5	90
Minicomputer	150	180	215	20	450
Workstation/PC	260	320	395	23	900
Total	475	570	685	20	1,440

EXHIBIT IV-26

Turnkey Systems Market
Finland

Subsector	User Expenditures (FM Millions)				
	1989	1990	1991	1990-1995 CAGR (Percent)	1995
Systems Equipment	325	370	420	14	715
Software and Other Charges	270	335	415	24	985
Total	595	705	835	19	1,700

- Netherlands Exhibits IV-27 and IV-28

EXHIBIT IV-27

Application Software Products Market Netherlands

Subsector	User Expenditures (Dfl Millions)				
	1989	1990	1991	1990-1995 CAGR (Percent)	1995
Mainframe	105	110	120	7	155
Minicomputer	230	270	325	19	645
Workstation/PC	395	495	625	26	1,600
Total	730	875	1,070	22	2,400

EXHIBIT IV-28

Turnkey Systems Market Netherlands

Subsector	User Expenditures (Dfl Millions)				
	1989	1990	1991	1990-1995 CAGR (Percent)	1995
Systems Equipment	385	435	500	14	835
Software and Other Charges	315	390	490	24	1,165
Total	700	825	990	19	2,000

- Belgium Exhibits IV-29 and IV-30

EXHIBIT IV-29

Application Software Products Market
Belgium

Subsector	User Expenditures (BF Millions)				
	1989	1990	1991	1990-1995 CAGR (Percent)	1995
Mainframe	1,100	1,160	1,250	7	1,600
Minicomputer	2,530	2,990	3,540	19	7,000
Workstation/PC	4,270	5,350	6,610	24	15,800
Total	7,900	9,500	11,400	21	24,400

EXHIBIT IV-30

Turnkey Systems Market
Belgium

Subsector	User Expenditures (BF Millions)				
	1989	1990	1991	1990-1995 CAGR (Percent)	1995
Systems Equipment	3,570	4,070	4,650	14	8,000
Software and Other Charges	2,920	3,590	4,450	23	10,300
Total	6,490	7,660	9,100	19	18,300

- Switzerland Exhibits IV-31 and IV-32

EXHIBIT IV-31

Application Software Products Market
Switzerland

Subsector	User Expenditures (SF Millions)				
	1989	1990	1991	1990-1995 CAGR (Percent)	1995
Mainframe	55	60	60	7	85
Minicomputer	80	95	115	19	230
Workstation/PC	130	165	205	26	525
Total	265	320	380	21	840

EXHIBIT IV-32

Turnkey Systems Market
Switzerland

Subsector	User Expenditures (SF Millions)				
	1989	1990	1991	1990-1995 CAGR (Percent)	1995
Systems Equipment	325	380	445	16	800
Software and Other Charges	260	325	410	25	1,000
Total	585	705	855	21	1,800

- Austria Exhibits IV-33 and IV-34

EXHIBIT IV-33

Application Software Products Market
Austria

Subsector	User Expenditures (Sch Millions)				
	1989	1990	1991	1990-1995 CAGR (Percent)	1995
Mainframe	155	165	185	7	230
Minicomputer	355	425	505	19	1,000
Workstation/PC	595	750	950	26	2,370
Total	1,105	1,340	1,640	22	3,600

EXHIBIT IV-34

Turnkey Systems Market
Austria

Subsector	User Expenditures (Sch Millions)				
	1989	1990	1991	1990-1995 CAGR (Percent)	1995
Systems Equipment	1,255	1,450	1,650	15	2,900
Software and Other Charges	1,025	1,250	1,570	24	3,700
Total	2,280	2,700	3,220	20	6,600

- Rest of Europe IV-35 and IV-36.

EXHIBIT IV-35

Application Software Products Market
Rest of Europe

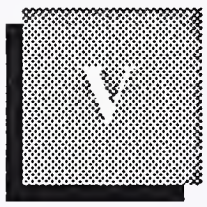
Subsector	User Expenditures ($ Millions)				
	1989	1990	1991	1990-1995 CAGR (Percent)	1995
Mainframe	10	11	12	10	16
Minicomputer	20	24	28	20	60
Workstation/PC	20	24	33	30	90
Total (rounded)	50	60	75	22	165

EXHIBIT IV-36

Turnkey Systems Market
Rest of Europe

Subsector	User Expenditures ($ Millions)				
	1989	1990	1991	1990-1995 CAGR (Percent)	1995
Systems Equipment	55	65	70	15	130
Software and Other Charges	45	55	70	25	165
Total	100	120	140	20	295

Application Product Opportunities



Application Product Opportunities

A Industry-Specific Applications

Industry-specific applications are defined as software products that perform functions related to solving business or organisational needs unique to a specific industry market and sold only to that market. The principal industry sectors discussed in this chapter are:

- Banking and Finance.
- Insurance.
- Distribution.
- Manufacturing.

For a more detailed analysis of each of these sectors the reader is referred to INPUT's series of specific industry sector reports.

Exhibit V-1 shows the size and growth of the market for industry-specific applications software products and turnkey systems over the period 1990-1995. Industry-specific application product market growth will be driven by user demand for more specific packaged solutions related to organisational needs and goals. The costs and risks associated with unique system development are breaking down resistance to packaged solutions for applications that were hitherto considered unique to the enterprise. Unique solutions are becoming increasingly too expensive to justify. From the vendor's perspective, an increasing potential user base for application products affectively lowers the price threshold at which they can be economically marketed.

EXHIBIT V-1

Industry-Specific Applications Products
Western Europe

	User Expenditures ($ Billions)		
Sector	1990	1990-1995 CAGR (Percent)	1995
Application Software Products	4.8	23	13.4
Turnkey Systems	6.7	18	15.3

1. Banking and Finance

The forecast growth for applications software products and turnkey systems in the banking and finance sector is shown in Exhibit V-2. The deregulation of European financial markets planned to be complete by 1st January 1993 has provided impetus to banking and financial institutions to restructure and develop new competitive products and services. Increasingly this requires considerable help from software and services vendors to assist in the task of developing the complex international systems needed for the 1990s.

The demand for applications software products in the banking and finance market can be categorised in specific areas:

- Securities back-office solutions.

- AI for securities systems:

  - Charting
  - Market analysers
  - Risk assessment
  - Forecasting
  - Deal ticket making.

- Small to medium sized banking total solutions.

- Customer terminals:

  - ATMs
  - EFTPOS
  - Corporate PC access system.

There are many vendors competing in the applications software products market. The banking and finance sector is an area where there is potential to develop a single product that can be readily exported throughout Europe. Concept in France has been successful in this strategy, especially for the securities market. Other important vendors active in this sector include BIS, now part of NYNEX, Kapiti, BASE 24, 50% owned by the Sema Group, and Actis Gmbh.

With the prospects for very strong growth in EFTPOS, there is also good growth potential for central EFTPOS switching software. Vendors such as BASE 24 and SD-Scicon are competing strongly in this area.

EXHIBIT V-2

Banking and Finance Sector
Western Europe

	User Expenditures ($ Billions)		
Sector	1990	1990-1995 CAGR (Percent)	1995
Application Software Products	0.9	21	2.3
Turnkey Systems	0.8	21	2.1

The two prime markets for turnkey systems in banking and finance are branch office systems for retail banks and EI (Electronic Information) systems for securities traders. With IBM dominating back-office systems and preferring to sell its equipment through channels in which it maintains a positive relation with the end user, the opportunities for turnkey systems in many areas of banking are limited. Also, since these back-office systems are generally on mainframes, turnkey is not an appropriate delivery mode.

Nixdorf, the leading European turnkey systems vendor, is the most important vendor in the German banking and finance sector. The German banking and finance market is Nixdorf's main market. Having recently been bought by Siemens, Nixdorf will be able to consolidate its total banking systems as a division of Europe's largest equipment vendor.

2. Insurance

The types of industry-specific application software products available to the insurance industry are extensive. Products are available that handle most types of policies, claims administration, billing, client profiling, actuarial and investment analysis, decision support and management reporting.

Insurers lag behind the banking and manufacturing industries in systems applications. They have been slow to bring information technology managers to positions of influence. The tendency is for boards or decision making groups to decide what they are going to do and not to tell the information services division soon enough. Some of the biggest companies still don't have a client base, but instead have a contract base. The older systems designed in the 1960s and developed in the 1970s were built around processing insurance contracts. The focus today is on servicing clients or intermediaries. The need to rewrite software represents a substantial investment. There are opportunities for:

- Back-office software application products
- Single, integrated front-office software products
- AI software products
  - charting
  - marketing analysers
  - risk assessment
  - forecasting
  - deal ticket making

The Sema Group has provided a number of systems to underwriters and brokers and is established itself as a leading supplier with BOX OFFICE. Designed by underwriters, BOX OFFICE is a comprehensive risk management system that provide tools to manage business—from underwriting through claims and reinsurance to the production of statistics.

Unisys has a Financial Services Systems product, a series of software modules that relate account information to individuals and increase the effectiveness of product development, targeting and cross-selling.

Within the insurance industry, expenditure for PC applications will grow faster than expenditures for mainframe and minicomputer applications. The information-intensiveness of insurance has resulted in a very high penetration by PCs. For example, laptop computers are used by agents to provide claim and policy information, whilst databases containing actuarial information can be downloaded so that a policy can be generated on the spot during a sales call.

Leading application software product vendors addressing the insurance sector include PAXUS, Continuum and Capsco. PAXUS in particular, 30% owned by IBM, holds the pre-eminent position in the supply of specialist software products for the insurance sector outside of North America. Major PAXUS application products include:

- POLICY, a real-time system for fire and general insurance.
- LIFE, a realtime on-line administration system for individual life insurance contracts.
- SUPER, a product that handles the administration of group superannuation (or pension) schemes.

An interesting development in the insurance industry is the joint arrangement between Aetna Life Casualty, Andersen Consulting and Digital to develop an investment management and accounting system for the insurance and financial services organisations.

The market forecast for the insurance sector for applications products and turnkey systems is shown in Exhibit V-3. The turnkey systems market in the insurance sector is extremely diverse with the German market being particularly well developed. Nixdorf is the clear market leader in the German market. Information systems for agents have spurred growth in the sector as a whole and this is likely to present a considerable opportunity in southern European countries to sell microcomputer based products. The Spanish market is thus likely to demonstrate strong growth for insurance application products.

Other driving forces in the market are the dismantling of trade barriers in the service sector in the move towards a single European market and growing competition for single-source financial services. Insurance companies are under increasing pressure to widen their product portfolios and seek new customers as a result of these changes. Insurers also need to adopt quickly to growing computer requirements for improved products.

EXHIBIT V-3

Insurance Sector
Western Europe

	User Expenditures ($ Billions)		
Sector	1990	1990-1995 CAGR (Percent)	1995
Application Software Products	0.6	23	1.7
Turnkey Systems	0.6	20	1.5

3. Distribution

The market analysis and forecast for the distribution sector is shown in Exhibit V-4.

Typically distribution sector mainframe users have done a lot of in-house development in spite of the success of vendors like German software company SAP, and of IBM, with their own Inforem inventory management package (now in its third generation form—rewritten for CICS). However, this is changing as users find they just cannot afford to develop and maintain their own software, especially since higher function and more flexible packages have appeared.

There are about ten software product vendors in Europe that specialise in IBM mainframe based products for the distribution sector. These include SAP, WCSS, and Dallas. Users find these companies offer proven products, a user community and the opportunity to add their own functions for unique working practices or competitive edge.

Minicomputers (including IBM's AS/400 and its predecessors) have long been the applications platform for most medium-sized companies. This encompasses most of the larger wholesalers, few of whom exceed $200 million revenue per annum. Traditionally, these minicomputers have supported an integrated business system, managing accounts, inventory, order processing, etc. Most of the growth in this market is now in departmental systems, rather than whole company systems, as distributed applications become a more cost-effective solution. For example, separate minicomputers are being used for in-store, warehouse, marketing,

materials and accounting systems. Digital's strength in networked solutions has been a major force in getting such solutions accepted in the larger companies. Several hundred application packages are available on minicomputers in this sector.

EXHIBIT V-4

Distribution Sector
Western Europe

	User Expenditures ($ Billions)		
Sector	1990	1990-1995 CAGR (Percent)	1995
Application Software Products	0.4	22	1.1
Turnkey Systems	1.2	15	2.4

The most common forms of PC's or workstations in this sector are the ECR (Electronic Cash Register) and the EPOS (Electronic Point of Sale) terminal. Nearly all current POS products use MS-DOS, with some also running UNIX. In addition, very large numbers of conventional PCs are being used in a similar way to the departmental minicomputers, but in smaller departments, sites or businesses. Applications software products, rather than the hardware specification, have become the primary basis for choosing a system. There are well over ten thousand PC application products in the European distribution sector.

One of the largest untapped opportunities in the distribution sector lies in offering small shopkeepers and supply chain middle-men easy-to-use software products—for the price of a cash register or two—for managing their business. Some of the leading equipment vendors believe that such products are now less than two years away from widespread availability.

Areas expected to receive the most attention in future include:

- Human Resource Management
- Customer Care Applications
- Property and Space Management

- DRP - Distribution Resource Planning
- Logistics Decision Support
- Local Store/Depot Decision Support
- Pan-European Support.

New technology is driving other applications:

- Item Tracking
- Home Shopping
- Warehouse Automation
- Route Planning/Vehicle Scheduling
- Demand Forecasting (Expert) Systems
- Merchandising Support

Although there are huge numbers of existing products, all the major vendors are still seeking wider portfolios with which to win business. Few products yet meet the general requirements listed below:

- Specialist use by business subsector or department
- Conforms to equipment vendor's chosen architecture(s)
- Portable and scalable across different platforms
- Can coexist in a distributed environment
- Suitable for supporting local languages and working practices
- Modular and rich in function
- Easily tailored without writing programs
- Packaged training and retraining for users
- Adequate performance for time-critical core business functions
- Demonstrably reliable with a community of users.

In respect of turnkey systems it is expected that the custom software element will steadily decline over the next five years. This is in response to several factors:

- Customers are continually looking for cost savings in their acquisition of business solutions.

- Well designed applications software products with much richer functionality are now far easier to tailor for a particular client.

- Clients now accept that organisational changes and new working practices should accompany the installation of many new applications.

In the past there has been a tendency for the application to be adapted to the organisation, rather than the other way about. Since many new applications—like DRP (Distribution Resource Planning)—reflect more up-to-date practices, users can see the sense in changing the "way things are done here" to get full benefit from the IS investment.

Two leading turnkey vendors (Nixdorf and GSI) have both invested heavily in re-engineering applications for greater profitability and flexibility and to make downsizing onto smaller hardware platforms easier. Partnerships will increasingly lie at the centre of vendor growth strategies.

4. Manufacturing

a. Discrete Manufacturing Sector

The two principal application areas in this sector are production management and CAD/CAM although shopfloor data collection and control and production engineering are increasing in importance. The market forecast for both applications products and turnkey systems is shown in Exhibit V-5.

EXHIBIT V-5

Discrete Manufacturing Sector
Western Europe

	User Expenditures ($ Billions)		
Sector	1990	1990-1995 CAGR (Percent)	1995
Application Software Products	1.7	18	3.9
Turnkey Systems	2.1	15	4.3

Levels of growth are expected to be very low for mainframe-based software products. For example, CAD is no longer typically implemented on mainframes. The workstation, and to a lesser extent the microcomputer, have become the primary CAD equipment platforms. One of the most important influences on the CAD market has been, and will remain, the rapidly decreasing "cost per seat". Even IBM is publicly recognising this trend, with increased emphasis on the RS/6000 as the equipment platform for products such as CATIA. IBM has also recently introduced microcomputer-based CAD systems, to provide entry-level systems.

Similarly for production management systems, the emphasis is changing in favour of minicomputer-based systems. For example, Xerox—formerly one of the major suppliers of mainframe-based MRPII systems—has just announced a new MRPII product, which will also run on the RS/6000 and Digital VAX. Support for the AS/400 and UNIX-based systems are planned for future release. Likewise, Dun & Bradstreet has just launched AMAPS/400, a production management system for the AS/400, and is developing UNIX versions.

Overall, the level of growth in software applications products is much higher for minicomputers than mainframes. Minicomputers remain the basic workhorse for MRPII installations, though there appear to be signs of a slow-down in the Digital VAX-based market. Certainly, many of the major vendors of Digital-based MRPII systems are developing the latest versions of their systems to run under UNIX. This route is being taken by both ASK and CINCOM.

One sector showing strong growth in 1990 is the market for AS/400 based production management systems. In addition to companies migrating from System/38 and System/36, there is a significant move to AS/400 from companies formerly running their production management systems on mainframes. This is true for both IBM and non-IBM mainframe users.

Overall, IBM is now placing considerable emphasis in its intermediate computer-integrated manufacturing (I-CIM) products, such as:

- AS/400 and MAAPICS DB
- RS/6000 and CATIA
- Industrial computers and SFDC (Shop Floor Data Collection)

Growth will remain highest at the microcomputer level. Much of the growth in the CAD market is taking place at the low end of the market. Major CAD vendors, such as Intergraph and Prime/Computervision, have responded to the success of Autodesk by launching their own microcomputer-based products:

- Intergraph with the Microstation drafting product
- Prime/Computervision with Personal Designer

Similarly, there is appreciable demand from small discrete manufacturing organisations for microcomputer-based production management systems.

A high level of demand is forecast by both users and vendors for shopfloor data collection and control systems, reflecting the increased need to closely monitor events in the factory floor and maintain tighter control over production schedules. Such systems give production managers the levels of feedback necessary to provide a more flexible and responsive service to their customers.

Production management systems can expect moderate levels of growth overall. The minicomputer-based production management software market is now primarily a replacement market. However, there could be a fresh surge of growth if a significant move to UNIX-based systems occurs in the discrete manufacturing sector.

Engineering data/document management is one of the principal growth areas targeted by the major equipment vendors, such as IBM and Digital, and by the specialist CAD vendors. However, apart from a few leading-edge users, such as British Aerospace, there is little sign of user activity in this area at present. Nor is this application currently planned for implementation by the typical user.

The turnkey systems delivery mode remains the key delivery mode for CAD/CAM systems. However, there are few European vendors amongst the leading CAD suppliers to the discrete manufacturing sector. Most of the leading vendors are U.S. based. The principal European vendors are:

- Siemens
- Cisigraph
- Pafec

CAD is a key technology for users in the discrete manufacturing sector, as they endeavour to reduce the time required to introduce new products and to reduce production costs. Accordingly, the leading CAD vendors are seeking to develop the use of concurrent engineering and engineering data management.

Production management systems are also an important area for turnkey systems vendors. Traditionally, this was particularly true for the midrange proprietary equipment vendors, such as Nixdorf and Mannesmann Kienzle. In addition, all the mainframe equipment vendors—such as IBM, Siemens, Bull and ICL—offer turnkey production management systems.

Turnkey systems based on UNIX will become increasingly important in the future, particularly on midrange equipment platforms.

Turnkey systems vendors are now placing considerable emphasis in shopfloor data collection and control (SFDCC). SFDCC is increasingly becoming an integral part of the software products vendors' MRPII systems. However, SFDCC is also important as an application in its own right. Shopfloor data collection and control covers a number of uses, such as:

- Inventory and WIP tracking
- Workforce monitoring
- Cell control

Additionally it is now being extended to cover areas such as:

- Maintenance
- Statistical process control.

b. Process Manufacturing Sector

Typical industry-specific applications for the process manufacturing sector include:

- Production management
- Supervisory control and data acquisition (SCADA)
- Shopfloor data capture for manual input and time and attendance recording
- Quality systems
- Maintenance management
- Production supervision and control
- Transport management.

These are delivered via both turnkey systems and applications software product delivery modes, with applications such as SCADA and production supervision and control tending towards the turnkey system end of the spectrum. A major overall trend is the significant shift to the use of standard software packages reported by both users and vendors. This is particularly true in the case of production management systems. Until very recently, the majority of production management systems used in the process manufacturing sector were developed in-house by users and few of the software product vendors who service the discrete manufacturing sector had appropriate products for the process manufacturing sector.

The considerable growth taking place in the process manufacturing sector is clear from Exhibit V-6 which shows the market analysis and forecast for the application software products and turnkey systems markets.

Maintenance management systems, while important for plant efficiency and safety, are extensively used in the process manufacturing sector at present and are not expected to be a significant growth area over the next few years.

Two application areas of particular importance to the turnkey systems sector are those of:

- SCADA (Supervisory Control and Data Acquisition).

- POMS (Process Operations Management Systems).

SCADA systems linked directly to the plant process controllers are obviously instrumental in collecting data from the plant. This data can then be fed into mimic displays for plant operators and into higher level applications.

One recent innovation, introduced by IBM in 1990, is their Process Operations Management System (POMS). This application resides between the SCADA and production management systems. It is a production supervision and control product and its principal purpose is to ensure that best practice is carried out by process operators leading to the production of consistently high quality product. The main functions of POMS are:

- Enabling production supervisors to work to a defined production schedule with full knowledge of the plant status at all times.

- Providing the process operators with detailed instructions of the process steps to be followed.

- Ensuring that process supervision is carried out.

- Recording details of the materials used.

- Logging details of the plant used and its operating parameters for each batch.

- Updating inventory records.

IBM POMS is reported to have received a good reception since its European launch. It was first launched in Europe in the United Kingdom in March 1990 with subsequent roll-out to the other major countries six months later. POMS was initially developed by IBM and INCODE in the

U.S. utilising a consortium including Campbell Soup, Johnson & Johnson, Nestle Foods, Ralston Purina, and Smith Kline Beecham. The first installations in the United Kingdom are now underway with the implementation work being carried out by Logica.

CAD, another important turnkey systems application, also has a role to play in the process sector in the design and ongoing maintenance of process plant.

EXHIBIT V-6

Process Manufacturing Sector
Western Europe

	User Expenditures ($ Billions)		
Sector	1990	1990-1995 CAGR (Percent)	1995
Application Software Products	0.7	25	2.2
Turnkey Systems	0.8	19	1.9

In the last year, there have been a significant number of products launched specifically designed for the process manufacturing sector. This is particularly true in the United Kingdom where the leading U.S. production management vendors such as ASK have been at the forefront of these announcements. It has also become apparent that the majority of the traditional production management product vendors will endeavour to enter the process manufacturing sector. Many of the vendors who have yet to announce a process industry-specific version of their product will do so during the course of 1991.

This means that the battle for market share will now commence in earnest. Few products have an established installed base in the process manufacturing sector, at the present time.

A further level of complexity is added to the marketing and support of these products since a number of them will be launched under UNIX. There is a high level of support for open systems and UNIX within the process manufacturing sector at the production management level. Certainly within the larger companies in the industry, there appears to be a much stronger drive to UNIX in the medium-term than is apparent in the discrete manufacturing sector.

However, while there are exceptions, vendors offering AS/400-based production management systems for the process manufacturing sector are not yet moving to offer UNIX-based versions of their products.

At present many companies are installing production management systems on a centralised basis. However, this will gradually change as distributed systems become proven products. Many users have a longer term desire to move to a more decentralised approach.

Quality systems are another very important application in the process manufacturing sector because of the need for lot traceability. It is important to be able to identify any product discrepancies and the reasons why these occurred. Accordingly there is a high level of demand for Laboratory Information Management Systems or in-line quality testing. Such systems analyse the quality of both raw materials and finished product and feed the results to both the process operator and the production management system. The logging of process operating parameters such as temperature and pressure for each batch of product is also important both in ensuring that the process is operating within the preferred range and in improving product yields.

B

Cross-Industry Applications

Cross-industry applications are defined as software products that perform a specific function that is applicable to a wide range of industry sectors. The application areas discussed in this section are:

- Accounting
- Human Resources
- Planning

Exhibit V-7 shows the size and growth of the market for cross-industry applications software products and turnkey systems over the period 1990-1995. In this sector of the market turnkey systems are less significant than in the industry-specific sector, the major reason for this being the higher penetration of cross-industry applications on mainframe systems. However forecast growth for cross-industry turnkey systems is forecast to be slightly higher than that for industry-specific applications (of Exhibit V-1) due to demand for office and engineering/scientific systems.

EXHIBIT V-7

Cross-Industry Applications Products
Western Europe

	User Expenditures ($ Billions)		
Sector	1990	1990-1995 CAGR (Percent)	1995
Application Software Products	2.1	23	6.0
Turnkey Systems	3.0	20	7.4

1. Accounting

Accounting is the single most important cross-industry sector representing some 18% of the total; its size and forecast growth are shown in Exhibit V-8. The scope of the accounting function is broad and includes the following specific functions:

- Accounts payable
- Accounts receivable
- Billing/Invoicing
- Costing
- Fixed assets
- General assets
- General ledger
- Integration accounting
- Payroll

A number of other related applications integrate with accounting systems, these include:

- Order entry
- International accounting (Currency conversion, value-added taxation and consolidation)
- Sales lead tracking
- Purchasing
- Financial modeling
- Sales analysis
- Management reporting

Financial modeling and sales analysis are included within the Planning and Analysis sector, sales analysis and order entry are included within the "Other" Cross-Industry Sector and payroll is included within the Human Resources sector.

One of the most significant trends in accounting software products during the 1980s has been the shift from batch to on-line transaction based software products. This direction has been partly determined by the many other on-line systems providing the benefits of initial updating. As business responds to identifying competitive pressure so these trends are reinforced. Users want a computerised accounting system that can be used as a tool for managing the business, the package must satisfy both the needs of management accounting and management reporting. This trend has led to increasing demand for fully integrated systems provided by a single vendor. This further emphasises the need for vendors that have sufficient resources to supply an extensive range of products using a common database and that can support the needs of large organisation who may wish to use the same software products across all divisions and subsidiaries of the European marketplace.

Users of applications solutions are becoming more discerning in their evaluation of accounting systems. Having usually experienced the implementation of one system, they appreciate the difficulties and costs if something goes wrong in moving from one system to another. For users, therefore the single most important issue is quality—their requirement is for a tried and tested system.

EXHIBIT V-8

Accounting
Applications Solutions Product Market
Western Europe

User Expenditures ($ Billions)		
1990	1990-1995 CAGR (Percent)	1995
0.5	18	1.1

2. Human Resources

Human resource management system applications include payroll, personnel administration, benefits administration and tax reporting systems. These application software products are rarely sold through a turnkey system delivery mode and consequently this sector of the market is defined as applications software products. The forecast growth for Western Europe for this market is shown in Exhibit V-9.

The payroll sector is considered to be relatively saturated. The different tax structures and legislative environment for each European country makes attempts at implementing a pan-European payroll product extremely difficult. The movement towards a single market in 1993 is unlikely to substantially change this position in the medium term.

EXHIBIT V-9

Human Resources
Applications Software Product Market
Western Europe

User Expenditures ($ Billions)		
1990	1990-1995 CAGR (Percent)	1995
0.3	17	0.6

The other applications within human resources which includes manpower planning and forecasting, are being stimulated by the change in demographics that has reduced the number of school-leavers entering the labour market and thus necessitated the need to better forecast and plan future staffing requirements. As organisations appreciate increasingly that they need to retain staff in short supply or retain part-time or temporary workers, the need has grown for other applications to monitor and aid the planning or training of the human resource.

3. Planning and Analysis

Planning and Analysis applications are primarily provided through the applications product delivery mode. Exhibit V-10 shows the market forecast for Western Europe. The applications included in the Planning and Analysis sector are:

- Spreadsheet systems
- Decision support systems and executive information systems
- Project management
- Financial modeling tools
- Budgeting and forecasting tools
- Operations research.

Spreadsheet systems are one of the most widely used software applications. Lotus with its 1-2-3 product is believed to have approximately 70% of the worldwide market for spreadsheet systems. Although originally PC based, Lotus has introduced both mini and mainframe based versions.

An important opportunity within this sector is that for executive information systems (EIS). EIS has had a relatively short life; it first took shape as a product and application in 1985. In five years the underlying technology has gone through significant evolution, and the user community has begun to adopt EIS in significant numbers.

EIS has its foundation in four key trends of the early 1980s, the year during which end-user computing took shape. The adoption of fourth-generation languages, the use of specialised 4GLs to develop decision support systems, the explosion of personal computing, and the emergence of relational data base management systems provided an environment for the creation of the first EIS software products. In Exhibit V-11, INPUT characterises the EIS technology evolution as one of *breaking new ground*. EIS has provided the opportunity to move application systems into a new world characterised by:

- A new category of users—senior and upper management.
- An early and valuable use of relational data base technology.
- A shift from focusing on collection of data to the use of information for critical business decisions.
- A proving ground for the use of graphical as opposed to character-based user interfaces.
- The creation of an environment in which a mostly illiterate computer user begins to use a PC for several tasks.
- One of the first common implementations of co-operative processing concepts.

EXHIBIT V-10

Planning and Analysis Applications Software Product Market Western Europe

User Expenditures ($ Billions)		
1990	1990-1995 CAGR (Percent)	1995
0.5	16	1.1

EXHIBIT V-11

Breaking New Ground with EIS

1. New category of user
2. Relational data base management systems
3. Information versus data
4. Graphical user interface
5. Integration of personal productivity tools
6. Cooperative processing

Exhibit V-12 provides a simplified look at the phases through which EIS has, and will, pass in a short ten-year timespan. The exhibit describes three states of evolution: from an application to a specialised development tool kit and, in the next five years, to a generalised development tool kit.

Although EIS technology may not replace the common user interface for data input and collection, it will impact the reporting and presentation of operational systems. In addition, it will continue to expand into a new family of information presentation and analysis applications.

The use of EIS and EIS technology itself can be expected to expand in three directions:

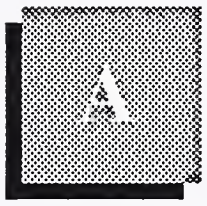
- The types of users will increase by moving down into the organisation.
- The types of applications will expand across the organisation.
- The number of users will grow significantly.

EXHIBIT V-12

Evolution of EIS Technology

	1985	1990	1995
Development System	Applications system product	Special-purpose development tool kit	General-purpose development tool kit
Frequency of Use	One application	Some applications	Many applications
Type of User	Select executives	Executives and managers	All levels of management

Appendixes



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 repackaging 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 unfeasible 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

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 record-keeping, 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.

C

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.

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 record-keeping, 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.

1990 Exchange Rates and Inflation Assumptions

EXHIBIT B-1

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	LR	1,336.0	1,502.0
Sweden	SK	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	Pta	115.8	129.7
Rest of Europe	$	1.0	0.83

EXHIBIT B-2

Inflation Assumptions

Country	Assumption 1989-1994	Assumption 1990-1995	Change
France	4.0	4.5	+0.5
Germany	2.5	4.0	+1.5
United Kingdom	5.5	7.0	+1.5
Italy	6.0	7.0	+1.0
Sweden	6.0	7.0	+1.0
Denmark	6.0	5.0	-1.0
Norway	4.0	5.0	+1.0
Finland	6.0	6.0	0.0
Netherlands	2.0	3.0	+1.0
Belgium	3.5	4.0	+0.5
Switzerland	2.5	5.0	+2.5
Austria	3.0	4.0	+1.0
Spain	5.5	6.5	+1.0
Rest of Europe	8.0	10.0	+2.0
European Average	4.5	5.5	+1.0

Detailed Forecast Data—Local Currencies

EXHIBIT C-1

Applications Software Products Market Forecast in Local Currency by Market Segment, 1990-1995 France

Subsector	FF Millions								
	1989	1989-1990 Growth (Percent)	1990	1991	1992	1993	1994	1995	1990-1995 CAGR (Percent)
Mainframe	1,050	14	1,200	1,250	1,300	1,370	1,450	1,550	5
Minicomputer	3,650	21	4,400	5,300	6,400	7,680	9,250	10,900	20
Workstation/PC	4,500	31	5,900	7,600	9,800	12,700	16,400	22,200	30
Total	9,200	25	11,500	14,150	17,500	21,750	27,100	34,650	25

EXHIBIT C-2

Turnkey Systems Market Forecast in Local Currency by Market Segment, 1990-1995 France

Subsector	FF Millions								
	1989	1989-1990 Growth (Percent)	1990	1991	1992	1993	1994	1995	1990-1995 CAGR (Percent)
Equipment	4,500	13	5,100	5,850	6,650	7,600	8,650	9,900	14
Software and Other Charges	3,700	22	4,500	5,450	6,700	8,150	9,950	12,100	22
Total	8,200	17	9,600	11,300	13,350	15,750	18,600	22,000	18

EXHIBIT C-3

Applications Software Products Market Forecast in Local Currency by Market Segment, 1990-1995 Germany

Subsector	DM Millions								
	1989	1989-1990 Growth (Percent)	1990	1991	1992	1993	1994	1995	1990-1995 CAGR (Percent)
Mainframe	350	6	370	400	435	475	520	570	9
Minicomputer	550	18	650	770	950	1,150	1,400	1,600	20
Workstation/PC	850	24	1,050	1,300	1,650	2,130	2,800	3,630	28
Total	1,750	18	2,070	2,470	3,035	3,755	4,720	5,800	23

EXHIBIT C-4

Turnkey Systems Market Forecast in Local Currency by Market Segment, 1990-1995 Germany

Subsector	DM Millions								
	1989	1989-1990 Growth (Percent)	1990	1991	1992	1993	1994	1995	1990-1995 CAGR (Percent)
Equipment	2,490	12	2,800	3,200	3,650	4,200	4,750	5,450	14
Software and Other Charges	2,040	22	2,480	3,050	3,700	4,550	5,600	6,850	23
Total	4,530	17	5,280	6,250	7,350	8,750	10,350	12,300	18

EXHIBIT C-5

Applications Software Products Market Forecast in Local Currency by Market Segment, 1990-1995 United Kingdom

Subsector	£ Millions								
	1989	1989-1990 Growth (Percent)	1990	1991	1992	1993	1994	1995	1990-1995 CAGR (Percent)
Mainframe	75	7	80	85	90	95	105	115	8
Minicomputer	170	12	190	225	270	325	390	465	20
Workstation/PC	275	22	335	425	535	670	845	1,070	26
Total	520	16	605	735	895	1,090	1,340	1,650	22

EXHIBIT C-6

Turnkey Systems Market Forecast in Local Currency by Market Segment, 1990-1995 United Kingdom

Subsector	£ Millions								
	1989	1989-1990 Growth (Percent)	1990	1991	1992	1993	1994	1995	1990-1995 CAGR (Percent)
Equipment	590	10	650	735	835	965	1,100	1,250	14
Software and Other Charges	485	18	570	690	845	1,030	1,270	1,550	22
Total	1,075	13	1,220	1,425	1,680	1,995	2,370	2,800	18

EXHIBIT C-7

Applications Software Products Market Forecast in Local Currency by Market Segment, 1990-1995 Italy

Subsector	Lira Billions								
	1989	1989-1990 Growth (Percent)	1990	1991	1992	1993	1994	1995	1990-1995 CAGR (Percent)
Mainframe	160	6	170	180	195	210	220	240	7
Minicomputer	370	18	435	520	620	735	875	1,040	19
Workstation/PC	620	25	775	980	1,240	1,570	1,990	2,520	27
Total	1,150	20	1,380	1,680	2,055	2,515	3,085	3,800	22

EXHIBIT C-8

Turnkey Systems Market Forecast in Local Currency by Market Segment, 1990-1995 Italy

Subsector	Lira Billions								
	1989	1989-1990 Growth (Percent)	1990	1991	1992	1993	1994	1995	1990-1995 CAGR (Percent)
Equipment	415	11	460	520	595	670	760	855	13
Software and Other Charges	340	21	410	505	630	770	950	1,165	23
Total	755	15	870	1,025	1,225	1,440	1,710	2,020	18

EXHIBIT C-9

Applications Software Products Market Forecast in Local Currency by Market Segment, 1990-1995 Sweden

Subsector	SK Millions								
	1989	1989-1990 Growth (Percent)	1990	1991	1992	1993	1994	1995	1990-1995 CAGR (Percent)
Mainframe	165	6	175	185	200	210	225	245	7
Minicomputer	335	19	400	490	590	710	860	1,045	21
Workstation/PC	625	26	790	1,020	1,290	1,620	2,050	2,610	27
Total	1,125	21	1,365	1,695	2,080	2,540	3,135	3,900	23

EXHIBIT C-10

Turnkey Systems Market Forecast in Local Currency by Market Segment, 1990-1995 Sweden

Subsector	SK Millions								
	1989	1989-1990 Growth (Percent)	1990	1991	1992	1993	1994	1995	1990-1995 CAGR (Percent)
Equipment	910	15	1,050	1,200	1,370	1,600	1,850	2,100	15
Software and Other Charges	745	23	915	1,140	1,410	1,750	2,180	2,700	24
Total	1,655	19	1,965	2,340	2,780	3,350	4,030	4,800	20

EXHIBIT C-11

Applications Software Products Market Forecast in Local Currency by Market Segment, 1990-1995 Denmark

Subsector	DK Millions								
	1989	1989-1990 Growth (Percent)	1990	1991	1992	1993	1994	1995	1990-1995 CAGR (Percent)
Mainframe	95	5	100	105	110	115	120	430	34
Minicomputer	320	19	380	440	515	605	710	830	17
Workstation/PC	495	25	620	770	965	1,135	1,395	1,740	23
Total	910	21	1,100	1,315	1,590	1,855	2,225	3,000	22

EXHIBIT C-12

Turnkey Systems Market Forecast in Local Currency by Market Segment, 1990-1995 Denmark

Subsector	DK Millions								
	1989	1989-1990 Growth (Percent)	1990	1991	1992	1993	1994	1995	1990-1995 CAGR (Percent)
Equipment	780	15	900	1,050	1,170	1,330	1,530	1,750	14
Software and Other Charges	640	23	790	960	1,170	1,430	1,750	2,150	22
Total	1,420	19	1,690	2,010	2,340	2,760	3,280	3,900	18

EXHIBIT C-13

Applications Software Products Market Forecast in Local Currency by Market Segment, 1990-1995 Norway

Subsector	NK Millions								
	1989	1989-1990 Growth (Percent)	1990	1991	1992	1993	1994	1995	1990-1995 CAGR (Percent)
Mainframe	100	5	105	115	120	130	140	150	7
Minicomputer	235	19	280	345	420	515	610	730	21
Workstation/PC	395	25	495	625	780	975	1,210	1,520	25
Total	730	21	880	1,085	1,320	1,620	1,960	2,400	22

EXHIBIT C-14

Turnkey Systems Market Forecast in Local Currency by Market Segment, 1990-1995 Norway

Subsector	NK Millions								
	1989	1989-1990 Growth (Percent)	1990	1991	1992	1993	1994	1995	1990-1995 CAGR (Percent)
Equipment	555	15	640	750	850	970	1,105	1,260	15
Software and Other Charges	455	24	565	705	880	1,100	1,390	1,740	25
Total	1,010	19	1,205	1,455	1,730	2,070	2,495	3,000	20

EXHIBIT C-15

Applications Software Products Market Forecast in Local Currency by Market Segment, 1990-1995 Finland

Subsector	FM Millions								
	1989	1989-1990 Growth (Percent)	1990	1991	1992	1993	1994	1995	1990-1995 CAGR (Percent)
Mainframe	65	8	70	75	75	80	85	90	5
Minicomputer	150	20	180	215	260	310	375	450	20
Workstation/PC	260	23	320	395	485	595	730	900	23
Total	475	20	570	685	820	985	1,190	1,440	20

EXHIBIT C-16

Turnkey Systems Market Forecast in Local Currency by Market Segment, 1990-1995 Finland

Subsector	FM Millions								
	1989	1989-1990 Growth (Percent)	1990	1991	1992	1993	1994	1995	1990-1995 CAGR (Percent)
Equipment	325	14	370	420	480	550	625	715	14
Software and Other Charges	270	24	335	415	515	640	795	985	24
Total	595	18	705	835	995	1,190	1,420	1,700	19

EXHIBIT C-17

Applications Software Products Market Forecast in Local Currency by Market Segment, 1990-1995 Netherlands

Subsector	Dfl Millions								
	1989	1989-1990 Growth (Percent)	1990	1991	1992	1993	1994	1995	1990-1995 CAGR (Percent)
Mainframe	105	5	110	120	125	135	145	155	7
Minicomputer	230	17	270	325	390	465	545	645	19
Workstation/PC	395	25	495	625	790	1,005	1,270	1,600	26
Total	730	20	875	1,070	1,305	1,605	1,960	2,400	22

EXHIBIT C-18

Turnkey Systems Market Forecast in Local Currency by Market Segment, 1990-1995 Netherlands

Subsector	Dfl Millions								
	1989	1989-1990 Growth (Percent)	1990	1991	1992	1993	1994	1995	1990-1995 CAGR (Percent)
Equipment	385	13	435	500	570	655	745	835	14
Software and Other Charges	315	24	390	490	610	760	940	1,165	24
Total	700	18	825	990	1,180	1,415	1,685	2,000	19

EXHIBIT C-19

Applications Software Products Market Forecast in Local Currency by Market Segment, 1990-1995 Belgium

Subsector	BF Millions								
	1989	1989-1990 Growth (Percent)	1990	1991	1992	1993	1994	1995	1990-1995 CAGR (Percent)
Mainframe	1,100	5	1,160	1,250	1,310	1,400	1,500	1,600	7
Minicomputer	2,530	18	2,990	3,540	4,190	4,980	5,900	7,000	19
Workstation/PC	4,270	25	5,350	6,610	8,200	10,220	12,700	15,800	24
Total	7,900	20	9,500	11,400	13,700	16,600	20,100	24,400	21

EXHIBIT C-20

Turnkey Systems Market Forecast in Local Currency by Market Segment, 1990-1995 Belgium

Subsector	BF Millions								
	1989	1989-1990 Growth (Percent)	1990	1991	1992	1993	1994	1995	1990-1995 CAGR (Percent)
Equipment	3,570	14	4,070	4,650	5,350	6,100	7,000	8,000	14
Software and Other Charges	2,920	23	3,590	4,450	5,480	6,770	8,350	10,300	23
Total	6,490	18	7,660	9,100	10,830	12,870	15,350	18,300	19

EXHIBIT C-21

Applications Software Products Market Forecast in Local Currency by Market Segment, 1990-1995 Switzerland

Subsector	SF Millions								
	1989	1989-1990 Growth (Percent)	1990	1991	1992	1993	1994	1995	1990-1995 CAGR (Percent)
Mainframe	55	9	60	60	65	70	80	85	7
Minicomputer	80	19	95	115	135	160	190	230	19
Workstation/PC	130	27	165	205	260	330	415	525	26
Total	265	21	320	380	460	560	685	840	21

EXHIBIT C-22

Turnkey Systems Market Forecast in Local Currency by Market Segment, 1990-1995 Switzerland

Subsector	SF Millions								
	1989	1989-1990 Growth (Percent)	1990	1991	1992	1993	1994	1995	1990-1995 CAGR (Percent)
Equipment	325	17	380	445	515	595	690	800	16
Software and Other Charges	260	25	325	410	515	645	800	1,000	25
Total	585	21	705	855	1,030	1,240	1,490	1,800	21

EXHIBIT C-23

Applications Software Products Market Forecast in Local Currency by Market Segment, 1990-1995 Austria

Subsector	Sch Millions								
	1989	1989-1990 Growth (Percent)	1990	1991	1992	1993	1994	1995	1990-1995 CAGR (Percent)
Mainframe	155	6	165	185	195	210	215	230	7
Minicomputer	355	20	425	505	605	710	840	1,000	19
Workstation/PC	595	26	750	950	1,200	1,500	1,880	2,370	26
Total	1,105	21	1,340	1,640	2,000	2,420	2,935	3,600	22

EXHIBIT C-24

Turnkey Systems Market Forecast in Local Currency by Market Segment, 1990-1995 Austria

Subsector	Sch Millions								
	1989	1989-1990 Growth (Percent)	1990	1991	1992	1993	1994	1995	1990-1995 CAGR (Percent)
Equipment	1,255	16	1,450	1,650	1,890	2,180	2,500	2,900	15
Software and Other Charges	1,025	22	1,250	1,570	1,950	2,400	2,990	3,700	24
Total	2,280	18	2,700	3,220	3,840	4,580	5,490	6,600	20

EXHIBIT C-25

Applications Software Products Market Forecast in Local Currency by Market Segment, 1990-1995 Spain

Subsector	Pta Millions								
	1989	1989-1990 Growth (Percent)	1990	1991	1992	1993	1994	1995	1990-1995 CAGR (Percent)
Mainframe	2,800	7	3,000	3,250	3,500	3,800	4,050	4,400	8
Minicomputer	6,400	20	7,700	9,300	11,250	13,600	16,450	19,900	21
Workstation/PC	10,700	28	13,700	17,650	22,750	29,400	37,900	48,900	29
Total	19,900	23	24,400	30,200	37,500	46,800	58,400	73,200	25

EXHIBIT C-26

Turnkey Systems Market Forecast in Local Currency by Market Segment, 1990-1995 Spain

Subsector	Pta Millions								
	1989	1989-1990 Growth (Percent)	1990	1991	1992	1993	1994	1995	1990-1995 CAGR (Percent)
Equipment	18,650	14	21,300	24,500	28,100	32,300	37,200	42,800	15
Software and Other Charges	15,250	25	19,000	23,700	29,600	36,900	46,200	57,700	25
Total	33,900	19	40,300	48,200	57,700	69,200	83,400	100,500	20

EXHIBIT C-27

Applications Software Products Market Forecast by Market Segment, 1990-1995 Rest of Europe

Subsector	$ Millions								
	1989	1989-1990 Growth (Percent)	1990	1991	1992	1993	1994	1995	1990-1995 CAGR (Percent)
Mainframe	10	10	11	12	13	14	15	16	10
Minicomputer	20	20	24	28	34	40	48	60	20
Workstation/PC	20	20	24	33	40	55	70	90	30
Total (rounded)	50	20	60	75	90	110	135	165	22

EXHIBIT C-28

Turnkey Systems Market Forecast in Local Currency by Market Segment, 1990-1995 Rest of Europe

Subsector	$ Millions								
	1989	1989-1990 Growth (Percent)	1990	1991	1992	1993	1994	1995	1990-1995 CAGR (Percent)
Equipment	55	18	65	70	85	95	110	130	15
Software and Other Charges	45	22	55	70	85	105	135	165	25
Total	100	20	120	140	170	200	245	295	20

D

Detailed Forecast Data—ECUs

EXHIBIT D-1

Applications Software Products Market Forecast in ECUs by Market Segment, 1990-1995 France

Subsector	ECU Millions								
	1989	1989-1990 Growth (Percent)	1990	1991	1992	1993	1994	1995	1990-1995 CAGR (Percent)
Mainframe	153	14	175	182	189	199	211	226	5
Minicomputer	531	21	640	771	932	1,118	1,346	1,587	20
Workstation/PC	655	31	859	1,106	1,426	1,849	2,387	3,231	30
Total	1,339	25	1,674	2,060	2,547	3,166	3,945	5,044	25

EXHIBIT D-2

Turnkey Systems Market Forecast in ECUs by Market Segment, 1990-1995 France

Subsector	ECU Millions								
	1989	1989-1990 Growth (Percent)	1990	1991	1992	1993	1994	1995	1990-1995 CAGR (Percent)
Equipment	655	13	742	852	968	1,106	1,259	1,441	14
Software and Other Charges	539	22	655	793	975	1,186	1,448	1,761	22
Total	1,194	17	1,397	1,645	1,943	2,293	2,707	3,202	18

EXHIBIT D-3

Applications Software Products Market Forecast in ECUs by Market Segment, 1990-1995 Germany

Subsector	ECU Millions								
	1989	1989-1990 Growth (Percent)	1990	1991	1992	1993	1994	1995	1990-1995 CAGR (Percent)
Mainframe	171	6	180	195	212	232	254	278	9
Minicomputer	268	18	317	376	463	561	683	780	20
Workstation/PC	415	24	512	634	805	1,039	1,366	1,771	28
Total	854	18	1,010	1,205	1,480	1,832	2,302	2,829	23

EXHIBIT D-4

Turnkey Systems Market Forecast in ECUs by Market Segment, 1990-1995 Germany

Subsector	ECU Millions								
	1989	1989-1990 Growth (Percent)	1990	1991	1992	1993	1994	1995	1990-1995 CAGR (Percent)
Equipment	1,215	12	1,366	1,561	1,780	2,049	2,317	2,659	14
Software and Other Charges	995	22	1,210	1,488	1,805	2,220	2,732	3,341	23
Total	2,210	17	2,576	3,049	3,585	4,268	5,049	6,000	18

EXHIBIT D-5

Applications Software Products Market Forecast in ECUs by Market Segment, 1990-1995 United Kingdom

Subsector	ECU Millions								
	1989	1989-1990 Growth (Percent)	1990	1991	1992	1993	1994	1995	1990-1995 CAGR (Percent)
Mainframe	101	7	108	115	122	128	142	155	8
Minicomputer	230	12	257	304	365	439	527	628	20
Workstation/PC	372	22	453	574	723	905	1,142	1,446	26
Total	703	16	818	993	1,209	1,473	1,811	2,230	22

EXHIBIT D-6

Turnkey Systems Market Forecast in ECUs by Market Segment, 1990-1995 United Kingdom

Subsector	ECU Millions								
	1989	1989-1990 Growth (Percent)	1990	1991	1992	1993	1994	1995	1990-1995 CAGR (Percent)
Equipment	797	10	878	993	1,128	1,304	1,486	1,689	14
Software and Other Charges	655	18	770	932	1,142	1,392	1,716	2,095	22
Total	1,453	13	1,649	1,926	2,270	2,696	3,203	3,784	18

EXHIBIT D-7

Applications Software Products Market Forecast in ECUs by Market Segment, 1990-1995 Italy

Subsector	ECU Millions								
	1989	1989-1990 Growth (Percent)	1990	1991	1992	1993	1994	1995	1990-1995 CAGR (Percent)
Mainframe	107	6	113	120	130	140	146	160	7
Minicomputer	246	18	290	346	413	489	583	692	19
Workstation/PC	413	25	516	652	826	1,045	1,325	1,678	27
Total	766	20	919	1,119	1,368	1,674	2,054	2,530	22

EXHIBIT D-8

Turnkey Systems Market Forecast in ECUs by Market Segment, 1990-1995 Italy

Subsector	ECU Millions								
	1989	1989-1990 Growth (Percent)	1990	1991	1992	1993	1994	1995	1990-1995 CAGR (Percent)
Equipment	276	11	306	346	396	446	506	569	13
Software and Other Charges	226	21	273	336	419	513	632	776	23
Total	503	15	579	682	816	959	1,138	1,345	18

EXHIBIT D-9

Applications Software Products Market Forecast in ECUs by Market Segment, 1990-1995 Sweden

Subsector	ECU Millions								
	1989	1989-1990 Growth (Percent)	1990	1991	1992	1993	1994	1995	1990-1995 CAGR (Percent)
Mainframe	22	6	24	25	27	28	30	33	7
Minicomputer	45	19	54	66	80	96	116	141	21
Workstation/PC	84	26	107	138	174	219	277	352	27
Total	152	21	184	229	281	343	423	526	23

EXHIBIT D-10

Turnkey Systems Market Forecast in ECUs by Market Segment, 1990-1995 Sweden

Subsector	ECU Millions								
	1989	1989-1990 Growth (Percent)	1990	1991	1992	1993	1994	1995	1990-1995 CAGR (Percent)
Equipment	123	15	142	162	185	216	250	283	15
Software and Other Charges	101	23	123	154	190	236	294	364	24
Total	223	19	265	316	375	452	544	648	20

EXHIBIT D-11

Applications Software Products Market Forecast in ECUs by Market Segment, 1990-1995 Denmark

Subsector	ECU Millions								
	1989	1989-1990 Growth (Percent)	1990	1991	1992	1993	1994	1995	1990-1995 CAGR (Percent)
Mainframe	12	5	13	13	14	15	15	55	34
Minicomputer	41	19	49	56	66	78	91	106	17
Workstation/PC	63	25	79	99	124	146	179	223	23
Total	117	21	141	169	204	238	285	385	22

EXHIBIT D-12

Turnkey Systems Market Forecast in ECUs by Market Segment, 1990-1995 Denmark

Subsector	ECU Millions								
	1989	1989-1990 Growth (Percent)	1990	1991	1992	1993	1994	1995	1990-1995 CAGR (Percent)
Equipment	100	15	115	135	150	171	196	224	14
Software and Other Charges	82	23	101	123	150	183	224	276	22
Total	182	19	217	258	300	354	421	500	18

EXHIBIT D-13

Applications Software Products Market Forecast in ECUs by Market Segment, 1990-1995 Norway

Subsector	ECU Millions								
	1989	1989-1990 Growth (Percent)	1990	1991	1992	1993	1994	1995	1990-1995 CAGR (Percent)
Mainframe	13	5	13	14	15	16	18	19	7
Minicomputer	30	19	35	43	53	65	77	92	21
Workstation/PC	50	25	62	79	98	123	152	191	25
Total	92	21	111	137	166	204	247	302	22

EXHIBIT D-14

Turnkey Systems Market Forecast in ECUs by Market Segment, 1990-1995 Norway

Subsector	ECU Millions								
	1989	1989-1990 Growth (Percent)	1990	1991	1992	1993	1994	1995	1990-1995 CAGR (Percent)
Equipment	70	15	81	94	107	122	139	159	15
Software and Other Charges	57	24	71	89	111	139	175	219	25
Total	127	19	152	183	218	261	314	378	20

EXHIBIT D-15

Applications Software Products Market Forecast in ECUs by Market Segment, 1990-1995 Finland

Subsector	ECU Millions								
	1989	1989-1990 Growth (Percent)	1990	1991	1992	1993	1994	1995	1990-1995 CAGR (Percent)
Mainframe	13	8	14	15	15	17	18	19	5
Minicomputer	31	20	37	44	54	64	77	93	20
Workstation/PC	54	23	66	82	100	123	151	186	23
Total	98	20	118	142	169	204	246	298	20

EXHIBIT D-16

Turnkey Systems Market Forecast in ECUs by Market Segment, 1990-1995 Finland

Subsector	ECU Millions								
	1989	1989-1990 Growth (Percent)	1990	1991	1992	1993	1994	1995	1990-1995 CAGR (Percent)
Equipment	67	14	76	87	99	114	129	148	14
Software and Other Charges	56	24	69	86	106	132	164	204	24
Total	123	18	146	173	206	246	293	351	19

EXHIBIT D-17

Applications Software Products Market Forecast in ECUs by Market Segment, 1990-1995 Netherlands

Subsector	ECU Millions								
	1989	1989-1990 Growth (Percent)	1990	1991	1992	1993	1994	1995	1990-1995 CAGR (Percent)
Mainframe	46	5	48	52	54	59	63	67	7
Minicomputer	100	17	117	141	170	202	237	280	19
Workstation/PC	172	25	215	272	343	437	552	696	26
Total	317	20	380	465	567	698	852	1,043	22

EXHIBIT D-18

Turnkey Systems Market Forecast in ECUs by Market Segment, 1990-1995 Netherlands

Subsector	ECU Millions								
	1989	1989-1990 Growth (Percent)	1990	1991	1992	1993	1994	1995	1990-1995 CAGR (Percent)
Equipment	167	13	189	217	248	285	324	363	14
Software and Other Charges	137	24	170	213	265	330	409	507	24
Total	304	18	359	430	513	615	733	870	19

EXHIBIT D-19

Applications Software Products Market Forecast in ECUs by Market Segment, 1990-1995 Belgium

Subsector	ECU Millions								
	1989	1989-1990 Growth (Percent)	1990	1991	1992	1993	1994	1995	1990-1995 CAGR (Percent)
Mainframe	26	5	27	30	31	33	35	38	7
Minicomputer	60	18	71	84	99	118	140	166	19
Workstation/PC	101	25	127	156	194	242	300	374	24
Total	187	20	225	270	324	393	475	577	21

EXHIBIT D-20

Turnkey Systems Market Forecast in ECUs by Market Segment, 1990-1995 Belgium

Subsector	ECU Millions								
	1989	1989-1990 Growth (Percent)	1990	1991	1992	1993	1994	1995	1990-1995 CAGR (Percent)
Equipment	84	14	96	110	127	144	166	189	14
Software and Other Charges	69	23	85	105	130	160	197	244	23
Total	153	18	181	215	256	304	363	433	19

EXHIBIT D-21

Applications Software Products Market Forecast in ECUs by Market Segment, 1990-1995 Switzerland

Subsector	ECU Millions								
	1989	1989-1990 Growth (Percent)	1990	1991	1992	1993	1994	1995	1990-1995 CAGR (Percent)
Mainframe	31	9	33	33	36	39	44	47	7
Minicomputer	44	19	53	64	75	89	106	128	19
Workstation/PC	72	27	92	114	144	183	231	292	26
Total	147	21	178	211	256	311	381	467	21

EXHIBIT D-22

Turnkey Systems Market Forecast in ECUs by Market Segment, 1990-1995 Switzerland

Subsector	ECU Millions								
	1989	1989-1990 Growth (Percent)	1990	1991	1992	1993	1994	1995	1990-1995 CAGR (Percent)
Equipment	181	17	211	247	286	331	383	444	16
Software and Other Charges	144	25	181	228	286	358	444	556	25
Total	325	21	392	475	572	689	828	1,000	21

EXHIBIT D-23

Applications Software Products Market Forecast in ECUs by Market Segment, 1990-1995 Austria

Subsector	ECU Millions								
	1989	1989-1990 Growth (Percent)	1990	1991	1992	1993	1994	1995	1990-1995 CAGR (Percent)
Mainframe	11	6	11	13	14	15	15	16	7
Minicomputer	25	20	30	35	42	49	58	69	19
Workstation/PC	41	26	52	66	83	104	131	165	26
Total	77	21	93	114	139	168	204	250	22

EXHIBIT D-24

Turnkey Systems Market Forecast in ECUs by Market Segment, 1990-1995 Austria

Subsector	ECU Millions								
	1989	1989-1990 Growth (Percent)	1990	1991	1992	1993	1994	1995	1990-1995 CAGR (Percent)
Equipment	87	16	101	115	131	151	174	202	15
Software and Other Charges	71	22	87	109	136	167	208	257	24
Total	158	18	188	224	267	318	382	459	20

EXHIBIT D-25

Applications Software Products Market Forecast in ECUs by Market Segment, 1990-1995 Spain

Subsector	ECU Millions								
	1989	1989-1990 Growth (Percent)	1990	1991	1992	1993	1994	1995	1990-1995 CAGR (Percent)
Mainframe	22	7	23	25	27	29	31	34	8
Minicomputer	49	20	59	72	87	105	127	153	21
Workstation/PC	82	28	106	136	175	227	292	377	29
Total	153	23	188	233	289	361	450	564	25

EXHIBIT D-26

Turnkey Systems Market Forecast in ECUs by Market Segment, 1990-1995 Spain

Subsector	ECU Millions								
	1989	1989-1990 Growth (Percent)	1990	1991	1992	1993	1994	1995	1990-1995 CAGR (Percent)
Equipment	144	14	164	189	217	249	287	330	15
Software and Other Charges	118	25	146	183	228	285	356	445	25
Total	261	19	311	372	445	534	643	775	20

EXHIBIT D-27

Applications Software Products Market Forecast in ECUs by Market Segment, 1990-1995 Rest of Europe

Subsector	ECU Millions								
	1989	1989-1990 Growth (Percent)	1990	1991	1992	1993	1994	1995	1990-1995 CAGR (Percent)
Mainframe	12	10	13	14	16	17	18	19	10
Minicomputer	24	20	29	34	40	48	58	72	20
Workstation/PC	24	20	29	40	48	66	84	108	30
Total (rounded)	60	20	70	90	105	130	160	200	22

EXHIBIT D-28

Turnkey Systems Market Forecast in ECUs by Market Segment, 1990-1995 Rest of Europe

Subsector	ECU Millions								
	1989	1989-1990 Growth (Percent)	1990	1991	1992	1993	1994	1995	1990-1995 CAGR (Percent)
Equipment	66	18	78	84	102	114	133	157	15
Software and Other Charges	54	22	66	84	102	127	163	199	25
Total	120	20	145	169	205	241	295	355	20

E

Forecast Reconciliation, 1989-1990

Exhibit E-1 shows the changes made in this year's forecast in comparison to that of the previous year.

The change in the size of the market for the base year of 1989 is largely accounted for by the general use of European currencies against the US dollar which amounted to just over 3% on average.

The constancy of the growth rates forecast marks the increased inflation assumption of approximately 1% per annum and thus reflects a marginally pessimistic view due to the expectation of difficult economic conditions in Europe generally over the five year forecast period.

EXHIBIT E-1

Applications Solutions
Reconciliation of Market Forecast
Western Europe

Subsector	1989 Market			1994 Market			1989-1994 CAGR Forecast in 1989 (Percent)	1990-1995 CAGR Forecast in 1990 (Percent)
	1989 Report ($ Millions)	1990 Report ($ Millions)	Variance (Percent)	1989 Report ($ Millions)	1990 Report ($ Millions)	Variance (Percent)		
Applications Software Products	5,380	5,700	+6	15,120	15,800	+4	23	23
Turnkey Systems	8,030	8,300	+3	19,500	19,250	-1	19	18

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