INPUT

STRATEGIC MARKET PERSPECTIVE

Key Applications that Drive SI Projects

Europe, 1993-1998

Systems Integration Programme—Europe

MARCH 1994

KEY APPLICATIONS THAT DRIVE SI PROJECTS

EUROPE, 1993-1998

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Abstract

The advent of the concept of business re-engineering supported by new enabling technologies such as client/server architecture and document image processing is causing many organisations to rethink the application of information systems to their business processes. This is leading to changes in the pattern of applications giving rise to major systems projects. This pattern is becoming increasingly volatile.

This report tackles this issue by identifying the key applications which are driving systems integration projects in each of twelve industry sectors.

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Key Applications that Drive SI Projects Europe, 1993-1998

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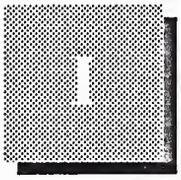


Introduction

A

Objectives

The systems integration market remains one of the fastest growing segments within the European information services market. However, even this market is becoming more volatile as organisations react to the increasingly competitive environment in differing ways. In some organizations, information technology (IT) is once again being used aggressively to enhance the organisation's service delivery to customers leading potentially to large systems integration (SI) projects. In other instances, information systems (IS) are viewed primarily as an expensive overhead where spending needs to be minimised.

Within this environment, it can be difficult to identify the major application areas which are consistently generating SI projects. The aim of this report is to identify the major applications giving rise to SI projects within each industry sector.

B

Scope and Methodology

This report identifies the major applications leading to SI projects in each of the following twelve sectors:

- Government
  - Defence
  - Central government
  - Local government and health care

- Financial services
  - Banking and finance
  - Insurance

- Manufacturing
  - Process
  - Discrete
- Utilities (Gas/Water/Electricity)
- Transportation (Air/Sea/Road/Rail)
- Telecommunications
- Distribution (Retail/wholesale)
- Business Services

INPUT's industry sector definitions are provided in Appendix A.

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

As listed in Exhibit I-1, the components of a SI project are the following:

- *Equipment* - Includes information processing and communication equipment required to build the systems solution. This component may include custom, as well as off-the-shelf, equipment to meet the unique needs of the project. The SI equipment category excludes turnkey systems by definition.
- *Software products* - Includes prepackaged applications and systems software products.
- *Professional services* - Includes the value-added component that adapts the equipment and develops, assembles or modifies the software and hardware to meet the system's requirements. It includes all of the professional service's activities required to develop, implement, and if included in the contract, operate an information system, including consulting, programme/project management, design and integration, software development, education and training, documentation and systems operations and maintenance.

- *Other services* - Most SI contracts include other services and product expenditures that are not classified elsewhere. This category includes miscellaneous items such as engineering services, automation equipment, computer supplies, business support services and supplies and other items required for a smooth development effort.

EXHIBIT I-1

Products/Services in Systems Integration Projects

- Equipment
  - Information Systems
  - Communications
- Software Products
  - Systems software
  - Applications software
- Professional Services
  - Consulting
    - Feasibility and trade-off studies
    - Selection of equipment, network and software
  - Programme/project management
  - Design/integration
    - Systems design
    - Installation of equipment, network and software
    - Demonstration and testing
  - Software development
    - Modification of software packages
    - Modification of existing software
    - Custom development of software
  - Education/training and documentation
    - Systems operations/maintenance
- Other Miscellaneous Products/Services
  - Site preparation
  - Data processing supplies
  - Processing/network services
  - Data/voice communication services

This study is based on the following:

- 20 interviews of users in the retail sector across France, Germany and the U.K.
- 20 interviews of users in the banking and finance sector across France, Germany and the U.K.
- INPUT's database of SI projects awarded over the past three years.

C

Report Structure

Section II consists of the Executive Overview which is a summary of the key conclusions of the study.

Section III identifies the key applications leading to SI projects in each of the twelve industry sectors listed above.

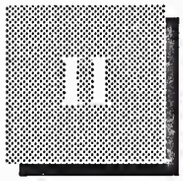
Section IV contains a more detailed analysis of application demand within the banking and finance sector.

Section V contains a more detailed analysis of application demand within the retail sector.

D

Related Reports

- *Systems Integration Opportunities in Re-engineering, Europe 1992*
- *Impact of Downsizing on Systems Integration, Europe 1992-1997*
- *Systems Integration Vendor Analysis, Europe 1992*
- *Methods for Successful Systems Integration Projects, Europe 1992*
- *Procurement Approaches to Systems Integration, Europe, 1993*
- *Systems Integration Market, Europe, 1993-1998*
- *Client/Server Impact on Major Project Contracting, Europe 1993-1998*



Executive Overview

A

Improved Customer Service Defines Leading SI Applications Drivers

The initiation of a systems integration (SI) project by an organisation is an implicit acknowledgment that a radical change in IT support is needed by one or more business processes. Consequently, the timing of SI projects can vary significantly even between organisations in the same industry sub-sector.

Some organisations will react aggressively in response to increasing competition in their business environment. Others will only react when it becomes essential for them to do so. As a result, it can be difficult to identify the major applications which are generating SI projects within an industry.

However, major SI projects are more prevalent in industry sectors where:

- There is a major discontinuity in the business environment, or
- Where the nature of the products and services delivered is changing rapidly.

As a result, it is possible to identify:

- Some industries where the rate of change of information systems is comparatively high
- A range of applications having a significant impact across a number of sectors.

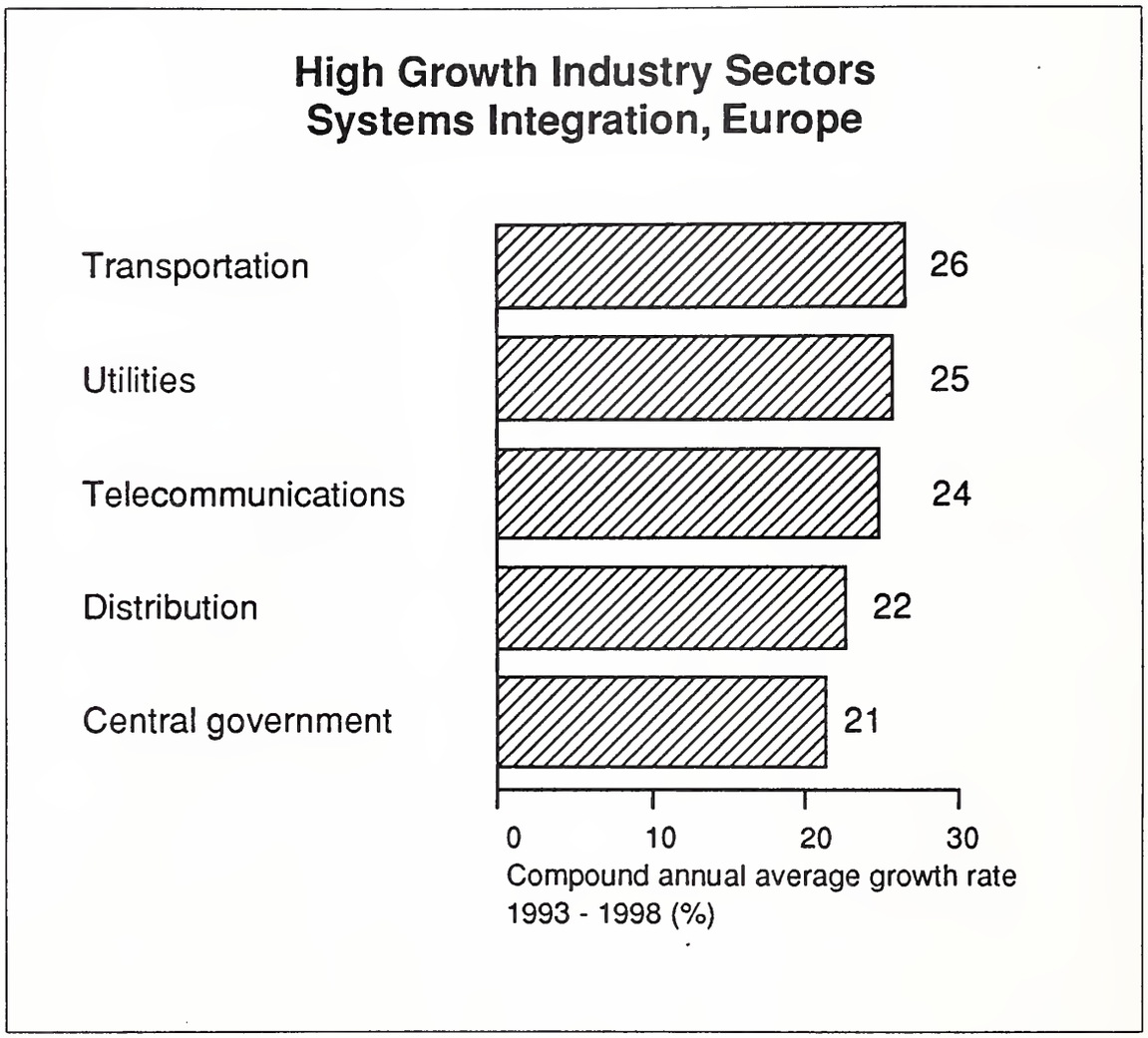
In addition, technical integration skills are now a key requirement as users increasingly require vendors to operate in multivendor networked environments.

B

Transportation and Utilities are High Growth Sectors

Exhibit II-1 lists the growth rates for the industry sectors expected to exhibit the highest growth in Europe over the next five years.

EXHIBIT II-1



The banking and finance sector remains the single largest commercial sector as a source of SI projects in Europe. However, despite the considerable commercial pressures facing organisations in this sector, the rate of SI revenue growth is lower here than in a number of other sectors.

In particular, the transportation, utilities and telecommunications sectors are experiencing major changes in their business environments.

The transportation sector is experiencing rising competition between different modes of transport. For example, high speed railways and the additional

options offered by the Channel Tunnel are challenging short-haul air services. Many ports are adopting harbour control systems to facilitate the clearance of goods and improve their service offerings to freight customers.

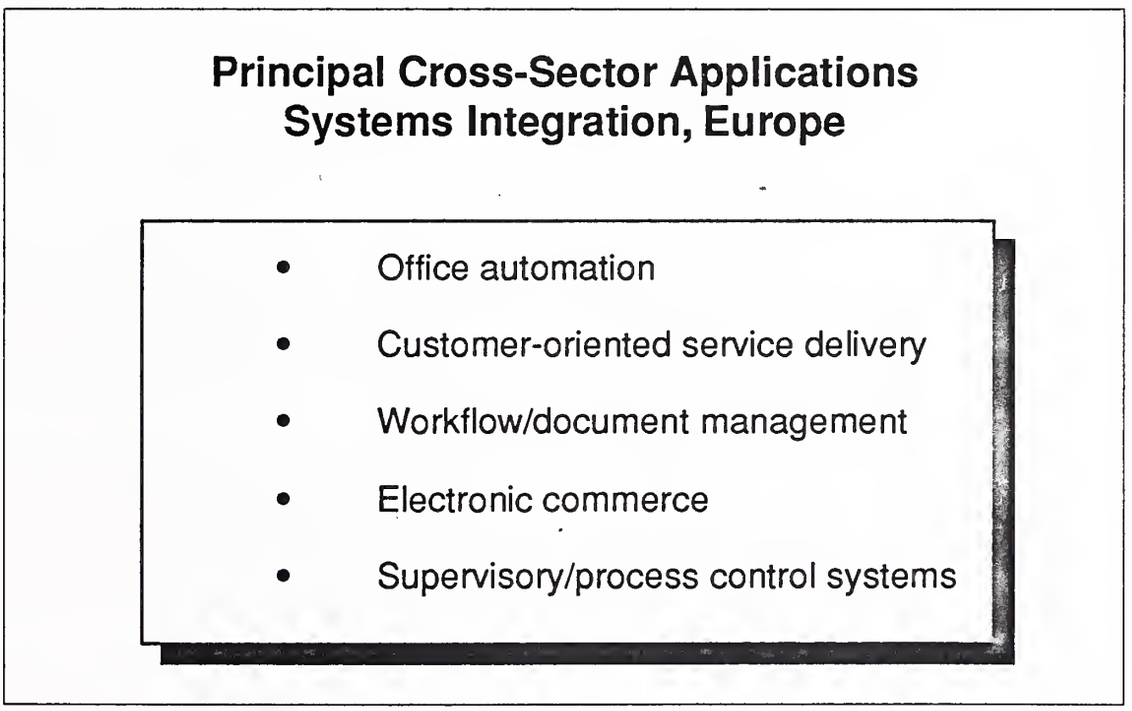
The telecommunications sector faces the combined challenge of increased competition and a rapidly changing service portfolio. This has led to considerable expenditure on new customer service/billing systems and network management systems for operational control of the new services.

C

Office Automation and Customer-Oriented Service Delivery are Leading Drivers of SI Projects

Exhibit II-2 lists the leading applications driving SI projects across a number of industry sectors in Europe.

EXHIBIT II-2



Examples of SI projects based around office automation include:

- The $500 million CHOTS project for the U.K. Ministry of Defence
- The Bundeswehr office project in Germany
- The Osprey project for the Department of Trade and Industry in the U.K.

- The $160 million House 2 project for the Home Office in the U.K.

As is evident from the above examples, office automation projects have been especially prevalent in providing improved communication between sites in the central government, local government and defence sectors.

In the commercial services sectors, there is a powerful trend toward customer- (rather than product) oriented service delivery. This is most evident in the banking and finance, insurance and business services sectors. In these sectors, organisations have achieved this new orientation either by implementing new GUI-based front-ends to link applications or by re-implementing support for their service offerings.

Examples of the former approach include:

- Unisys' project for Caisse D'Epargne in France covering 200 branches

- Logica's project for Norwich Union.

An example of a project providing a major new client-centred banking system is the project being undertaken by Sema Group and IBM on behalf of two French regional savings banks. This project has a value of $85 million.

Workflow is also becoming an important source of projects in the banking and finance, insurance and business services sectors, as a means of improving service delivery and customer responsiveness.

Electronic commerce is a major source of projects in process manufacturing, discrete manufacturing and distribution sectors as organisations endeavour to streamline their supply chain management procedures. Electronic commerce is centred around electronic data interchange (EDI) and represents the elimination of paper documents within these sectors.

Supervisory control systems are a major source of SI projects in the process manufacturing sector where they provide the link between the shopfloor equipment and the organisations' administrative systems. Supervisory control systems are also important in the utilities and telecommunications sectors. Examples of projects in these sectors include:

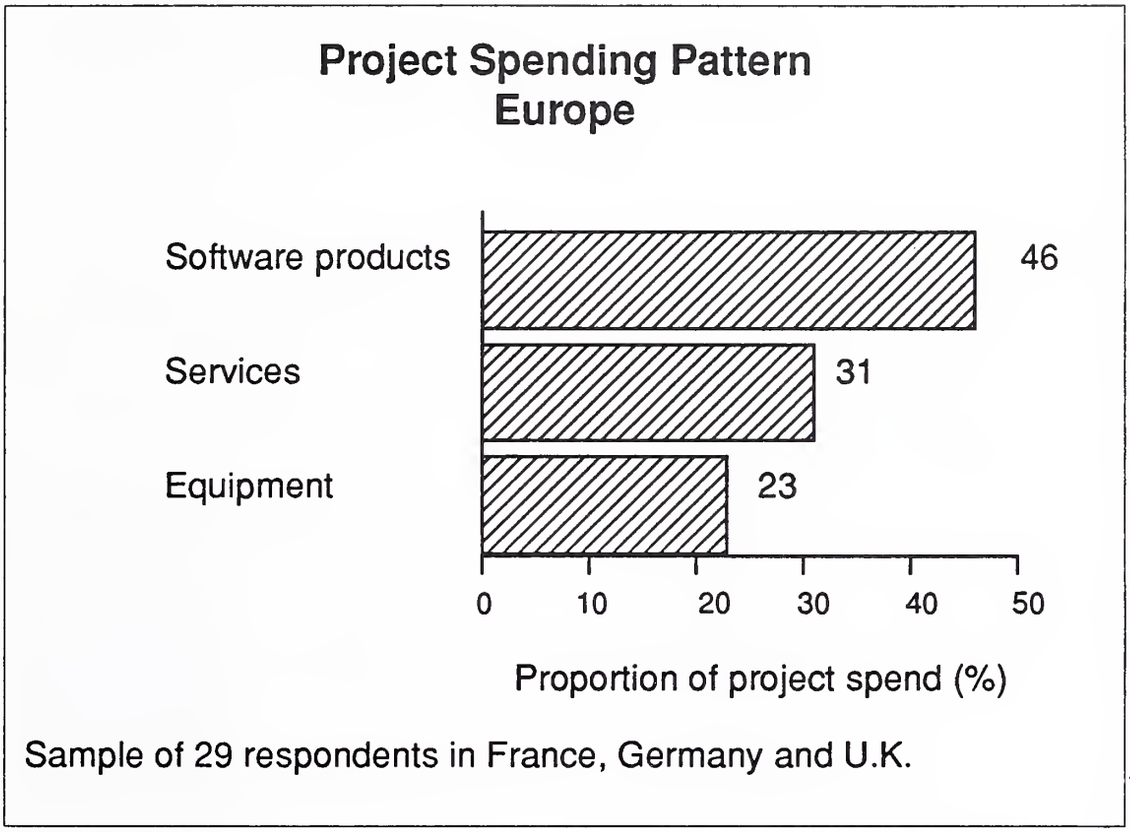
- Provision of an infrastructure management system for a digital mobile communications network run by Deutsche Bundespost Telekom

- Logica's telemetry projects on behalf of Anglian Water and Yorkshire Water Authority

- Provision of a system for remote management of outlying nuclear generating stations on behalf of Electricité de France.

Exhibit II-3 shows the current spending breakdown of major projects as estimated by users.

EXHIBIT II-3



Although custom development is still relatively important in the retail sector, users perceive that the expenditure on major SI projects is now dominated by software products.

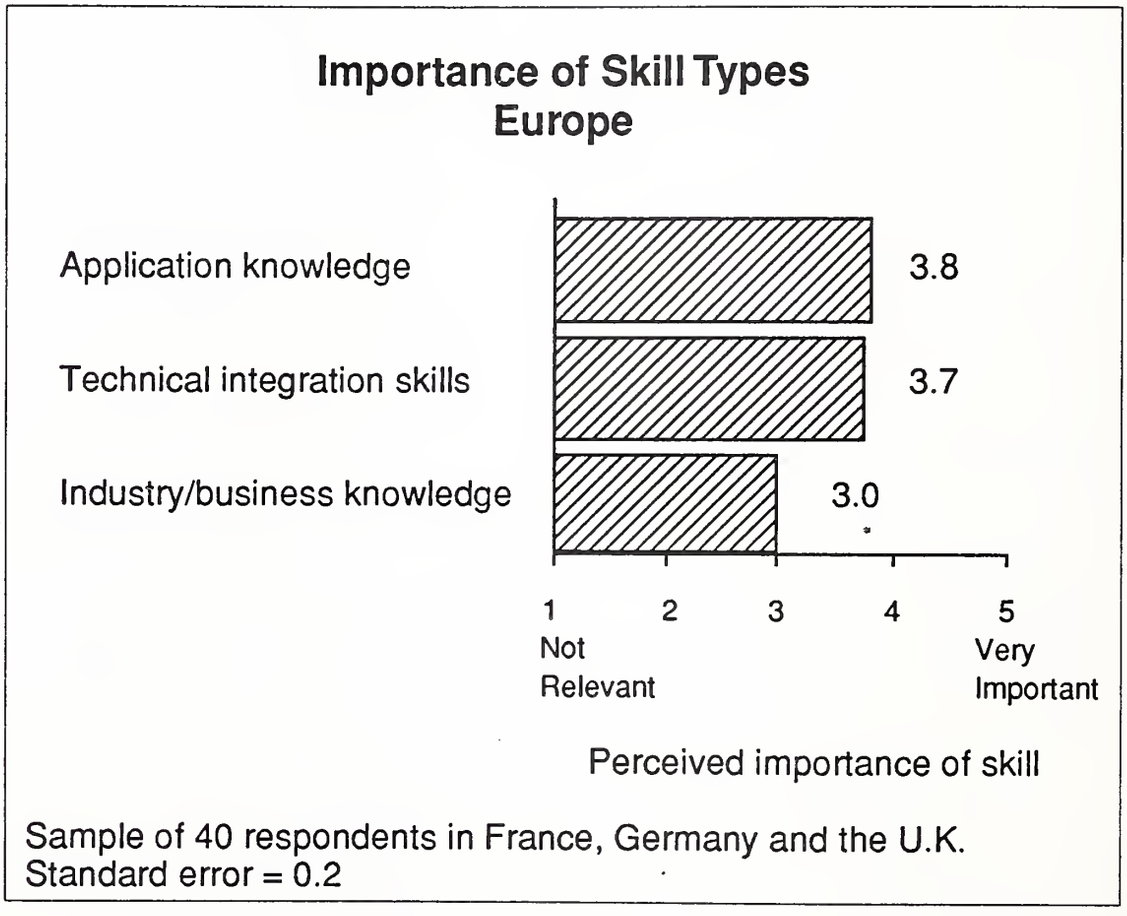
In addition to the trend toward use of application software products, organisations are adopting preferred 4GLs as their bases for project development. Both these trends are motivated by the needs for rapid application development, implementation and cost savings.

D

Networking Expertise and Application Knowledge are Critical Success Factors

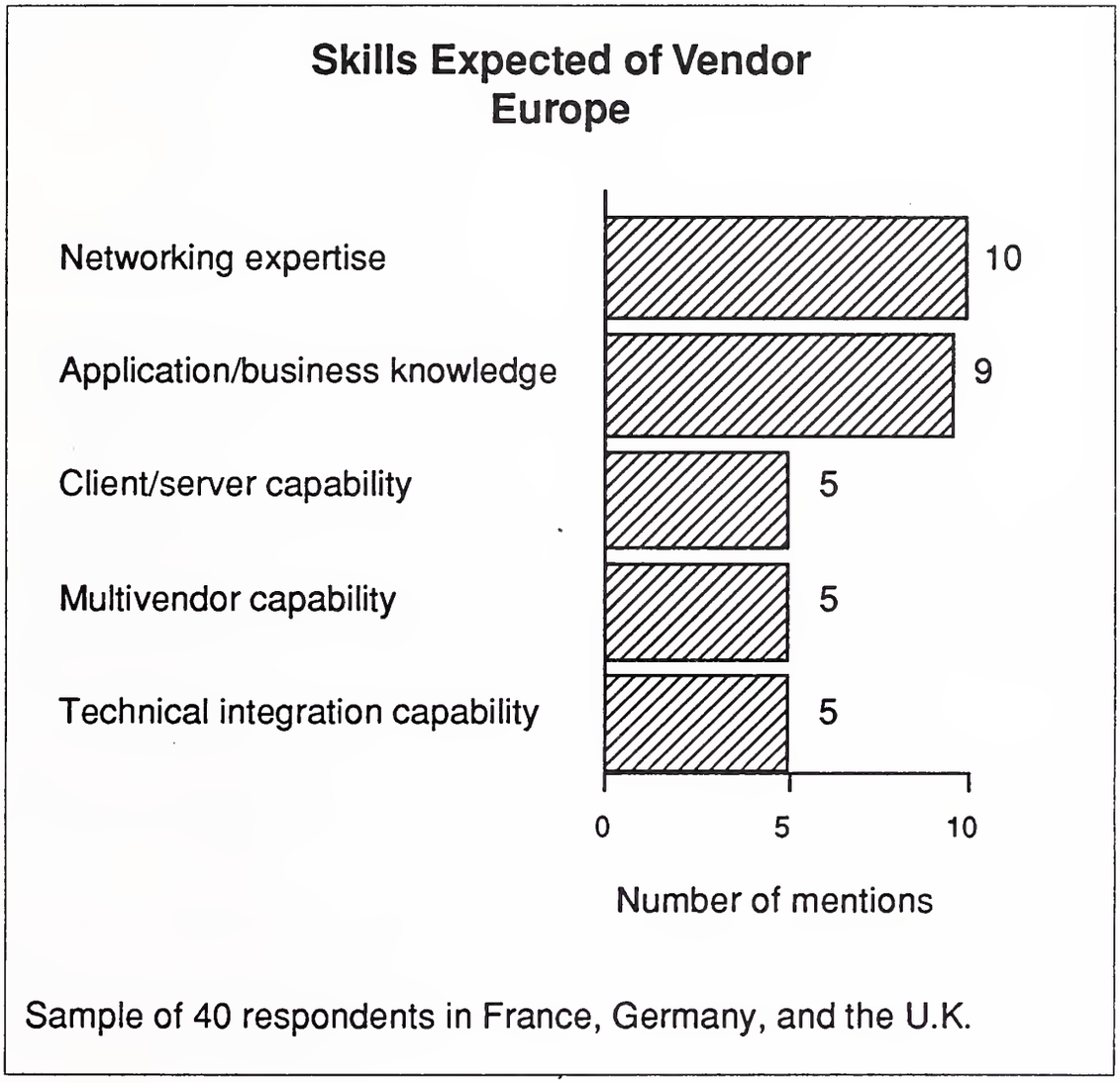
Exhibit II-4 lists the ratings users gave to the importance of vendors possessing each of a number of potential skill types when undertaking major projects.

EXHIBIT II-4



In addition, users were asked to nominate the skills they perceived to be important. The results are listed in Exhibit II-5.

EXHIBIT II-5



Users expect vendors to have a detailed knowledge of the application area required. However, technical integration skills are now viewed as having approximately equal importance. In particular, it is important vendors have networking expertise and multivendor capability.

For example, users in the retail sector expected vendors to exhibit simultaneous capabilities in:

- LAN and WAN integration
- AS/400 and UNIX operating systems
- A range of point-of-sale (PoS) equipment

The need for multivendor network integration is equally evident in the banking and finance sector.

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III

Industry Sector Analysis

A

Industry Profile of SI Market Impacted by Business Re-engineering

In the past, the industry sector profile of the systems integration (SI) market has been comparatively slow to change. After the government sector, the market has been dominated by the financial services and manufacturing sectors. This is now starting to change as other sectors, such as the retail and transportation sectors, recognise the contribution that IT can make in assisting the implementation of re-engineered business processes.

In addition, the rapid growth in new services and the introduction of higher levels of competition into the telecommunications sector is generating a high level of SI business in this sector.

The government sector has always been the major contributor to the SI market in Europe. This can be expected to continue, especially as the French and British governments concentrate on diverting activities away from civil service departments.

However, the pattern of demand in the commercial sector is beginning to change.

Exhibit III-1 provides a breakdown of the European SI market by industry sector for 1992 and Exhibit III-2 provides a growth forecast by industry sector.

EXHIBIT III-1

Systems Integration Industry Sector Analysis
Europe, 1992

Sector	Value ($M)	Proportion of Market (Percent)
Government	1,655	41
• Defence	530	13
• Central	750	18
• Local	375	9
Financial Services	860	21
• Banking and Finance	550	14
• Insurance	310	8
Manufacturing	660	16
• Process	300	7
• Discrete	360	9
Utilities	385	9
Transportation	235	6
Telecommunications	185	5
Distribution	85	2
Total	4,065	100

EXHIBIT III-2

Systems Integration Industry Sector Forecast Europe, 1993-1998

Sector	Market Size ($M)		
	1993	1998	CAGR (Percent)
Government	1,990	4,810	19
• Defence	630	1,380	17
• Central	920	2,380	21
• Local	440	1,050	19
Financial Services	940	1,920	15
• Banking and Finance	580	1,180	15
• Insurance	360	740	16
Manufacturing	710	1,450	15
• Process	330	740	18
• Discrete	380	710	13
Utilities	470	1,410	25
Transportation	315	1,020	26
Telecommunications	225	650	24
Distribution	110	300	22
Total	4,760	11,560	19

Traditionally, the commercial SI market has been dominated by projects in the financial services and manufacturing sectors. These sectors have traditionally invested heavily in information systems but are now showing signs of concern regarding the level of business benefits derived from these investments.

Consequently, there are now signs of the demand from these two sectors stagnating, and new sectors such as utilities, transportation and distribution are assuming a greater importance in the SI market.

Sectors such as retail and transportation have been comparatively low investors in the past. However, these traditional low investors are often characterised by the highly distributed nature of their operations. The advent of client/server architectures has led such organisations to perceive that information technology and communications have now matured to the stage where they can provide real business benefits.

The remainder of this chapter identifies the key applications that are generating SI projects for each of the following sectors:

- Defence
- Central government
- Local government and health care
- Banking and finance
- Insurance
- Process manufacturing
- Discrete manufacturing
- Utilities
- Transportation
- Telecommunications
- Distribution
- Business services.

B

Defence - Aiming to Improve Responsiveness

The end of the cold war has ushered in a period of cost reduction and downsizing in respect to defence spending. Nonetheless, the defence sector remains a major source of large SI projects as the military adapts to their new peacekeeping role.

In particular, now that the military threat from the Soviet Union has been replaced by a collection of less specific threats from the Middle-East, the military needs to be able to respond in a more flexible manner. This places considerably increased demands on the military's logistics capability. The example of Iraq and the response of *Desert Storm* taught a number of lessons with regard to modern military operations. One was the need for rapid mobilisation of forces and another was the need to be able to cope with the complexity of interoperation among a multinational task force once the joint political will to act had been created.

This has led to a number of major logistics projects such as:

- The LITS (Logistics IT Strategy) for the RAF, currently at the shortlist stage with three consortia, with a value estimated in excess of $600 million over the life of the project.

- UNICOM, a contract placed with Groupe Bull for a supplies system for the British Army, with a total value estimated in excess of $350 million over the life of the project.

Technology is also being used to improve battlefield communications systems and command and control systems. Examples include:

- The Nemesis battlefield identification system contract valued at $6 million. This project arose out of a desire to limit future "friendly-fire" casualties, such as those that arose during the Gulf War.

- Command and control systems for Type 23 and Horizon frigates.

In addition, the need for rapid response and improved coordination led to a demand for secure office automation projects such as CHOTS.

The key applications driving SI projects in the defence sector are summarised in Exhibit III-3.

EXHIBIT III-3

Key Applications
Defence - Europe

Application	Driving Forces
Supply and engineering logistic systems	Coordination of dispersed centres Cost reduction and downsizing Improved access to supplies
Office automation (secure)	Improved coordination/response Automated Records Management
Command and Control systems	New generations of warships Need for improved battlefield communication and identification systems

C

Central Government Seeks Administrative Efficiency

Central Governments are having difficulty keeping public expenditure under control, when faced with factors such as:

- High, and increasing levels of unemployment
- Ageing populations
- The demands made by improving medical technology.

Simultaneously, the adverse economic environment is limiting government income generation through taxation. Accordingly, the principal pressures on central government are the needs for more efficient delivery and administration of public services.

Additionally, there exists the need to be responsive and provide greater levels of service to the public thus demonstrating greater accountability in the effective and efficient use of tax-payers' money. Privatisation, once only an ideological imperative in the U.K., is becoming increasingly attractive as an economic policy in many other countries around the world.

Because of the budgetary pressure on governments, it is important the operational systems within government departments ensure that:

- All taxes are collected
- Only legitimate benefit payments are incurred.

Information technology can play a major role in achieving these aims by:

- Using advanced office automation techniques such as workflow and document image processing
- Linking administrative offices
- Linking government departments.

Accordingly, many recent projects have been concerned with the implementation of operational systems across the geographically dispersed offices of individual government departments. Examples of this type of project are:

- The Maiden project valued at $30 million for the U.K. Ministry of Agriculture, Food and Fisheries

- The Home Office UNIX Systems Environment 2 (House 2) criminal justice system valued at $160 million
- The National Infrastructure Procurement project for the U.K. departments of Environment and Transport, valued at $30 million
- The client/server implementation for the Belgian Ministry of Social Security
- The office automation project for the Bundeswehr Office in Germany.

Increasing crime rates and the mobility of criminals is also producing a demand for criminal information systems. Examples of projects of this type include:

- The Police National Computer (PNC2) project awarded to SNI
- The National Fingerprint and Crime Reporting System projects on behalf of the Metropolitan Police.

Geographical information systems are being adopted for planning purposes. For example, the Department of Transport in the U.K. is intending to implement a computerised street and road works register based around a geographical information system.

The key applications driving SI projects in central government are summarised in Exhibit III-4.

EXHIBIT III-4

Key Applications
Central Government - Europe

Application	Driving Forces
Operational/administrative office automation systems specific to government departments	Reduced paper-handling Greater efficiency at point-of-service
Criminal Information systems	Improved communication/ availability of information between locations Mobility of criminals
Geographic Information systems	Cost reduction Improved access to information
Customs handling systems	Impact of 1992/1993 legislation
Post office systems/ counter automation	Cross-selling of services Improved international mail handling
Interoperability projects	Improved access to information Administrative efficiency

D

Local Government and Health Care - Improved Sharing of Information

The key applications driving SI projects in the local government and health care sectors are listed in Exhibit III-5.

EXHIBIT III-5

Key Applications
Local Government and Health Care

Application	Driving Forces
Hospital information support systems	Need to monitor hospital activity and performance levels
Criminal information systems	Rising crime rates
Office automation	Decentralised administration

Overall, the local government and health care sectors are not major sources of large SI projects.

In the health sector, the implementation of Hospital Information Support Systems, entailing the replacement of existing information systems throughout a hospital, can lead to projects of $20 million. In addition, the establishment of health care administration infrastructures within eastern Europe has led to major projects such as the one for Universal Health Insurance in the Czech Republic.

Within local government, there has been an increased demand for criminal information systems and for improved access to information across local government boundaries in response to rising crime rates and higher levels of criminal mobility.

Office automation is important to enable local authorities to share information and, in some cases, enables them to decentralise their activities.

E

Banking and Finance - Improving Customer Service

The needs of the banking and finance sector are discussed in detail in Section IV. In addition, the key applications driving SI projects in the banking and finance sector are listed in Exhibit III-6.

EXHIBIT III-6

Key Applications
Banking and Finance - Europe

Application	Driving Forces
Dealing systems	Desktop integration Change to digital information feeds
Cheque/credit card management	Competition for lucrative credit card market
Customer-oriented service delivery/integration of financial services	Improved marketing access for tellers/branches Cross-selling of financial services Improved customer service
Workflow systems Electronic Document Management	Improved efficiency/ document handling Improved customer service Improved interlocation/ department links
Retail banking systems Interbank clearing systems	Development of banking infrastructure in Eastern Europe
Home banking	Cost reduction, customer service, 24-hour access
Stock exchange clearing and settlement systems	Competition between rival stock exchanges

Dealing room systems have been a major source of projects in this sector over recent years, as financial institutions have changed to digital information feeds and endeavoured to consolidate dealing onto a single screen. Examples of this type of project include:

- Logica's implementation of dealing room systems for the VSB Groep in the Netherlands
- Sema Group's implementation of dealing systems for BNP in France
- Syntegra's implementation of OTSview, its trading support system, on behalf of Nippon Credit Bank in the United Kingdom.

There is also intense competition within Europe for the lucrative credit card market. One example is a project generated as a result is Sema Group's development of a credit card management system on behalf of a consortium of German savings banks. Further projects are likely to arise out the move to use smartcards as cash alternatives in a number of European countries, including the United Kingdom, Spain and Denmark.

Within the retail banking sector, the primary driving forces are:

- The desire to cross-sell financial services while improving customer service
- The need to reduce the cost of delivery of services.

Examples of projects designed to improve customer focus and cross-selling of services are:

- Unisys' project for Caisse D'Epargne in France to improve access to marketing information for tellers
- The bank branching system valued at $85 million developed by IBM and Sema Group for two French regional savings banks.

F

Insurance - Improving Response Times

The key applications driving SI projects in the insurance sector are listed in Exhibit III-7.

EXHIBIT III-7

Key Applications
Insurance - Europe

Application	Driving Forces
Workflow/document management	Improved customer response times. Administrative efficiency
Customer-oriented service delivery	Improved customer service Cross-selling of services
Claims processing	Improved administrative efficiency

Like the banks, insurance companies have typically been product-oriented rather than customer-focused. Accordingly, much of their customer information is held by policy number and duplicated across product-based applications. The trend to customer-oriented service delivery has generated projects such as that conducted by Logica on behalf of Norwich Union to build a common front-end providing access to all financial services products.

However, the major development within the Insurance sector is the introduction of workflow systems. Initially these systems are being implemented:

- In life assurance rather than general insurance
- In new policy sales rather than claims administration.

However, workflow and document management systems have the potential to revolutionize the administration of insurance companies. Accordingly, they are expected to remain a major source of SI projects for many years.

G

Process Manufacturing - Integrating pan-European Production

The key applications driving SI projects in the process manufacturing sector are listed in Exhibit III-8.

EXHIBIT III-8

Key Applications
Process Manufacturing - Europe

Application	Driving Forces
Distributed manufacturing systems/ enterprise computing systems	Pan-European production Desire to integrate data from all plants/common production management
Supervisory control	Sensors permit real-time process control
Electronic commerce	Need for JIT delivery to retailers Increased customer responsiveness Pipeline distribution
Emergency control centres/ Environmental monitoring	Stricter regulation

The key need of organisations in the process manufacturing sector is to achieve improved coordination:

- Between geographically dispersed plants
- Between process control equipment and administrative systems
- Between their organisation and the retailers.

Like their counterparts in the discrete manufacturing sector, process manufacturing organisations are migrating from centralised production management systems such as SAP's R/2 to decentralised systems such as R/3.

However, it remains easier for process manufacturing companies than discrete manufacturing companies to establish strong links between their shop floor machinery and administrative systems. This is because much of the required data is readily collected by the process control equipment already installed.

The supply chain for products, typically produced by the process manufacturing sector, is strongly controlled by the retailers not the producers. As a result, process manufacturing companies are having to adopt electronic commerce to develop high levels of responsiveness to retailers' needs.

In addition, environmental considerations are steadily increasing in importance in the process manufacturing sector.

H

Discrete Manufacturing - Improving Dealer Services

The key applications driving SI projects in the discrete manufacturing sector are listed in Exhibit III-9.

EXHIBIT III-9

Key Applications
Discrete Manufacturing - Europe

Application	Driving Forces
Distributed production management systems	Coordination of pan-European production
Electronic commerce including CAD EDI	Reduce time to market Improved service to dealers/ retailers
Dealer systems including CBT maintenance documentation	Tie in of dealers Improved product knowledge/ customer service from dealers
CIM, Concurrent Development	Integrated manufacturing, improved quality, accurate design, speedier development, improved quality.

The overriding imperative for manufacturing companies is to match the challenges of intensifying competitive conditions. At the business level, these are manifested as the need to match fragmenting, and rapidly changing, customer preferences through more flexible production systems.

The business needs are improving the value of products through better quality, increasing speed, efficiency and reliability and improving the postproduction processes involved in the distribution of goods and after-sales service.

At the administrative level, many companies are changing from centralised systems to distributed production management systems such as SAP R/3.

Concurrent engineering is a key application development required to design improved products and get them into production more quickly. Improved communications capabilities, including increased bandwidth, are vital to the support of concurrent engineering implemented across distributed facilities. The backbone of CIM systems is the electronic exchange of data and information between the engineering design, operations and productions systems.

In the discrete manufacturing sector, the driving force for the adoption of electronic commerce has been the major manufacturers, as they have endeavoured to devolve more of the responsibility for stockholding and quality control to their suppliers.

However, faced with strong price competition, manufacturers are seeking to achieve a competitive advantage by improving the level of service to their dealers and, hence, making it difficult for them to switch suppliers.

As a result, there has recently been an emphasis on improving dealer systems. Examples of SI projects of this type include:

- A system for Adam Opel in Germany for the provision of access to technical information from 6000 geographically distributed repair shops (Hewlett-Packard)

- A system for Renault to connect 5000 dealers throughout Europe, using UNIX-based PCs as nodes—value $50 million.

Imaging systems (e.g., service manuals) and expert systems provided through networks will contribute significantly to improved processes for post-production service provision.

I

Utilities - Implementing New Customer Service Systems

The key applications driving SI projects in the utilities sector are listed in Exhibit III-10.

EXHIBIT III-10

Key Applications
Utilities - Europe

Application	Driving Forces
Customer service systems	Improved customer service, responsiveness Pressure from regulators
Power station control/ management	Cost reduction, reliable service, energy conservation
Telemetry/flow monitoring/ long-distance command and control systems/ pipeline management	Operational efficiency, reliability
Digital records/ geographic information systems	Cost reduction Improved information for maintenance personnel etc.

In the face of competitive and consumer pressure, utilities are being forced to change from a monopoly status with a culture oriented to a public service obligation, to a service-oriented business mode where costs must be controlled and profitable operations achieved. Utilities have to manage increasingly complex power systems where capital investments have to be planned on a strategic planning horizon measured in decades (at least 10 to 20-year periods). At the same time, they have to attempt to accurately forecast consumer and business demands on a short- and long-term basis.

However, the most critical need for utilities changing to service-oriented businesses, is the need to improve its customer service delivery. This is illustrated by the high level of demand among the recently privatised utilities in the U.K. for customer service systems. Examples of major projects which have been initiated include:

- Andersen Consulting's development of a customer service system for Thames Water, valued at $20 million

- IBM's development of a customer service system for South Wales and South Western Electricity Boards, valued at $50 million.

Utilities are also initiating major SI projects to monitor and control their facilities and distribution networks.

The applications required concern the control of plant and transmission systems. Advanced telecommunications technology can support utility communications systems that manage large-scale distribution automation, load control systems functions between operations control centres, load dispatch centres, substations, feeders, meters and customer loads.

Recent examples of projects of this type include:

- Technical infrastructure project for National Power (Andersen Consulting, value $20 million)

- Distribution network management system for British Gas (Digital, value $20 million)

- A system for remote administration of power generating stations on behalf of EDF in France.

Geographic information systems are an important means of maintaining up-to-date information on the utilities' distribution networks, particularly for logging and coordinating maintenance activities.

J

Transportation - Competition between Modes is Increasing

The key applications driving SI projects in the transportation sector are listed in Exhibit III-11.

EXHIBIT III-11

Key Applications
Transport - Europe

Application	Driving Forces
Airport infrastructure support/ air traffic control	Volume of traffic Pressure on airspace
Freight/airmail management systems	Reduced delivery times/ better customer service
Urban transportation systems	Multivendor integration Improved operational data for management Improved customer service
Motorway management systems	Privatisation of highways
Harbour systems (customs, transportation etc.)	Competition between ports/ modes of transport Improved customer service

Competition between different modes of transport is increasing, for example; high-speed railways challenging short-haul air routes, whilst innovative operators seek intermode cooperation or offer combined services.

Increasing competition is driving the need for higher productivity growth, often through infrastructure development, in order to deliver more customised services at a higher quality. Service is measured by the ability to track and manage goods in transit and deliver them in an agreed timescale.

This is leading to the need to develop improved procedures for processing orders and the utilisation of electronic document interchange. Integrated dispatch and tracking systems can increase reliability and speed by eliminating bottle-necks.

However, the transportation business wants all of these services at the same or lower operating cost than their present systems—a requirement implying significant changes in working practices and operating cost structures are required. Transportation companies need to offer integrated services in order to compete effectively in the 1990s.

Applications will also include toll-control systems, airport and harbour management and support systems. Additional applications will be driven by regulatory requirements, for example; customs and tax requirements and environmental and safety requirements for hazardous material.

Transportation firms are thus seeking to use an array of technological innovations to support this drive for efficiency and effectiveness. These include, in addition to EDI systems, specialised sensors (e.g., for coin recognition and automatic vehicle recognition) specialised displays, portable terminals, fibre optic and wireless access technologies and geographical information systems (GIS).

Transportation systems projects are frequently large and complex using distributed configurations in order to:

- Support requirements for speed of access to information
- Reduce the costs of managing operations
- Track the flow of goods, people or vehicles in transportation
- Collect revenues.

Examples of transportation sector SI projects are as follows:

- German air traffic control short-term conflict alert system, valued at $20 million
- The National En-Route Centre airspace management system awarded to IBM by the U.K. Civil Aviation Authority, value $200 million.
- Lufthansa AIRPAS reservation system (SEMA Group)
- Europcar car hire system (Perot Systems), value $450 million

- Port of Marseille harbour control system, to integrate customs, road transportation and clearance agency functions using EDI (IBM)
- Bus fleet control system incorporating satellite global positioning and geographic information system for ATC in Italy
- The rail-boarding system developed as part of the Channel Tunnel project by ICL.

K

Telecommunications - Demand for Billing Systems Continues

The key applications driving SI projects in the telecommunications sector are listed in Exhibit III-12.

EXHIBIT III-12

Key Applications
Telecommunications - Europe

Application	Driving Forces
Customer service/billing systems	Introduction of new services Improved customer service, Virtual Networks
Network management systems	Introduction of new services e.g., mobile networks Improved reliability
Network planning systems	Introduction of new services
Office automation	Cost reduction, improved service and management

The issue of regulatory control is still a very important determinant of the business environment despite the continuing trend toward more competition in nearly all countries. Nevertheless, the telecommunications sector is slowly becoming a competitive business environment. This pressure is forcing the TELCOs:

- To reduce their costs
- To become more responsive to their clients
- To increase their ability to compete globally by taking up joint ventures and investments abroad.

Competitive pressure is also forcing the TELCOs to introduce new types of service. This service diversification is rendering existing billing systems obsolete and generating a demand for systems providing operational management of the new services.

Examples of recent SI projects based around a need for improved customer administration and billing systems include:

- EDS' billing and collections systems for Telefonica de Espana
- Digital's development of operational support systems for Energis in the U.K.
- The $30 million project providing Mercury with billing software capable of supporting the introduction of new services
- The customer administration system developed for Comvik in Sweden by Sema Group.

An example of a project concerned with operational network management is the $100 million project on behalf of Deutsche Bundespost Telekom providing management of a digital mobile communications network.

L

Distribution - Improving Supply Chain Management

The application needs of the retail sector are discussed in detail in Section V. The key applications driving SI projects in the distribution sector are listed in Exhibit III-13.

EXHIBIT III-13

Key Applications
Distribution - Europe

Application	Driving Forces
Supply chain management	Improved customer service Just-in-time deliveries Reduced stockholding
Electronic commerce	Reduced inventory costs
Warehouse automation	Reduced inventory costs Headcount reduction
Point-of-sale	Improved data capture Efficiency Analysis of buying patterns
Electronic funds transfer	Security/accuracy/efficiency

Falling trade barriers in Europe, as well as high labour and space costs, affect the overall competitive environment as retailers continue the search for efficiency and effectiveness. Retailers continue to need applications systems that deliver speed of delivery, speed of credit validation and accuracy in inventory control and management order status. Scanning terminals using bar-code technology and EFTPOS (Electronic Funds Transfer Point-of-Sale) facilities are transforming the efficiency of the check-out process and the availability of real-time sales data.

Overall, the emphasis within the distribution sector is a decline in SI projects based around scanning and EPOS data collection and an increase in projects concerned with improved supply chain management via electronic commerce.

M

Business Services Require Network Based Delivery Systems

Exhibit III-14 lists the key applications driving SI projects in the business services sector.

EXHIBIT III-14

Key Applications
Business Services - Europe

Application	Driving Forces
Car hire/travel reservation	Full service position Cross-selling of services
News transmission systems	Faster access to information
Document management	Improved customer service

This sector includes real estate companies, business and legal services, along with firms providing engineering, accounting, research, management and related services. It also includes the entertainment and hospitality industries, membership organizations and museums. Accordingly, it tends to be dominated by smaller organisations and is not a major source of large SI projects.

This sector is driven fundamentally by the overall growth of the service economy. The trend toward downsized functions focusing on core competences is leading to *increased* outsourcing of noncore functions by large firms. At the same time, smaller firms will require access to specialist capabilities (e.g., accounting, legal and management consultants) they have never established in-house. Business services organisations need more sophisticated network-based delivery systems. Such systems enable these organisations to reduce cost and improve the quality of customer service while operating over wide geographic areas.

The key area that will lead to SI projects is customer assistance oriented systems capable of delivering a quality service of high value, over a wide geographic spread of outlets.

The technology support required for these applications relates to systems for the improved handling of documents and image processing multimedia technology. The service priority inherent in this sector also places emphasis on the need for improved man-machine interfaces.

Examples of SI projects in this sector include:

- CSC's development of a global reservation system for SOFITEL/ NOVOTEL
- A news transmission system for Deutsche Press-Agentur

IV

Banking and Finance

A

Interoperability Drives Banking and Finance SI Projects

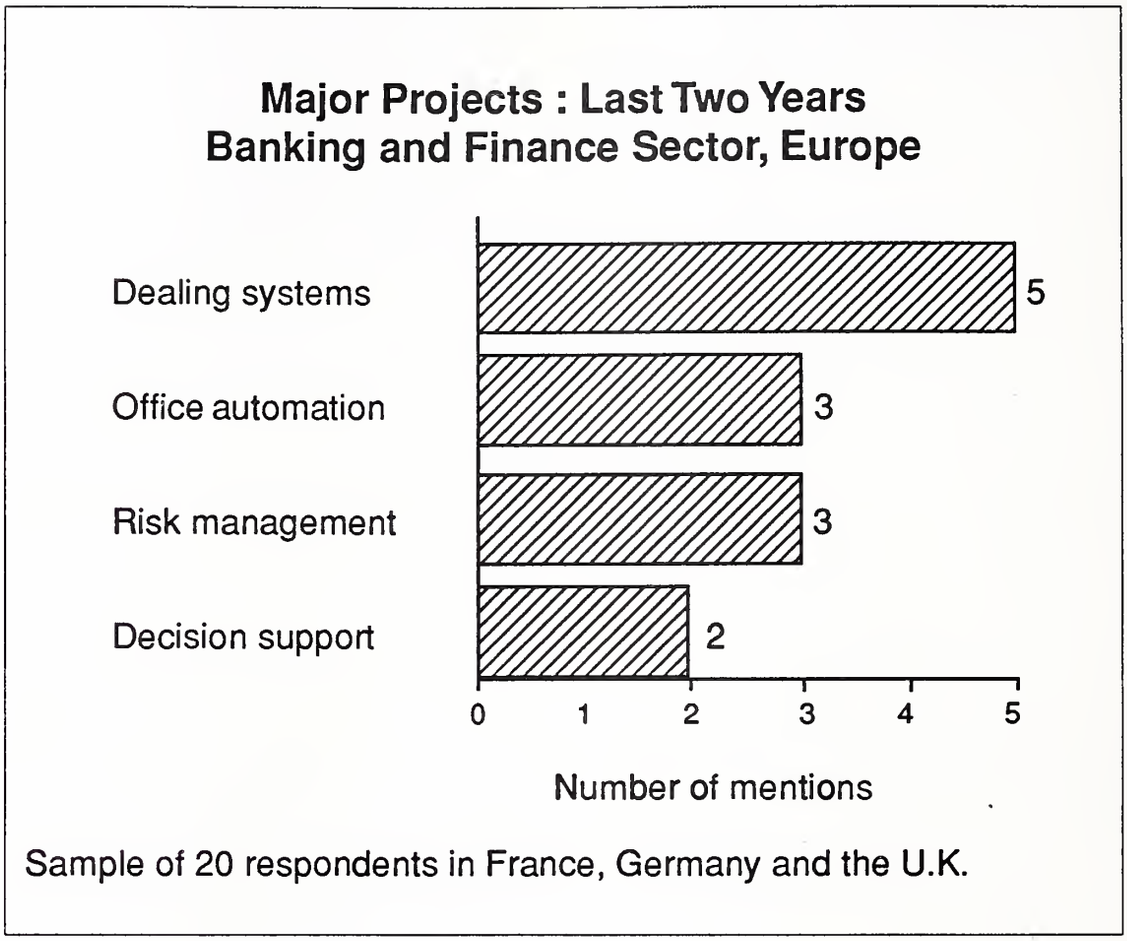
In the past, banks have frequently taken a centralised, product-centred approach to their operations and this trend was strongly reflected in the design of their information systems. However, many banks are now endeavouring to adopt a decentralised, client-centred approach.

This has a number of implications for systems integration (SI) vendors. Over the next two years, many SI projects in the banking sector will be driven by the need to connect heterogeneous systems that will enable banks to take a client-centred approach to their customers and provide management with improved access to information. Thereafter, banks will tend to adopt a more radical client/server approach and begin to decentralise their back office functions.

These trends necessitate that vendors continue to develop their technical integration skills in addition to their application specific expertise.

Exhibit IV-1 lists the principal types of projects undertaken within the European banking and finance sector over the last two years.

EXHIBIT IV-1

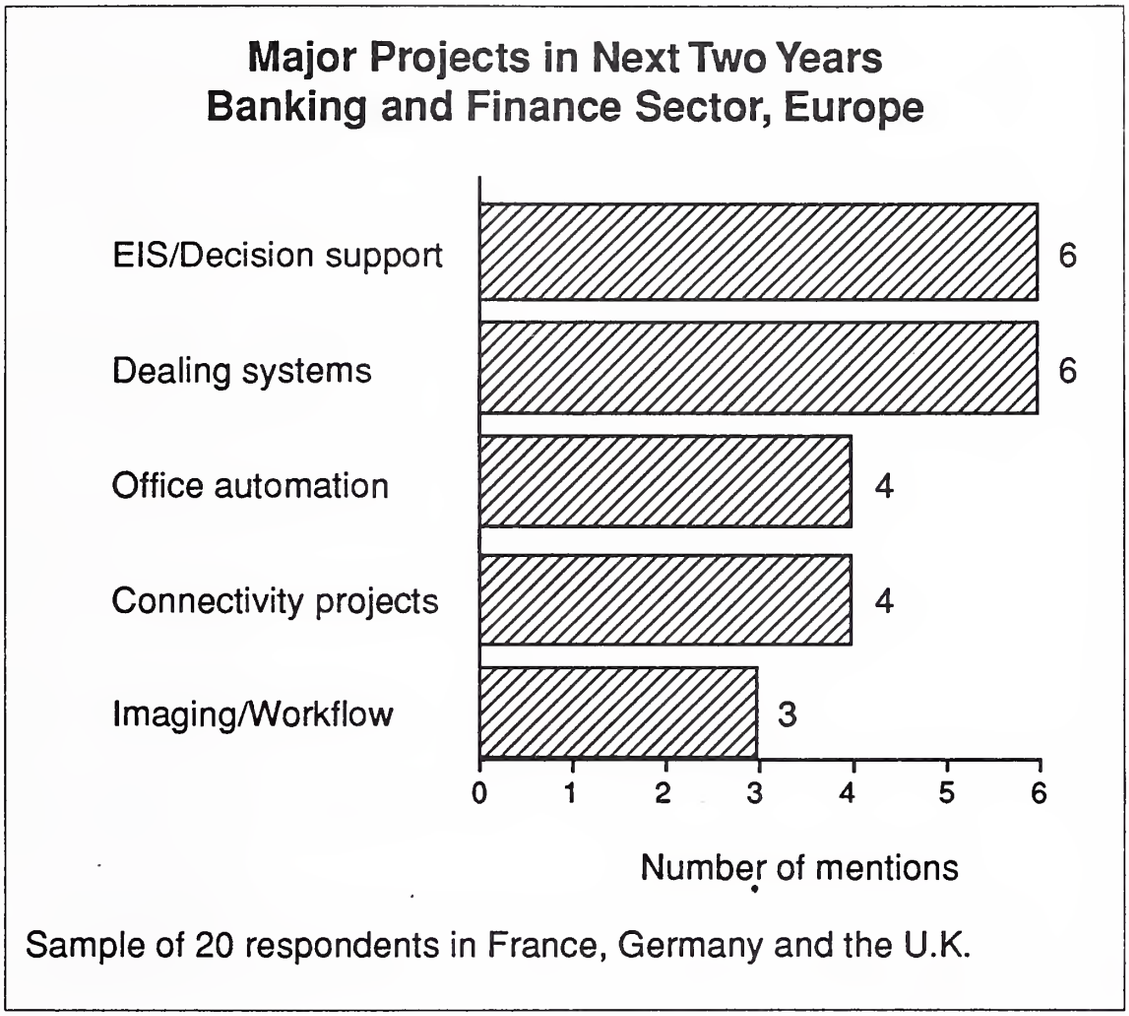


The market for dealing systems remained the largest segment over this period. Indeed, the level of demand for dealing systems is expected to remain high over the next five years.

However, over the next two years, banks are expected to express an intention to improve their access to information. Subsequently, they expect to decentralise their back office systems.

Exhibit IV-2 lists the principal types of major projects respondents stated would be undertaken in the next two years.

EXHIBIT IV-2



The major theme emerging from the data shown in this exhibit is the need to provide improved access to, and sharing of, information held in differing applications or departments. Traditionally, banks have held separate information on their clients specifically for each financial product. This has made it difficult for personnel to take a client-centred, rather than product-centred, approach to selling financial services.

Two recent SI projects that have focused on this need for a client-centred approach are:

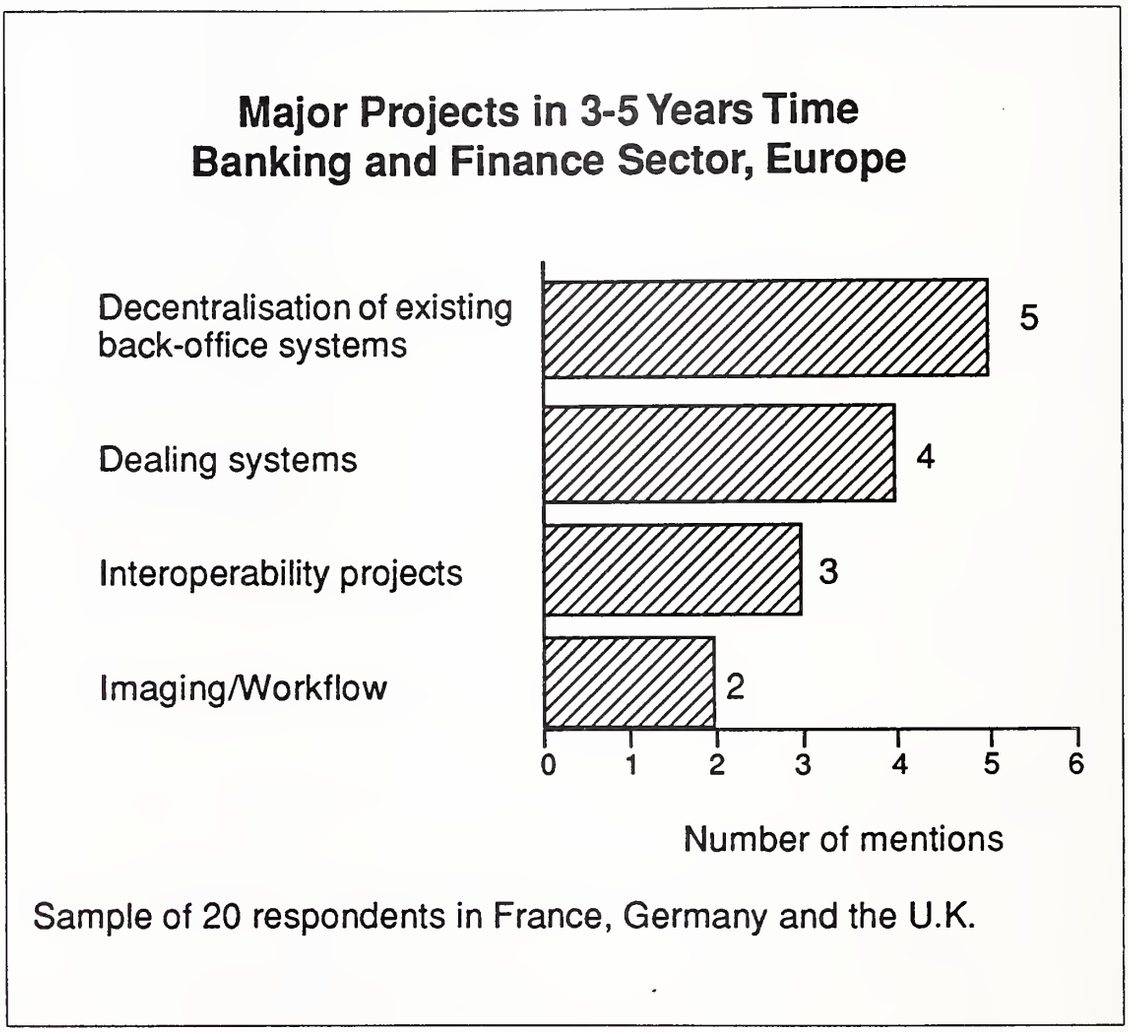
- Sema Group and IBM's project valued at $85 million, to provide client-centred retail banking systems to a consortium of two French regional savings banks

- Unisys' project valued at $4 million to provide tellers with on-line marketing information across the 200 branches of Caisse D'Epargne

In addition, other vendors such as CMG, have provided banking clients with LAN-based front-ends which collect information on a particular client from each of the main product-based applications.

Exhibit IV-3 lists the principal types of major projects that respondents forecast would be undertaken in the long-term, three to five years from now.

EXHIBIT IV-3



Many organisations perceived they would continue the process of decentralisation of their activities and initiate the introduction of departmental servers as they gradually adopt client/server architectures within their organisations.

By this time, it is also increasingly probable that banks will be adopting enterprise-wide workflow technology supported by document image processing techniques to provide common access to account information and a wide range of financial products.

B

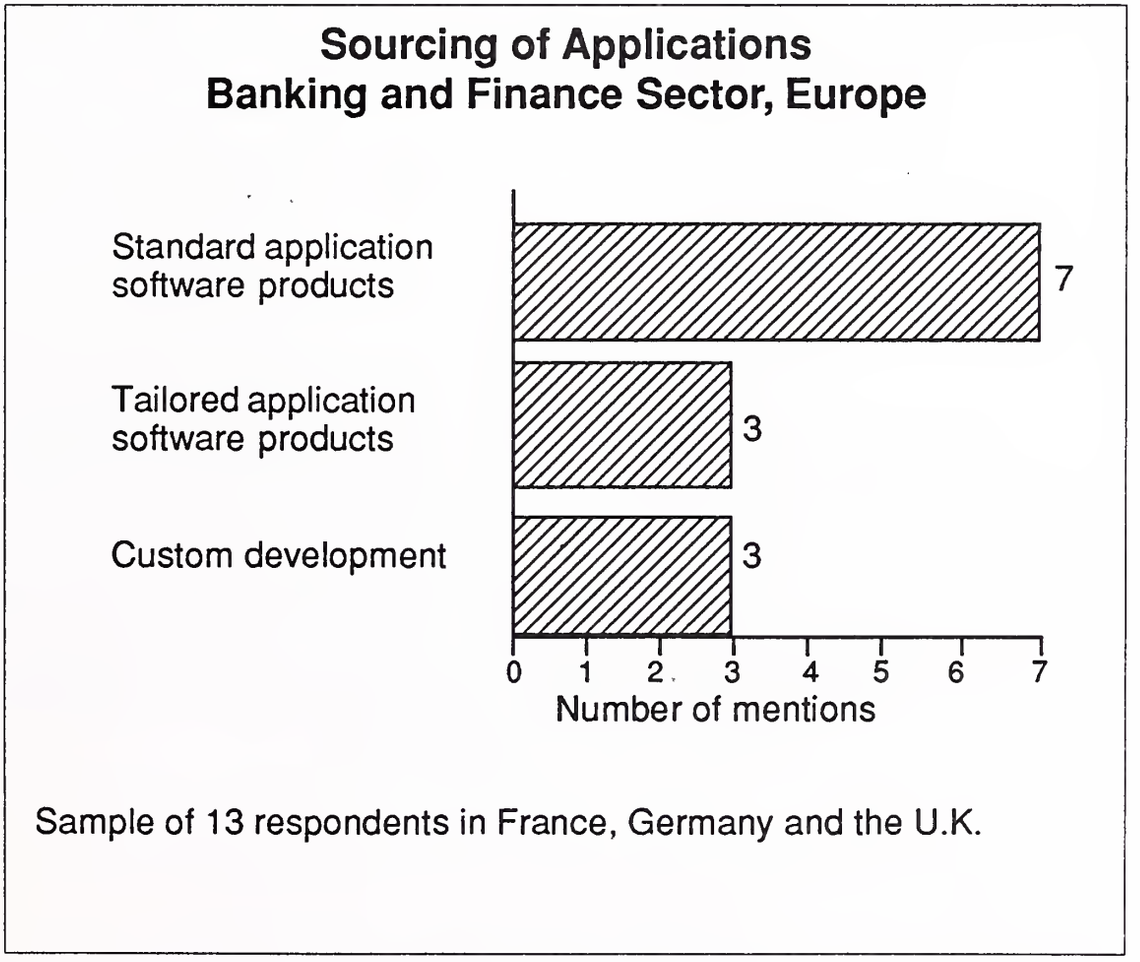
Standard Application Software Products Grow in Importance

The banking and finance sector used to be opposed to the use of application software products, preferring a custom development approach. The rationale for this was that a bank's information system is a critical part of the organisation's infrastructure and hence a major source of competitive advantage.

However, banks now recognise the use of application software products is a means of reducing costs and a means to more flexible and rapidly implemented business support.

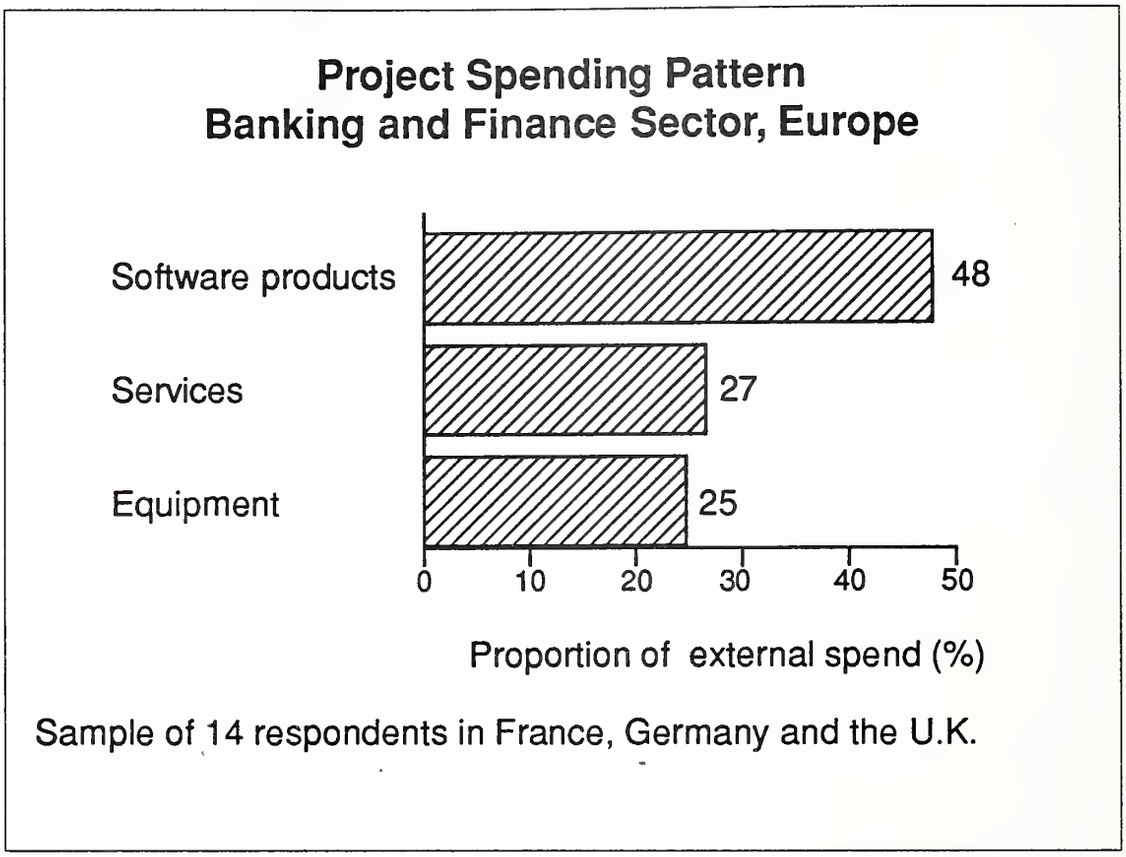
As a result, standard application software products are now the favoured means of sourcing applications, as shown in Exhibit IV-4.

EXHIBIT IV-4



This attitude is also reflected in the profile of spending incurred within recent projects, shown in Exhibit IV-5.

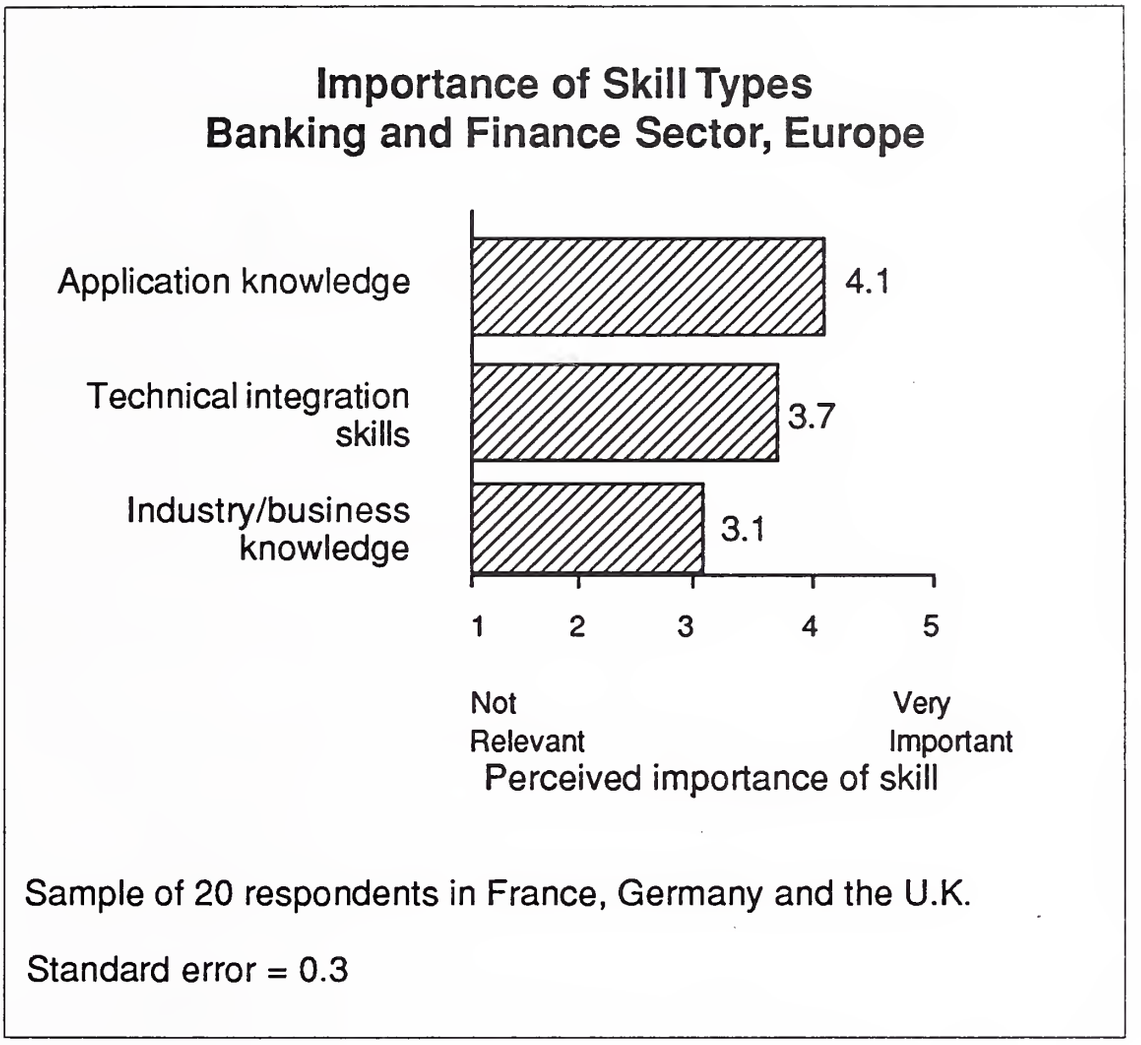
EXHIBIT IV-5



Here, the proportions spent on software products and services, respectively, have switched from those typically found in SI projects in Europe. The major element of project spending has typically been incurred on services. Respondents in the banking and finance sector estimate the major element of their project spend is now software products.

It is also evident that buyers principally value specific application knowledge from their vendors, rather than a less specific, general knowledge of the banking and finance sector. Users were asked to rate the importance of each of a number of skills potentially required of major project vendors. The results are shown in Exhibit IV-6.

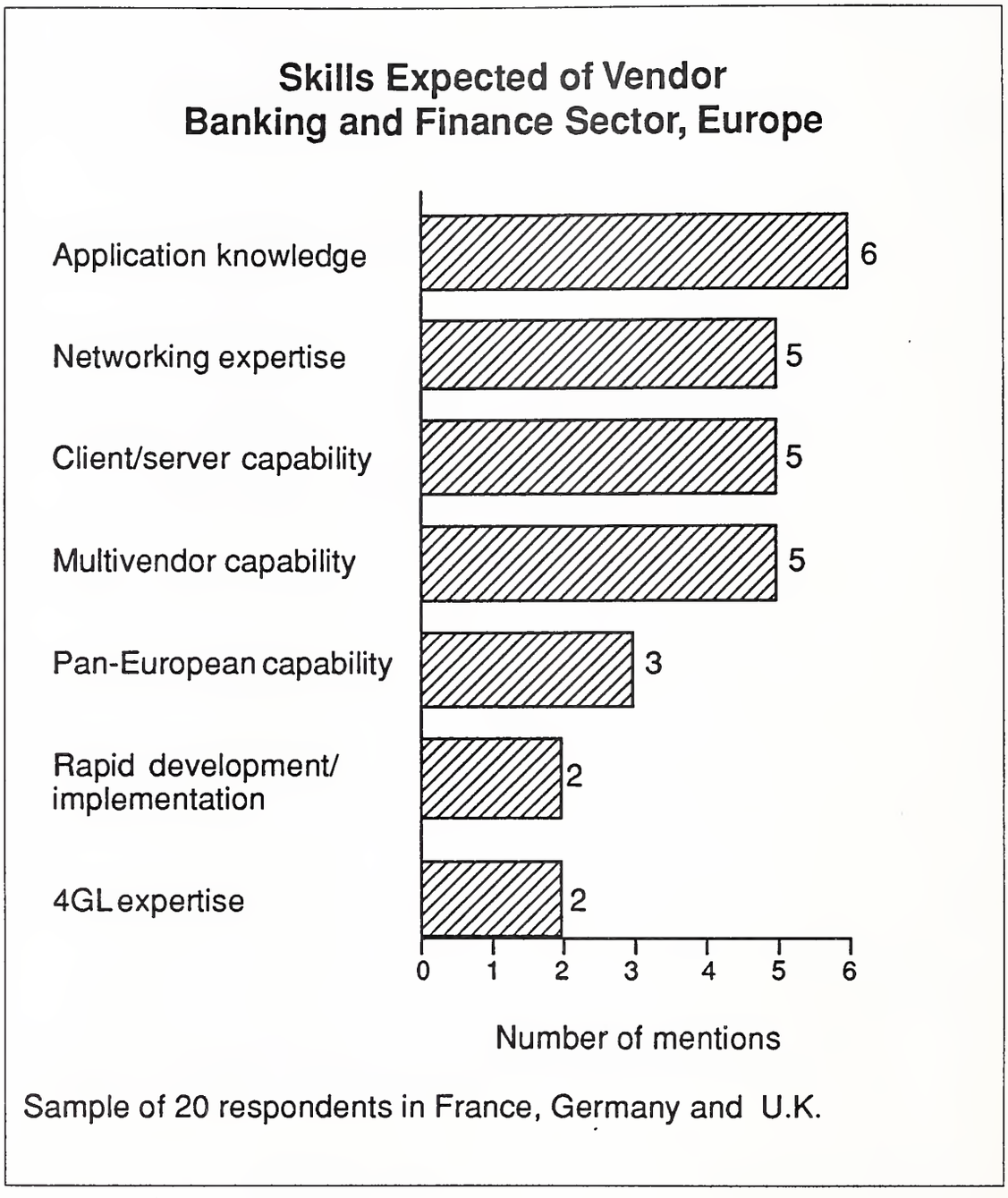
EXHIBIT IV-6



Whilst application knowledge and demonstrable application-specific capability are the key skills expected of major project vendors, technical integration skills are also of importance to clients in the banking and finance sector.

In addition to rating the importance of each of the skill types shown above, users were also asked to identify the primary skills required from external vendors involved in major projects. The results are listed in Exhibit IV-7.

EXHIBIT IV-7



There were three types of technical integration skills which were mentioned as requirements by a quarter of the respondents, even though they were not prompted for technical skills. These skills, expected of vendors serving the banking and finance sector are:

- Networking expertise
- Client/server capability
- Multivendor capability.

Clearly, multivendor network integration of applications is a key requirement in the banking and finance sector.

Other technical skills mentioned by respondents included the need for vendors to achieve rapid development and implementation of projects, and the need for 4GL expertise.

The need for multilingual systems and vendors capable of implementation across a range of European subsidiaries was also expressed by three respondents, indicating a move toward pan-European SI projects in the banking and finance sector.

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V

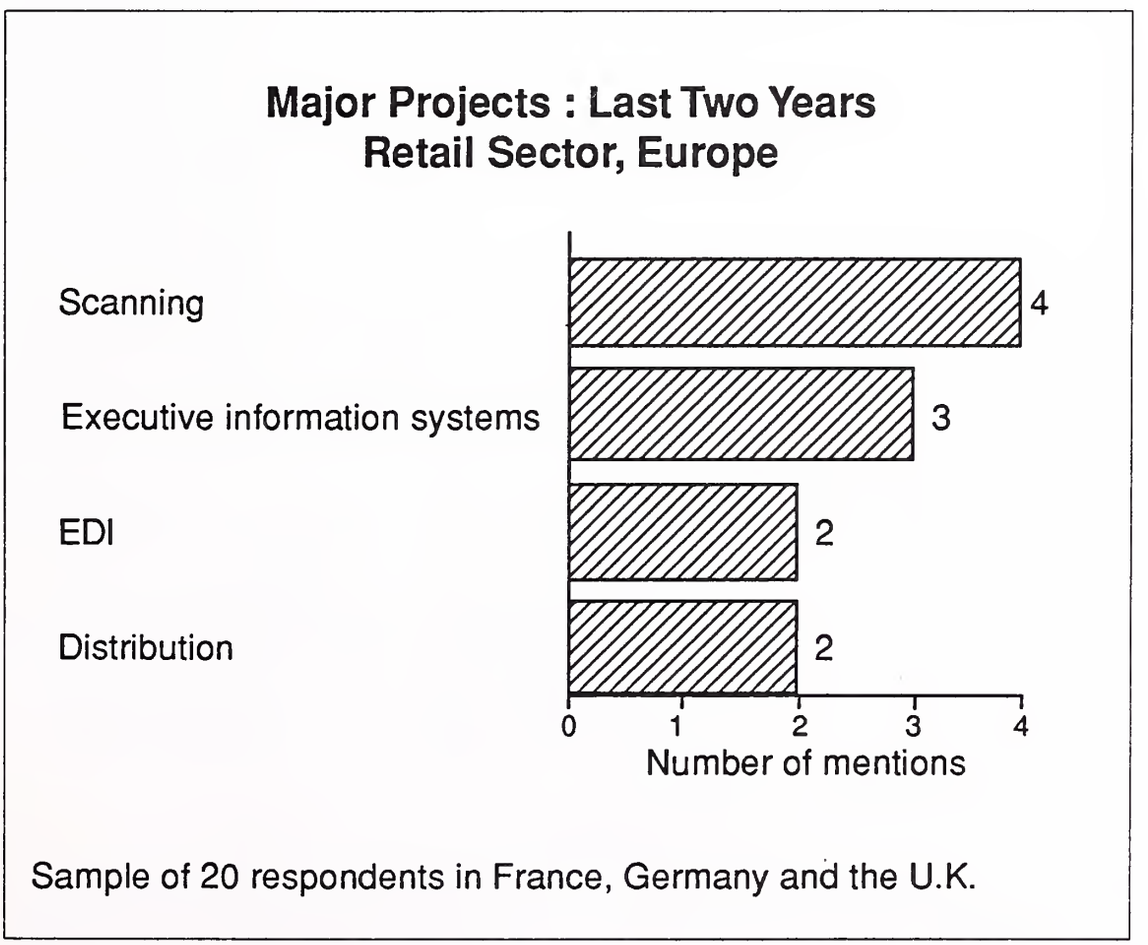
Retail Sector

A

Electronic Trading Drives Retail SI Projects

Exhibit V-1 lists the profile of major projects undertaken by organisations in the retail sector over the past two years.

EXHIBIT V-1



Projects involving scanning have been a major source of revenue as organisations in the retail sector have updated their ability to capture data at point-of-sale.

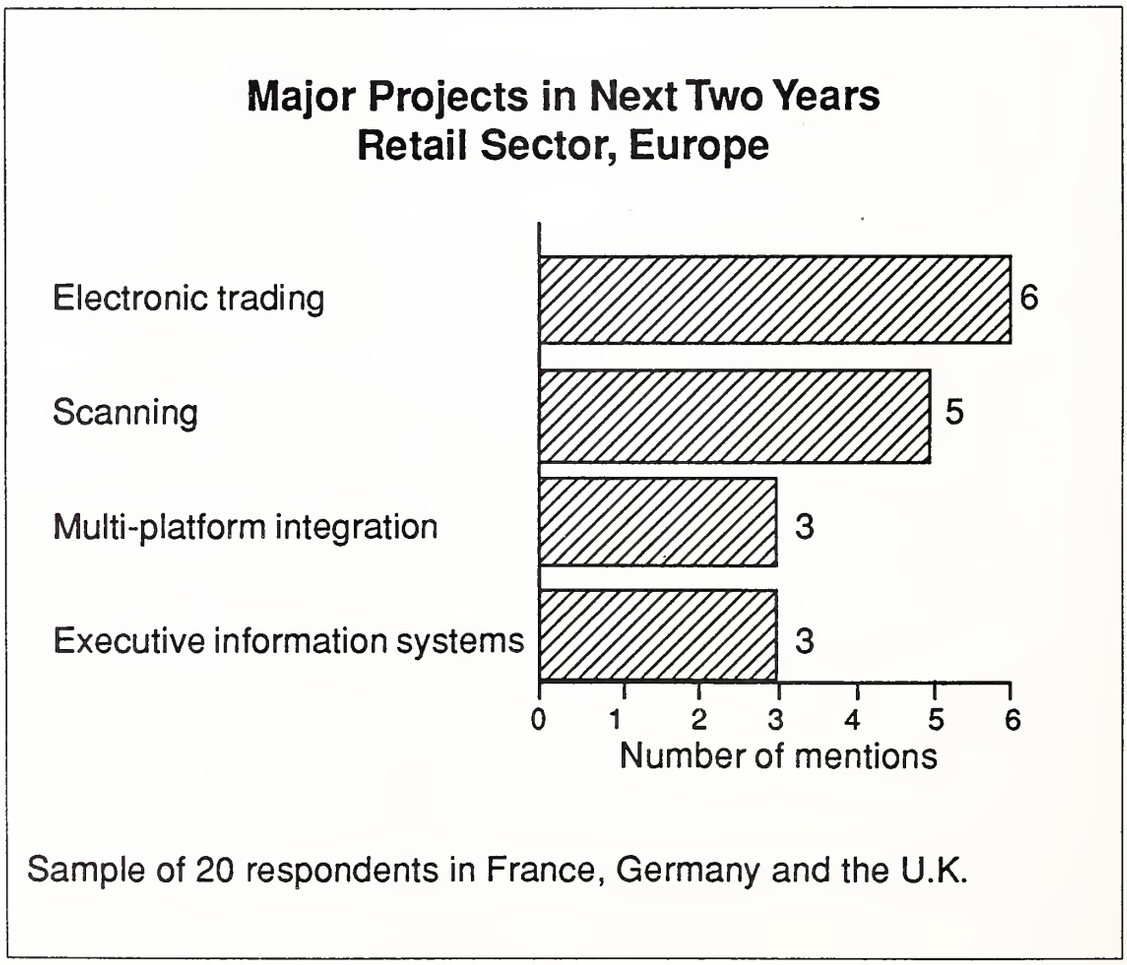
Monitoring changes in customers' buying patterns within individual stores is one of the critical success factors in retailing. Such knowledge enables organisations to fine-tune their stocking policies and increase sales.

Smartcards are also beginning to be used at point-of-sale to develop promotions and customer loyalty schemes.

Executive information systems (EIS) has been another major source of projects in the retail sector, enabling seminar executives to monitor store performance in a timely manner.

Exhibit V-2 lists the principal types of major projects organisations in the retail sector are planning to implement over the next two years.

EXHIBIT V-2



The implementation of point-of-sale systems is expected to remain important over the next two years. However, this type of project, which is primarily concerned with data capture, is gradually being overtaken by projects with an emphasis further down the value chain.

Over the next two years, the emphasis within the retail sector will be increasingly placed on electronic trading as a means of facilitating improved supply chain management.

The poor economic climate, particularly with high unemployment in Europe, continues to dampen prospects for increased consumer spending, and is driving distribution sector firms to achieve savings through faster product movement and lowered inventory. At the same time, market-leading retailers have raised consumer expectations for speed of delivery and the overall quality of goods and service.

Retailers are adopting JIT (Just-in-Time) type techniques to increase stock turn and force part of the business risk back onto suppliers. Advanced network-based applications enable retailers to bypass wholesalers altogether to improve margins.

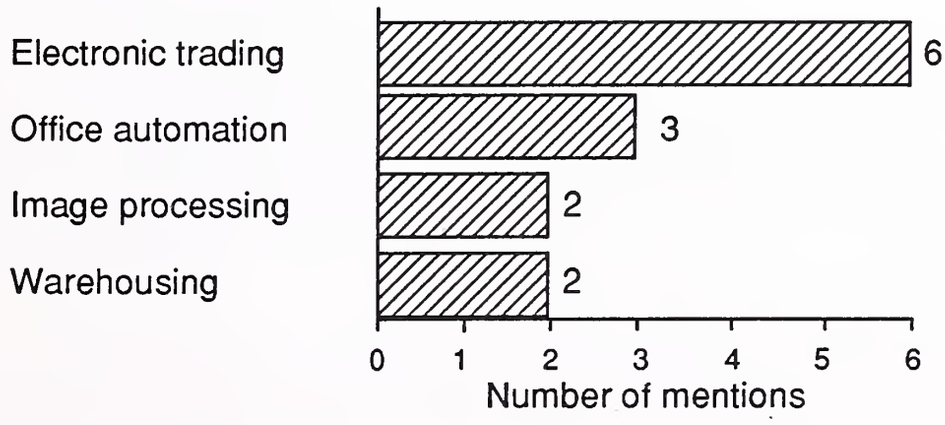
Widespread use of EDI is critical to enable organisations in the retail sector to achieve high levels of flexibility and responsiveness combined with efficient supply chain management.

Today, electronic commerce represents the elimination of paper documents, including money in many instances, in order to streamline trade among companies, and between companies and consumers.

Exhibit V-3 lists the principal types of major projects respondents forecast to be undertaken in the long-term, three to five years time.

EXHIBIT V-3

Major Projects in 3-5 Years Time
Retail Sector, Europe



Sample of 20 respondents in France, Germany and U.K.

The trend to electronic trading, or electronic commerce, is expected to remain strong throughout this timescale. EDI will be complemented by improved office automation and image processing systems for improved intra- and inter-company communication.

In some cases, electronic trading is expected to be complemented by full electronic funds transfer.

Although considerable automation will still take place at the branch level with applications such as automated shelf-life stock management systems being implemented, warehousing systems will also be updated to reduce stockholding levels still further.

B

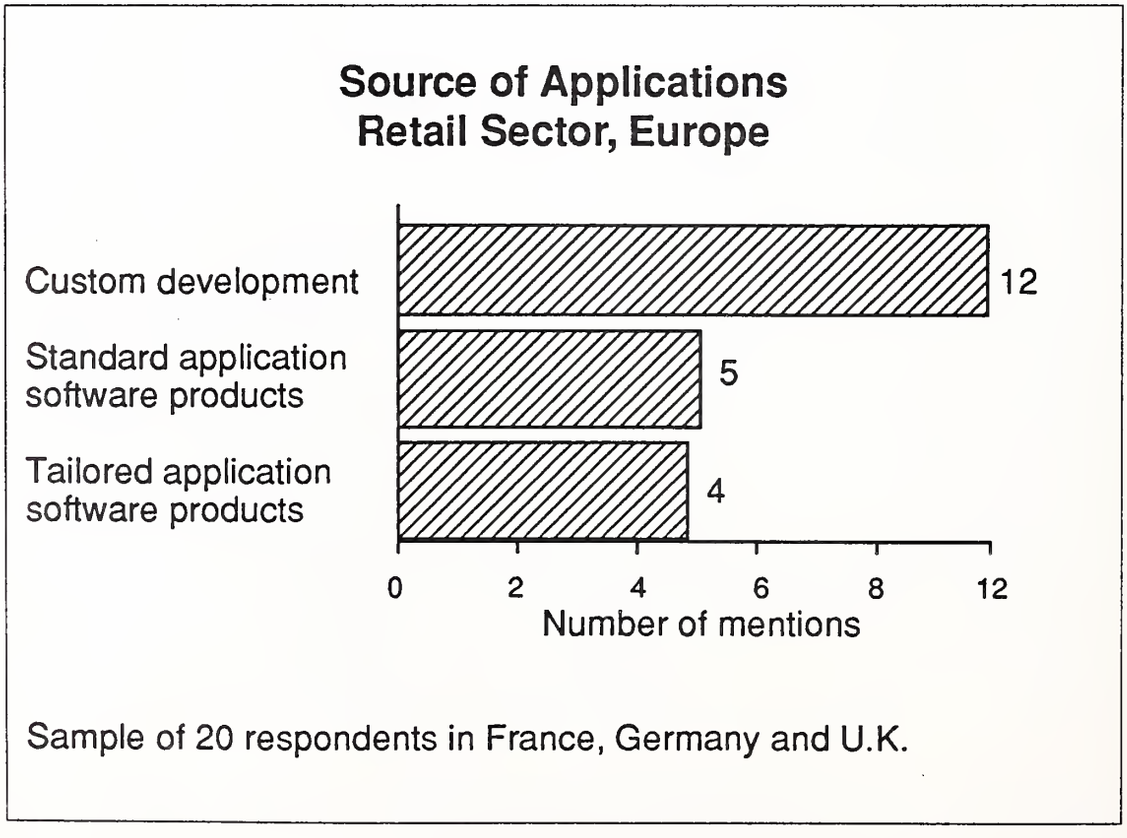
Technical Integration Skills are Favoured in the Retail Sector

The banking and finance sector shows a major shift in buying intention from custom development to adoption of application software products. However, this shift is much less pronounced in the retail sector with organisations placing greater emphasis on:

- The need for custom development
- The need for technical integration skills.

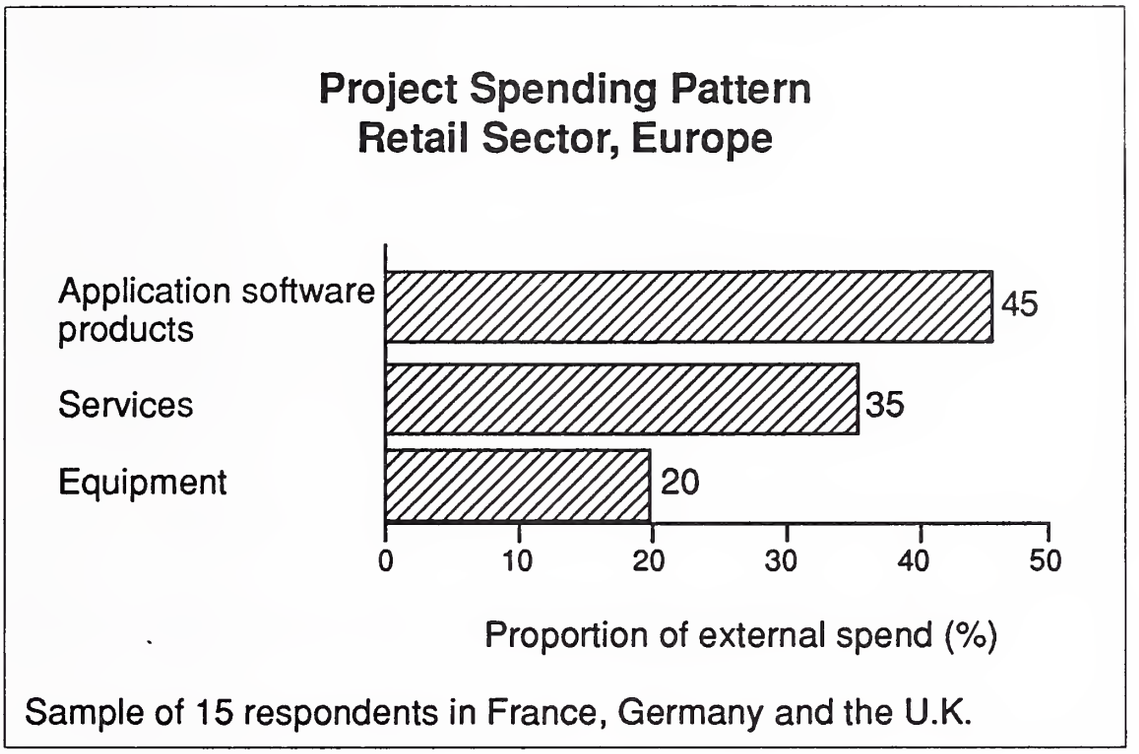
Exhibit V-4 shows that organisations in the retail sector still base their SI projects predominantly on custom development.

EXHIBIT V-4



However, this attitude is less pronounced in the profile of spending incurred within recent projects, as shown in Exhibit V-5.

EXHIBIT V-5



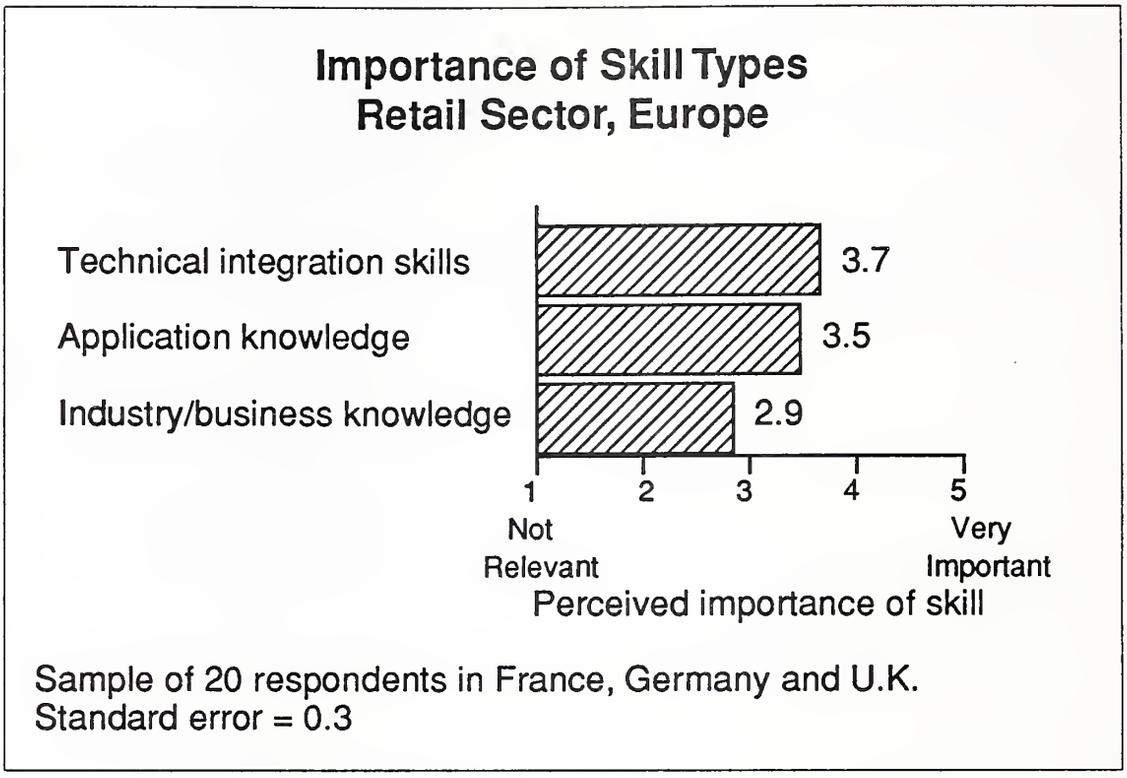
A higher proportion of services spend, including custom development, is estimated to have been incurred within the retail sector compared to the banking and finance sector. Simultaneously, the proportion of project spend incurred on equipment is estimated to be lower in the retail sector.

One of the major issues within the retail sector is integrating information systems between:

- Geographically dispersed outlets
- Front- and back-office systems
- EPOS and executive information systems
- Branches and warehouses
- Retailers and suppliers.

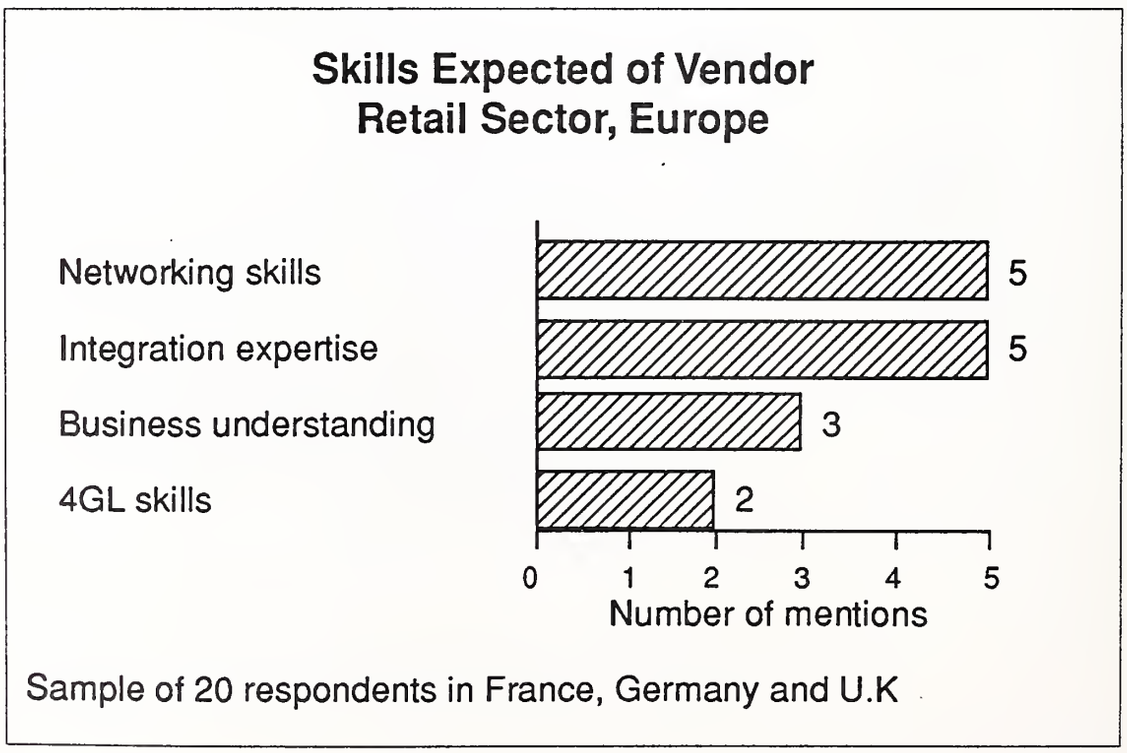
These difficulties can be further compounded by the existence of differing generations of systems across stores or regions. Accordingly, in line with their emphasis on electronic commerce and supply chain management, retailers place greatest importance on their vendor's technical integration skills as shown in Exhibit V-6.

EXHIBIT V-6



This conclusion is supported by further evidence. In addition to rating the importance of each of these skill types, users were asked to identify the primary skills required from external vendors involved in major projects. The results are listed in Exhibit V-7.

EXHIBIT V-7



Technical communications and networking skills received the highest number of mentions, followed by technical integration skills. Ideally, users are seeking vendors with widespread technical experience. For example, individual users specifically requested that vendors should have:

- Both WAN and LAN expertise
- Both AS/400 and UNIX expertise
- Multi-POS expertise.

Secondly, it is important the vendor understands the business objectives of the client and can successfully implement systems to meet these objectives. Nowadays, speed of development is also an important factor with users increasingly requesting rapid application development techniques.

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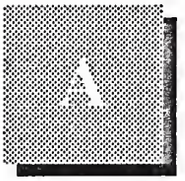

Industry Sector Definitions

INPUT structures the information services market into industry sectors such as process manufacturing, insurance, transportation, etc. The definitions of these sectors are based on the 1987 revision of the Standard Industrial Classification (SIC) code system. The specific industries (and their SIC codes) included under these industry sectors are detailed in this appendix.

Note: SIC code 88 is Personal Households. INPUT does not currently analyze or forecast information services in this market sector.

EXHIBIT A-1

Industry Sector Definitions

Industry Sector	SIC Code	Description
Discrete Manufacturing	23xx	Apparel and other finished products
	25xx	Furniture and fixtures
	27xx	Printing, publishing and allied industries
	31xx	Leather and leather products
	34xx	Fabricated metal products, except machinery and transportation equipment
	35xx	Industrial and commercial machinery and computer equipment
	36xx	Electronic and other electrical equipment and components, except computer equipment
	37xx	Transportation equipment
	38xx	Instruments: photo/med/optical goods; watches/clocks
	39xx	Miscellaneous manufacturing industry

EXHIBIT A-1

Industry Sector Definitions

Industry Sector	SIC Code	Description
Process Manufacturing	10xx	Metal mining
	12xx	Coal mining
	13xx	Oil and gas extraction
	14xx	Mining/quarrying nonmetallic minerals
	20xx	Food and kindred products
	21xx	Tobacco products
	22xx	Textile mill products
	24xx	Lumber and wood products, except furniture
	26xx	Paper and allied products
	28xx	Chemicals and allied products
	29xx	Petroleum refining and related industries
	30xx	Rubber and miscellaneous plastic products
	32xx	Stone, clay, glass and concrete products
	33xx	Primary metal industries
Transportation Services	40xx	Railroad transport
	41xx	Public transit/transport
	42xx	Motor freight transport/warehousing
	43xx	U.S. Postal Service
	44xx	Water transportation
	45xx	Air transportation (including airline reservation services in 4512)
	46xx	Pipelines, except natural gas
	47xx	Transportation services (including 472x, arrangement of passenger transportation)
Telecommunications	40xx	Communications
Utilities	49xx	Electric, gas and sanitary services
Retail Distribution	52xx	Building materials
	53xx	General merchandise stores
	54xx	Food stores
	55xx	Automotive dealers, gas stations
	56xx	Apparel and accessory stores
	57xx	Home furniture, furnishings and accessory stores
	58xx	Eating and drinking places
	59xx	Miscellaneous retail

EXHIBIT A-1

Industry Sector Definitions

Industry Sector	SIC Code	Description
Wholesale Distribution	50xx 51xx	Wholesale trade - durable goods Wholesale trade - nondurable goods
Banking and Finance	60xx 61xx 62xx 67xx	Depository institutions Nondepository credit institutions Security and commodity brokers, dealers, exchanges and services Holding and other investment offices
Insurance	63xx 64xx	Insurance carriers Insurance agents, brokers and services
Health Services	80xx	Health services
Education	82xx	Educational services
Business Services	65xx 70xx 72xx 73xx 7389x 75xx 76xx 78xx 79xx 81xx 83xx 84xx 86xx 87xx 89xx	Real estate Hotels, rooming houses, camps and other lodging places Personal services Business services (except hotel reservation services in 7389) Hotel reservation services Automotive repair, services and parking Miscellaneous repair services Motion pictures Amusement and recreation services Legal services Social services Museums, art galleries and botanical/zoological gardens Membership organisations Engineering, accounting, research, management, and related services Miscellaneous services
Federal Government	9xxx	
State and Local Government	9xxx	

EXHIBIT A-1

Industry Sector Definitions

Industry Sector	SIC Codes	Description
Miscellaneous Industries	01xx	Agricultural production - crops
	02xx	Agricultural production - livestock/animals
	07xx	Agricultural services
	08xx	Forestry
	09xx	Fishing, hunting and trapping
	15xx	Building construction - general contractors, operative builders
	16xx	Heavy construction - contractors
	17xx	Construction - special trade contractors

B

User Questionnaire
Applications Driving SI Projects

1(a) Has your organisation implemented any major corporate or departmental information systems in the last two years?

Yes ☐
No ☐ go to question 2

(b) What applications were covered by each of these projects?

(c) For which of these projects was an external vendor involved?

(d) What was the scope of their involvement?

(e) What was the appropriate level of external spend for each of these projects?

(b) Application	(c) Vendor Involved?	(d) Scope of Involvement	(e) External Spend

2(a) Do you expect to undertake any major information systems projects over the next two years?

Yes ☐
No ☐ go to question 4

(b) What is the nature of each of these projects?

_____

_____

_____

(c) For which of these projects do you expect to extensively involve an external vendor?

I should now like to discuss one of these projects in more detail.

3 Project A

(a) Are there any applications critical to the implementation of Project A?

Yes ☐
No ☐

(b) If so, what are they?

_____

_____

_____

(c) How do you expect to source these applications?

Options	Application 1	Application 2
Purchase standard package		
Tailor standard software package		
Written in-house		
Custom development		

Other: _____

(d) What are the primary skills you require from an external vendor to assist you with this project?

_____

_____

_____

(e) How important are:
(Please rate on a scale of 1 to 5 where 1=not relevant and 5=very important.)

Technical integration skills ___

Application knowledge ___

Industry/business knowledge ___

(f) How much do you expect to spend externally on this project?

_____

(g) How is this spend broken down between:

	%
Hardware	
Standard software	
Services	
	100

4(a) In the longer-term, say 3-5 years, what are the major types of information systems projects you expect your organisation to undertake?

_____

_____

_____

_____

4(b) What are the key applications underlying these projects?

_____

_____

_____

_____

Thank you very much for your assistance.