

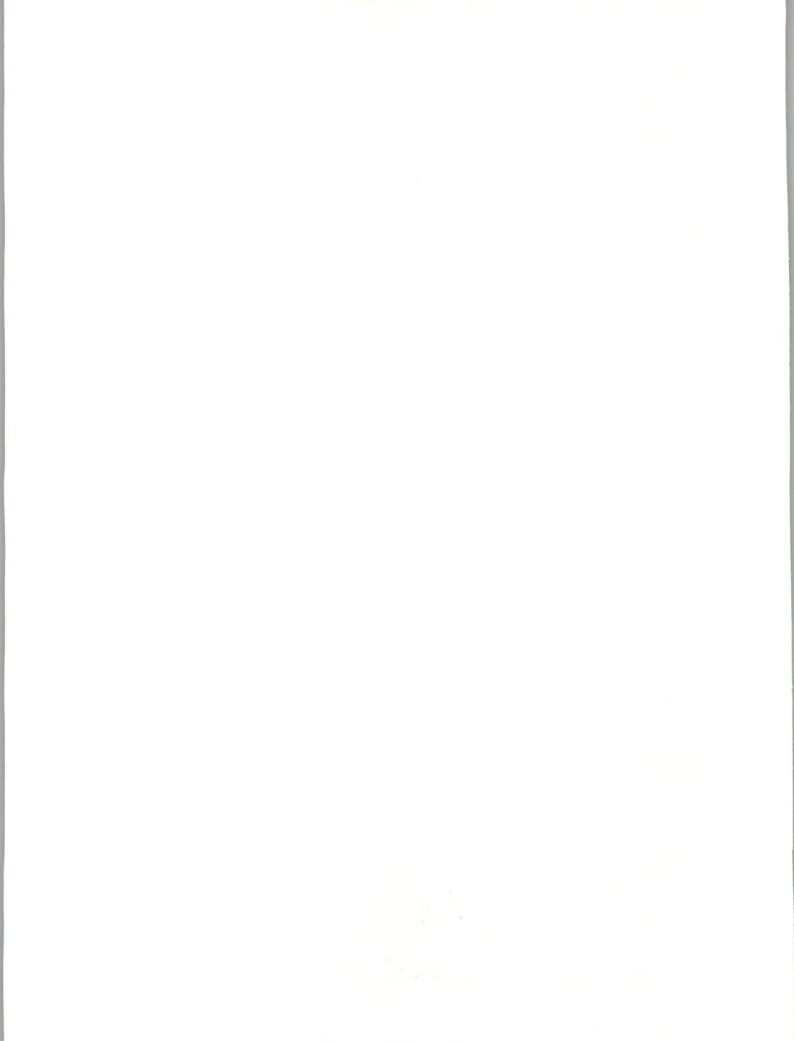
Market Analysis  
Program (MAP)

**Cross-Industry  
Markets  
1988-1993**

Human Resources  
Sector

**INPUT®**

1280 Villa Street, Mountain View, CA 94041 (415) 961-3300



DECEMBER 1988

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# CROSS-INDUSTRY MARKETS 1988-1993

## HUMAN RESOURCES SECTOR



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**Market Analysis Program  
(MAP)**

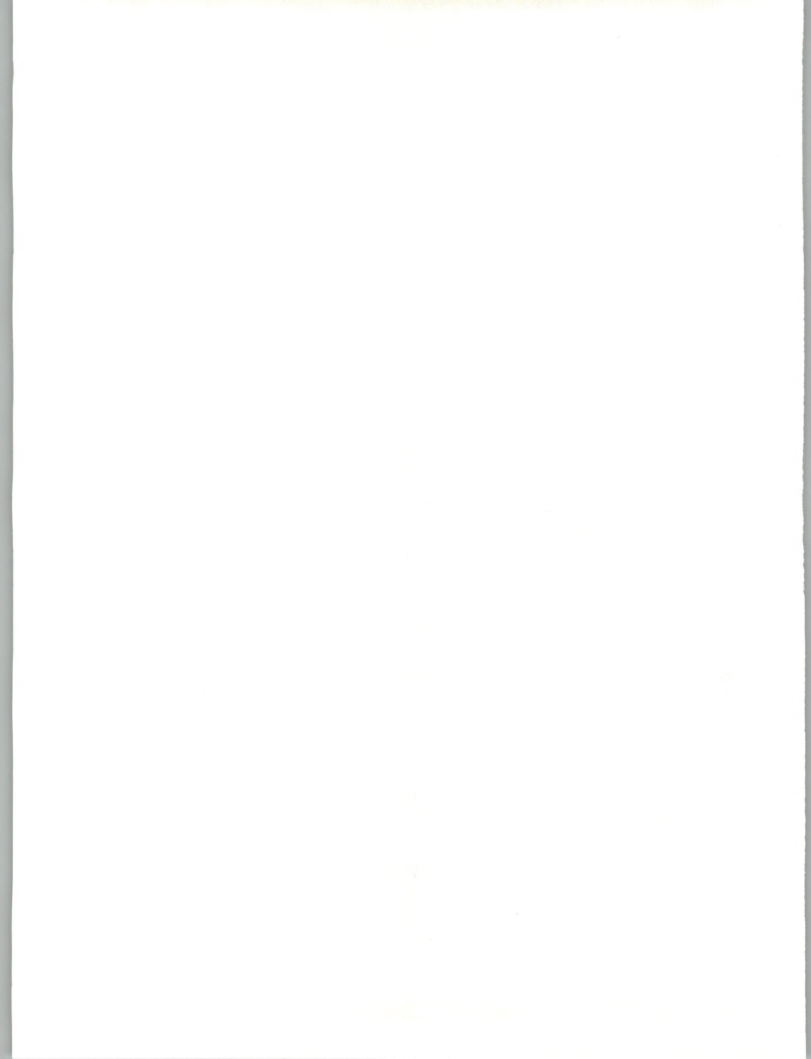
***Cross-Industry Markets, 1988-1993***  
***Human Resources Sector***

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## Introduction

### A

#### Definitions

The cross-industry human resources sector consists of two main categories: payroll and human resources management systems (HRMS). In a broad context, payroll is part of HRMS but because of its size and separability it is considered an application in this analysis. See Exhibit I-1 and I-2.

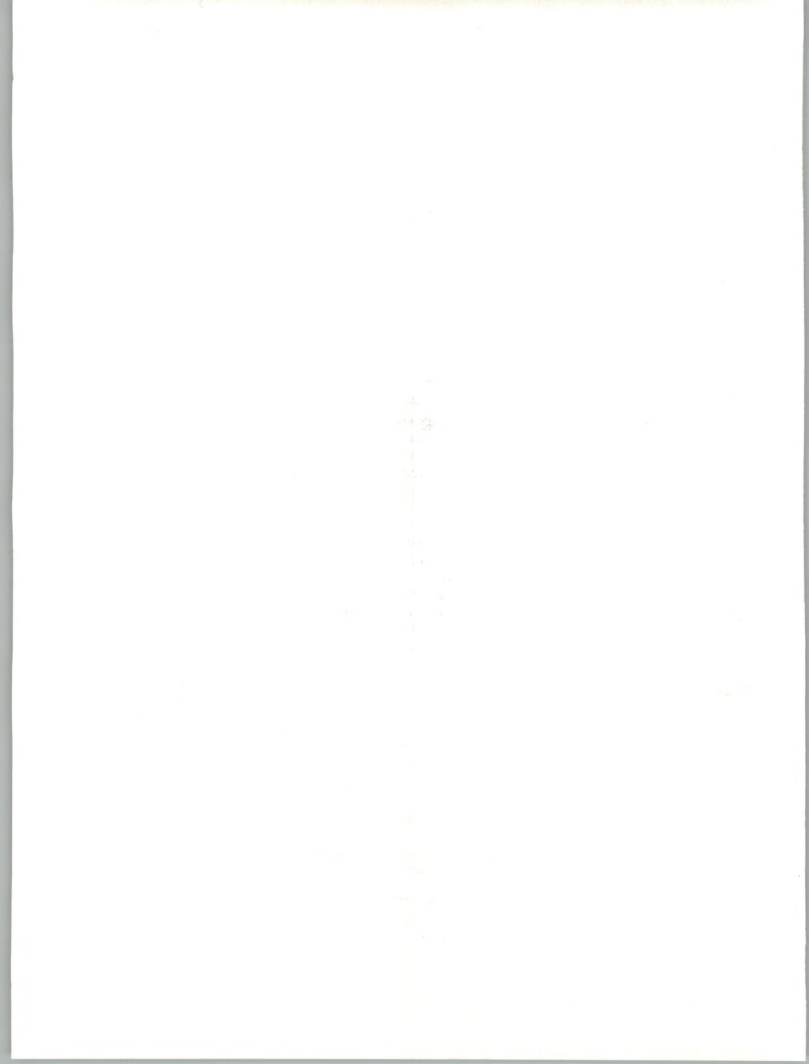
### B

#### Environment/ Overview

The human resources sector contains three modes of delivery of information services: processing, software products, and turnkey systems.

- Vendors specializing in processing services, such as ADP and Paychex, generally concentrate on payroll services. Processing vendors may offer terminal or PC systems linked to central computers; some have begun to sell software.
- Software product vendors include large firms, such as MSA and InSci, that have human resource management systems (HRMS), as well as many small vendors that sell selected applications such as payroll or benefits packages on PCs.
- Turnkey vendors tend to deliver a payroll and benefits system or a full HRMS with a selected computer.

HRMS have been developed for PCs, but they are generally used in firms with less than 5,000 employees. However, improvements in technology, particularly in storage and networking, will increase the potential use of these systems.



## EXHIBIT I-1

**HRMS APPLICATIONS****Payroll Management**

Payroll Administration  
Tax Reporting  
Flexible Earnings  
Payroll History

**Benefits Administration**

Flexible Benefits  
401(k)  
Profit Sharing Plans  
IRA  
Pension Plans

**Employee Relations**

Time and Attendance  
Grievances  
Seniority  
Union/Labor Relations  
Employee Demographics, History

**Compensation Administration**

Wage and Salary Structure  
Compensation Budgeting  
Salary Performance Review

**Government Compliance**

EEOC  
AAP  
OSHA  
COBRA

**Applicant Tracking**

Applicant Demographics  
Candidate Search  
Interview, Selection

**Manpower Planning**

Career Planning  
Turnover Analysis  
Human Resource Forecasting

**Position Control**

Inventory  
Budgeting  
Forecasting

the 1990s, the number of people in the UK who are aged 65 and over has increased by 1.5 million, and the number of people aged 75 and over has increased by 1 million (Office for National Statistics 1999). The number of people aged 65 and over is projected to increase to 6.5 million by 2011, and the number of people aged 75 and over to 3.5 million (Office for National Statistics 1999).

There is a growing awareness of the need to address the needs of older people in the community. The Department of Health (1999) has published a strategy for older people, which sets out the government's commitment to improve the lives of older people. The strategy is based on the principle that older people should be able to live independently and actively in the community. The strategy sets out a range of measures to improve the lives of older people, including measures to improve housing, transport, and social services. The strategy also sets out measures to improve the health and social care of older people. The strategy is a key document in the development of policy for older people in the UK.

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## EXHIBIT I-2

**PAYROLL SERVICES**

- Payroll Processing
- Tax Filing
- Personnel Reporting
- Unemployment Tax Management
- Unemployment Compensation Management
- Government Regulatory Compliance
- Management Reporting

**C****Industry Trends**

Human resource managers are concerned with many issues including:

- Gaining a better understanding of the workplace and managing people, motivating and developing employees, and improving productivity.
- Providing timely, accurate information to top management and line managers to enable better decision making and to integrate the human resource (HR) function with the business goals of the organization.
- Achieving the objectives of the human resource function in the most cost-efficient manner, and realizing cost savings in the area of employee benefits.
- Having the ability to respond to government issues and comply with government (federal, state, and local) laws and regulations.

HRMS usage has changed in many ways. Used originally as administrative and record-keeping systems, HRMS have evolved into comprehensive integrated systems used by HR managers and corporate management for business planning and other applications.





The important criteria used by companies when evaluating HRMS are functionality or range of capabilities, vendor reputation, cost to install, cost to support and maintain, ease of use, ease and speed of implementation, and security features.

PC/workstation-based HRMS have improved significantly in recent years.

- Initially developed as single-user standalone systems, micro-HRMS can now be used by multiple users in a networked environment.
- The performance characteristics and functionality of micro-HRMS approach their mainframe counterparts. In addition, micro-HRMS are perceived to be easier to use.
- Micro-HRMS are suited for companies with up to 5,000 employees. With continuing advances in microcomputer technology (memory, processing, networking), bigger organizations will be able to use microcomputer-based systems.
- Many companies offer flexible benefits programs. The number of companies offering these "cafeteria-style" benefits is expected to increase. Flexible benefits administration is facilitated by using HRMS.
- The administration and control of HRMS is moving from the hands of the information systems department to human resources as the human resource function seeks control over its own resources.
- Many companies continue to develop human resources systems in-house, often at great cost compared to commercially available products.
- Pending legislation that deals with human resources inhibits growth of HRMS as companies adopt a "wait-and-see" policy.

A continuing stream of legislation from the federal, state, and local governments on taxes, benefits, pensions, safety, equal employment, affirmative action, and other matters results in changes in human resource requirements, including the reports required by government. This has encouraged more businesses to rely on an information service vendor with considerable experience in handling software modifications for human resource applications.

Government legislation significantly influences the human resource function. Recent legislation and other laws pertaining to human resources are as follows:



- The Tax Reform Act of 1986 that overhauled the tax system entailed changes in the tax structure for three years (1986-1988).
- The Consolidated Omnibus Budget Reconciliation Act (COBRA) of 1986 mandated employers to extend health benefits to former employees.
- Occupational Safety and Health Administration (OSHA), Equal Employment Opportunity Commission (EEOC), and Affirmative Action Program (AAP) are other important regulatory issues.

In addition to federal laws, employers must also comply with legislation enacted by the different states and local governments. While some states may mimic federal changes, others may develop ways to make up for lost revenues due to tax reform.

The key issues and trends stimulating the demand for human resource management systems are the following:

- There is greater corporate awareness of the role of the human resource function. HR has made great strides with respect to its status in the organization. Management has realized the value of employees toward the overall success of the organization and is willing to commit greater resources toward the personnel function. In many companies a senior executive now heads the human resource function.
- The business environment is characterized by intense domestic and global competition as corporations strive to cut costs in order to remain competitive. Human resources is an area where cost savings can be realized. HRMS can help reduce the costs of hiring, training, and administering of employees. They can reduce the costs of paper-intensive manual systems.
- The economy is witnessing a greater number of mergers, acquisitions, and divestitures, which bring about the reorganization and dislocation of employees. These changes in personnel emphasize the importance of the human resource function.
- The growing shortage of qualified labor has led to greater corporate attention on reducing employee turnover by providing suitable growth opportunities and identifying attractive career paths.



**D****Driving Forces**

The expanding use of HR systems in organizations heads the list of driving forces identified by users, IS management, and vendors in this sector, shown in Exhibit I-3. These systems are of critical use to personnel, accounting, operations, and executive functions.

EXHIBIT I-3

**HUMAN RESOURCES  
DRIVING FORCES**

- Expanding Use of HR Systems within Organizations
- Changing Benefit Structures/Plans
- Rapid Response and Deployment
- Expanding Domain of Powerful Technology
- Government Reporting Requirements
- Changing Organizational Environment

The changing benefit structures and plans is a driving force that increases the importance of HR systems that can adjust to changes more rapidly than manual systems.

Rapid response and deployment is a driving force in this sector due to the urgent demand for expanded human resource capabilities at a management and a departmental level. Corporate structural changes, including acquisitions, also feed this demand.

The expansion of data base, storage, network, and workstation/PC capabilities is a driving force that has made it possible to extend HR applications to more users.

The growth and changes in government reporting requirements is another force that stimulates the development and use of HR systems, although this appears less important than in the 1970s and early 1980s.



The changing organizational environment—where IS departments are taking less of a role in controlling HR systems and human resource groups or departments are emerging—is also a force that has increased the importance of HRMS.

## E

### Major Issues for Vendors

The leading issue that must be considered by vendors is the currency of their applications as shown in Exhibit I-4. Several vendor contacts stated that vendor products and services that stay up-to-date with tax tables and government requirements for processing and reporting are very appealing to users. Vendors should emphasize this experience in presentations.

EXHIBIT I-4

#### ISSUES FOR INFORMATION SERVICE VENDORS

- Currency of Application
- Integration
- Data Management
- Connectivity
- Distributed Applications

Vendors must anticipate the need for their systems in larger companies and engage in consultative selling before internal development or reviews of alternatives begin.

In view of rising interest in human resource functions and the use of HR systems, integration, data management, and connectivity have become more important issues for vendors of software products and turnkey systems.

Interest in HR systems and capabilities within companies has been encouraging the development of HR applications in divisions and departments that are linked to the central HR system. There is a need for software that will allow HR applications to be run on a distributed basis.

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This need will produce a real opportunity for vendors of mainframe and mini HR systems to develop distributed applications that require their software be used on PCs to obtain the benefits of distribution.

**F****Major Issues for  
Information System  
(IS) Departments**

Rising management expectations is the leading issue for IS departments, as shown in Exhibit I-5. The rising interest in human resource functions has led management to demand that HR applications and systems used by competitors or reviewed in business publications be matched in their companies.

EXHIBIT I-5

**ISSUES FOR IS DEPARTMENTS**

- Rising Management Expectations
- User Demand for Complexity
- Integration of Data and Applications
- Changing Corporate and Government Requirements
- Backlog

Users and management are demanding more-complex HR applications and systems. Needs to help career planning and growth plans, accommodate new benefits (e.g., flex plans), provide data to help plan improvements in productivity or provide access to data bases from PCs for further analysis are all of interest to users. The IS staff must work with users to understand the planned use of applications and information and consider whether vendor products can help to meet needs.

The integration of data and applications is a major issue since current or future plans for human resources implies the development of fully integrated applications and a data base that can be accessed by various departments. IS departments and vendors must look beyond initial requests and not install standalone modules for benefits of career planning, or other purposes, without planning for growth.



Changing corporate and government requirements complicates the ability of IS departments to respond to HR needs. Users must become more involved with projects. The services of vendors that are used to dealing with this issue should also be considered.

The backlog of maintenance and development work that IS faces usually contains requests for HR improvements that are being sought simultaneously with demands for newer HR systems. IS must bring this issue to management and seek aid in determining priorities and the use of outside resources. IS management should face the fact that HR applications could be an area where vendor software and services could save considerable time in research and development. Vendors should support this approach with IS departments and users by stressing the research and work they have gone through in the development of HR systems.

## G

### Major Issues for Users

The major issue for users is their role in systems development, as shown in Exhibit I-6. This is particularly important in human resources, since the IS department may have taken a leading role in determining requirements before functional responsibilities in the company are, or were, clear. Users must determine system requirements and take over management of the HR system. This could lead to a role in managing the development and maintenance of the HR system, with IS aiding with data management and network technology. Vendors should anticipate the expanding role of users and help them articulate HR requirements.

EXHIBIT I-6

#### ISSUES FOR END USERS

- Role in Systems Development
- Maintaining Current Knowledge of Requirements
- Integration
- Connectivity
- Data Management



End users are finding that maintaining current knowledge of requirements is needed to interpret corporate objectives and track government regulations. Vendors should point out their ability to aid in these activities.

Integration of applications, connectivity, and data management are starting to be recognized as users attempt to confront the use of separate modules or systems in a company and the need to obtain data from local and remote systems. Users could seek tutorial aid on these topics in audiovisual or other presentations of the operation of HR systems by vendor representatives. Users have commented on the value of obtaining education from vendor presentations in the HR area.

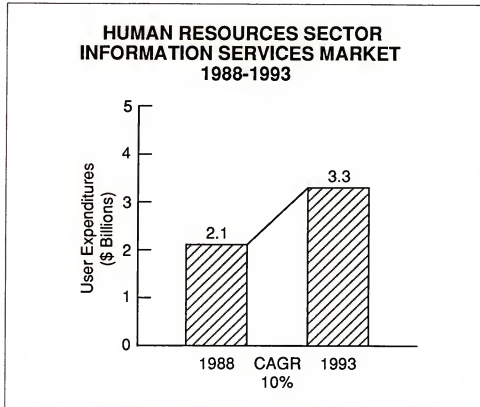


## II

## Market Forecast

INPUT forecasts that user expenditures for human resources software will increase from \$2.1 billion in 1988 to \$3.3 billion in 1993, for a compound annual growth rate of 9% (see Exhibit II-1). This growth will come in two different areas. First, the steady increase of third-party processing services for payroll function is expected to continue. The dynamic nature of tax laws and the complexity of multistate payrolls will ensure this trend. Simultaneously, organizations will invest in develop-

EXHIBIT II-1





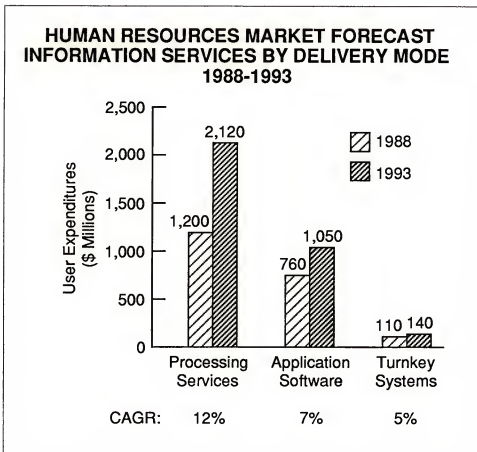


ment or purchase of software to create integrated human resource management systems (HRMS). Interfaces will transfer appropriate subsets for payroll data between the internal and external systems. This will not be a classical distributed processing approach, since the applications processed internally and externally will be different.

Payroll-related software and services will continue to grow more rapidly than HRMS software and services, since the former is a mandatory organizational function. However, integrated human resources systems will increasingly be implemented by progressive organizations, especially larger ones.

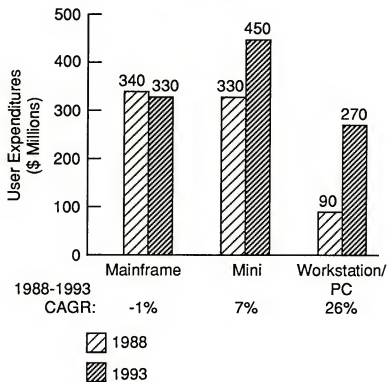
Processing services will continue to be the largest delivery mode in this sector, as shown in Exhibit II-2. Turnkey systems is relatively flat, while applications software will grow at 7%. However, workstation/PC software will grow much more rapidly, at a CAGR of 26%, as shown in Exhibit II-3. Mainframe software products growth will be flat, and minicomputer growth will equal 6% during the forecast period.

EXHIBIT II-2





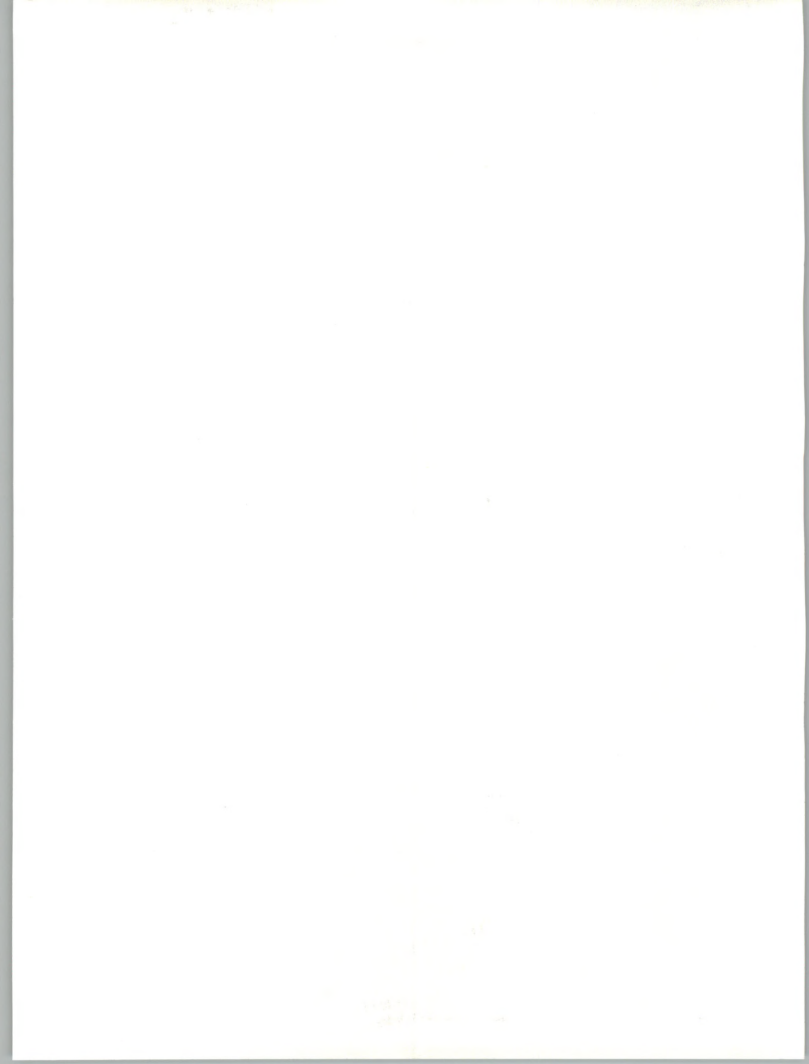
## EXHIBIT II-3

**HUMAN RESOURCES SECTOR FORECAST  
CROSS-INDUSTRY  
APPLICATION SOFTWARE MARKETS  
1988-1993**

Workstation/PC software growth will be driven by the continuing improvement in small-system price/performance, and increasingly available and function-rich software products from vendors.









## Competitive Developments

### A

#### Market Characteristics

Competition is increasing in this market sector but in distinctively different ways for vendors of processing services and software. There is little overlap among the groups shown in Exhibit III-1, but competition is increasing.

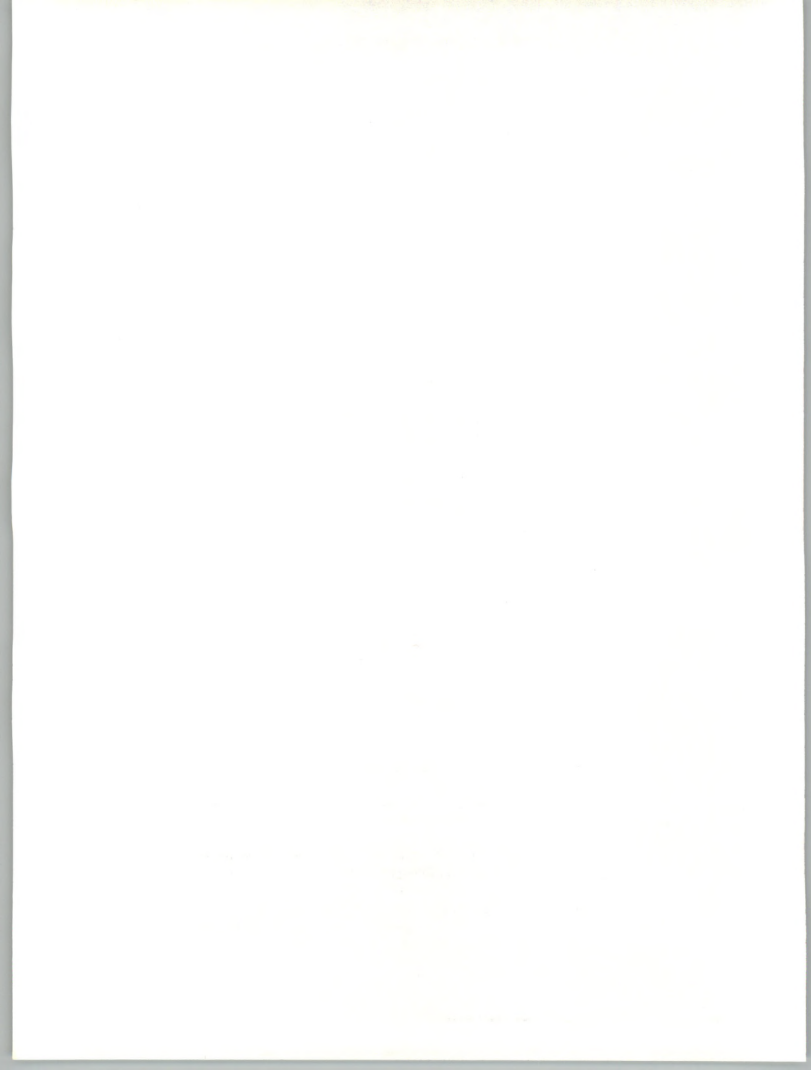
The major payroll processing companies, ADP and Paychex, are expanding the services they offer to include more areas such as benefits administration, compensation management, and personnel recordkeeping and reporting.

- ADP has extended its offerings to smaller companies, and has developed joint offerings with banks and PC links with clients.
- Paychex has been expanding its branch network and testing new services in the benefits areas.

Some software and turnkey companies have also started to offer payroll services, but their market impact is not significant compared to the major processors.

In the software area, the major vendors of human resource applications, such as MSA, McCormack & Dodge, and InSci, are facing increased competition, not only from new vendors of mainframe systems but also from aggressive vendors of mini and micro HR systems.

There tends to be agreement among vendors of payroll processing and HR software that integration of HR applications is the highest ranking item among key applications/technologies, as shown in Exhibit III-1.





## EXHIBIT III-1

**LEADING VENDORS IN  
HUMAN RESOURCES**Payroll Services

ADP

Paychex

Bank of America Business Services

Control Data Corporation Business Services

Safeguard Business Systems

Mainframe/Minicomputer HRMS

MSA

Integral Systems

InSci (Information Science)

McCormack &amp; Dodge

Microcomputer HRMS

Comshare

Mainframe Micros

Spectrum Human Resource

Use of data base technology is felt to be important since it is necessary to serve the complex reporting requirements and support integrated applications. Several users as well as vendors spoke of the need for relational technology.

Human resource applications on PCs is another key application/technology identified by processing and software vendors.

- Processing vendors tend to focus on the use of PCs at customer sites linked to services, whereas software vendors are interested in HR



applications or HRMS on PCs. Major vendors in the sector, such as McCormack & Dodge, and new vendors have developed similar products.

- Some vendors feel that distributed applications on PCs will be a key application in the future.

Connectivity is also mentioned as a key technology due to the need for accessing data in HR systems at local or remote sites in some organisations. Generally this is not ranked very high since security issues tend to lead to centralized handling of many applications.

Cafeteria-style (flexible or flex) benefits support is an application of some interest.

## B

### Leading and Emerging Vendors

ADP is the largest vendor in this sector, followed by two other service providers, as shown in Exhibit III-2.

The vendors that follow the service providers in this sector gain their revenue from application software, except for InSci and Comshare, which have both processing and software revenue. The three leading software vendors, McCormack & Dodge, MSA, Integral, and InSci, are competing more aggressively with each other and with the next tier of vendors, which includes Genesys, Tesseract, Cyborg, and Personnel Data Systems.

The larger software vendors offer application software principally for IBM mainframes, but some have extended their software to other equipment.

- Integral Systems can download data to PCs for planning and analysis and now offers System/38 and AS/400 software.
- InSci offers application software for the Wang VS and IBM PCs as well as mainframes.

Several second tier software vendors offer HR applications on a wide range of equipment.

- Cyborg has HR software for IBM mainframes, DEC VAX, Unisys, HP 3000, NCR, Data General, and Control Data.
- Personnel Data Systems has HR software for IBM mainframes and System/38, DEC VAX, Unisys, HP 3000, Honeywell, and Prime.

The larger vendors, such as MSA, have concentrated on expanded functional features and query and reporting (Expert Reporting) capabilities in competition with other software vendors in the mainframe market.



## EXHIBIT III-2

# ESTIMATED VENDOR SHARES OF HUMAN RESOURCES SECTOR INFORMATION SERVICES, 1987

Vendor Name	Processing Services	Application Software	Total IS Revenues	
	1987 Revenues (\$ Millions)	1987 Revenues (\$ Millions)	1987 Revenues (\$ Millions)	Market Share (Percent)
ADP	625	-	625	35
Paychex	70	-	70	4
Bank of America	65	-	65	4
McCormack & Dodge (D&B)	-	25	25	2
InSci (& Dyer Wells)	5	15	20	1
MSA	-	20	20	1
Integral Systems	-	18	18	1
Comshare	10	4	14	1
Genesys	-	10	10	1
Tesseract (Prudential)	-	10	10	1
Cyborg	-	8	8	<1
Personnel Data Systems	-	5	5	<1
Lawson	-	5	5	<1
Total	775	120	895	51

the 1990s, the number of people in the UK who are employed in the public sector has increased by 1.5 million, from 2.5 million in 1980 to 4 million in 1995. The public sector has also become an important employer of women, with 5.5 million women employed in the public sector in 1995, compared with 4.5 million in 1980.

There is a growing emphasis on the importance of the public sector in providing services to the community, and in particular in providing services to the elderly. The public sector has been the main provider of social care services in the UK, and it is expected that the demand for these services will continue to grow in the future. This has led to a growing emphasis on the importance of the public sector in providing social care services, and in particular in providing services to the elderly.

The public sector has also been the main provider of health care services in the UK, and it is expected that the demand for these services will continue to grow in the future. This has led to a growing emphasis on the importance of the public sector in providing health care services, and in particular in providing services to the elderly. The public sector has also been the main provider of education services in the UK, and it is expected that the demand for these services will continue to grow in the future.

The public sector has also been the main provider of housing services in the UK, and it is expected that the demand for these services will continue to grow in the future. This has led to a growing emphasis on the importance of the public sector in providing housing services, and in particular in providing services to the elderly. The public sector has also been the main provider of transport services in the UK, and it is expected that the demand for these services will continue to grow in the future.

The public sector has also been the main provider of cultural services in the UK, and it is expected that the demand for these services will continue to grow in the future. This has led to a growing emphasis on the importance of the public sector in providing cultural services, and in particular in providing services to the elderly. The public sector has also been the main provider of leisure services in the UK, and it is expected that the demand for these services will continue to grow in the future.

The public sector has also been the main provider of sports services in the UK, and it is expected that the demand for these services will continue to grow in the future. This has led to a growing emphasis on the importance of the public sector in providing sports services, and in particular in providing services to the elderly. The public sector has also been the main provider of environmental services in the UK, and it is expected that the demand for these services will continue to grow in the future.

The public sector has also been the main provider of safety services in the UK, and it is expected that the demand for these services will continue to grow in the future. This has led to a growing emphasis on the importance of the public sector in providing safety services, and in particular in providing services to the elderly. The public sector has also been the main provider of justice services in the UK, and it is expected that the demand for these services will continue to grow in the future.

The public sector has also been the main provider of defence services in the UK, and it is expected that the demand for these services will continue to grow in the future. This has led to a growing emphasis on the importance of the public sector in providing defence services, and in particular in providing services to the elderly. The public sector has also been the main provider of foreign affairs services in the UK, and it is expected that the demand for these services will continue to grow in the future.

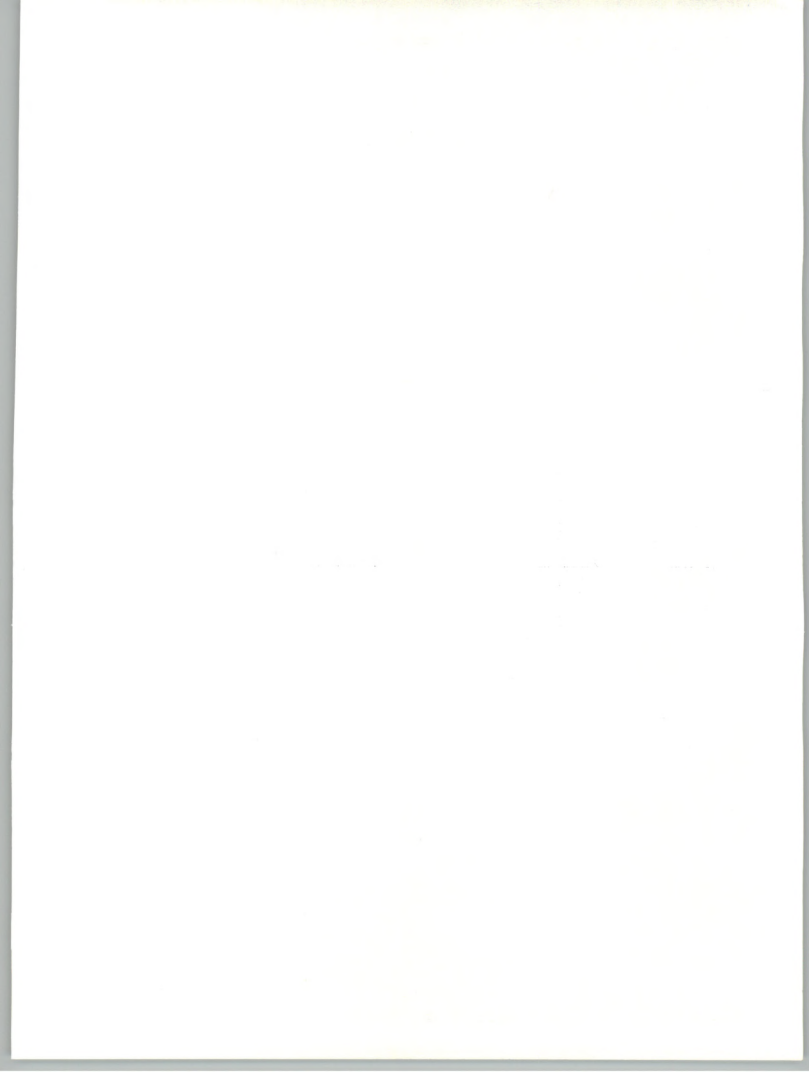
McCormack and Dodge and InSci have responded to this competition by offering a PC version of their HRMS.

The most significant competition between software firms on an aggregate basis is between the large number of small software firms marketing full HRMS on PCs to the relatively untapped market of smaller companies. Such companies include Mainframe Micros and Spectrum Human Resource System Corp.











## Opportunities for Vendors

INPUT estimates that only 30% of medium-sized and large organizations have a true HRMS installed, so considerable potential exists.

There is a sizable opportunity for vendors with knowledge of human resources to offer a workstation/PC-based HRMS to midsized and smaller firms. Well over half of these firms do not have adequate software.

- Most of the vendors offering PC-based systems are relatively inexperienced, but are aware of the opportunity.
- Some of the major vendors, specifically McCormack & Dodge and InSci, offer a PC-based system, but there is considerable room for other vendors, particularly for vendors that can offer a workstation product with more storage capabilities.

Users are becoming more interested in linking HR applications at division and department level within a company. Professional services or systems integration could be offered to aid in this effort by vendors that have knowledge of human resources.

Flexible (flex) cafeteria-style benefits is an application of interest providing an opportunity for smaller software firms to gain entry to large corporations.

Users are becoming interested in distributed HR applications, and this could prove to be an opportunity for major vendors that can supply distributed software for PCs that would work with users' mainframe software.



Many companies continue to develop human resource applications in-house, often at great cost. Hence educating and convincing the user on the benefits of using a commercial product is of importance to HRMS vendors.

As the control and administration of human resource management systems moves from the hands of data processing to the human resources department, it becomes imperative for HR software vendors to design human resource systems from an HR rather than a DP perspective.

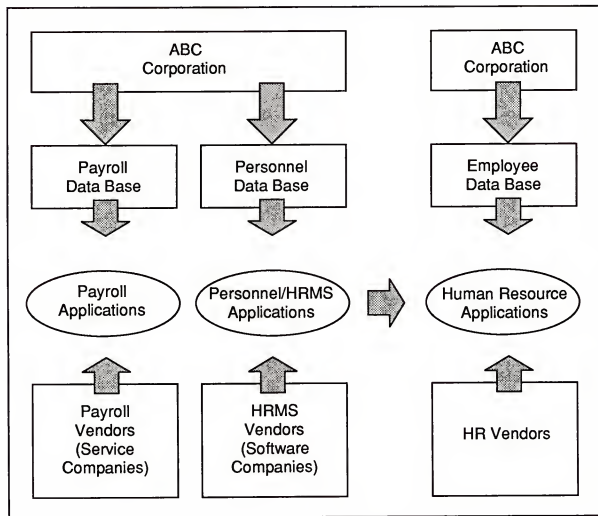
The most promising products and services will be those that fully exploit technology advances in the areas of relational data base technology, distributed data processing, networking, and expert systems.

Human resource management systems of the future will reflect developments in artificial intelligence (AI) and fourth-generation languages (4GL). HRMS will be easy to learn and easy to use, will have English-language front ends, and will allow users to define and build their own systems including menus, inquiry screens, and custom reports.

Many companies use HR products from more than one vendor suggesting that they are not able to meet all their requirements with one vendor. Looking into the future (Exhibit IV-1), INPUT foresees the eventual integration of the payroll and personnel/human resource functions. Both the service companies and the software companies will offer a complete range of products and services by moving into the other's territory. To achieve this, vendor strategies include new product development, marketing alliances, joint ventures, and mergers and acquisitions.



EXHIBIT IV-1

**HUMAN RESOURCES  
PRESENT VERSUS FUTURE**





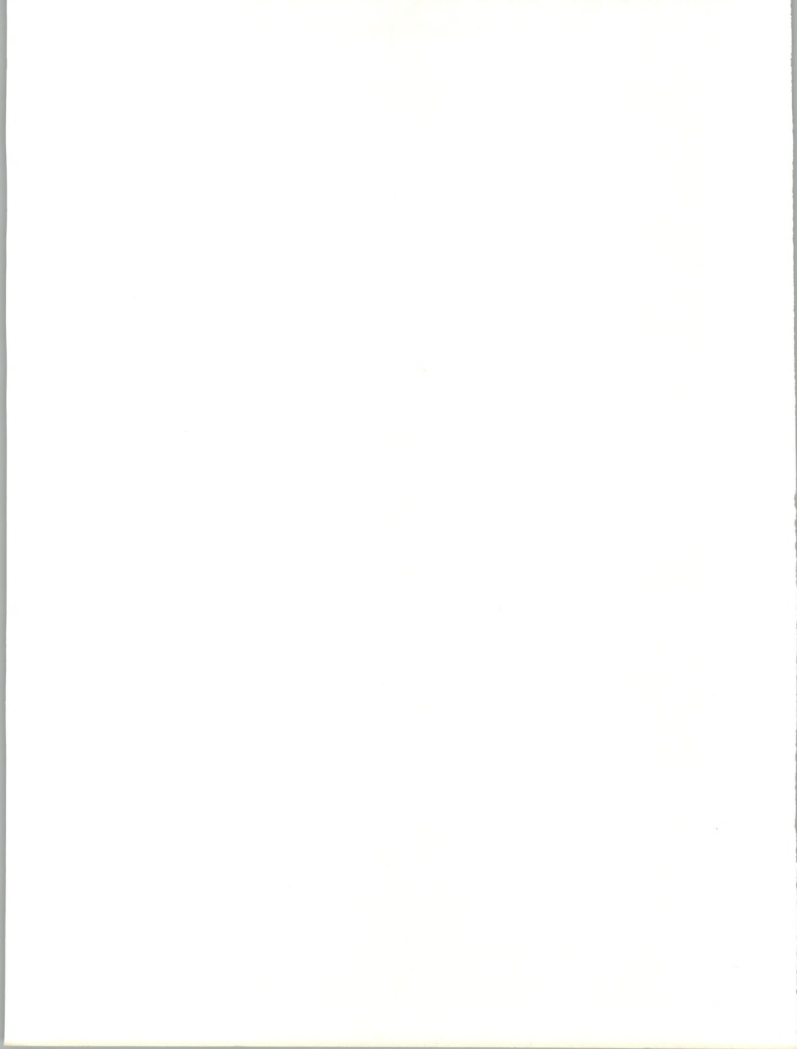






## Appendix: Forecast Data Base: Human Resources Sector

- This appendix contains the following forecast information, as shown in Exhibit A-1.
- Market size by delivery mode for each year, 1987-1993.
- Market growth rates for 1987-1988.
  - Compound annual growth rate (CAGR) for each delivery mode for the five-year period 1988-1993.



## EXHIBIT HR-A-1

### HUMAN RESOURCES SECTOR FORECAST USER EXPENDITURES BY DELIVERY MODE, 1987-1993

Sector By Delivery Mode	1987 (\$M)	1987- 1988 Growth (%)	1988 (\$M)	1989 (\$M)	1990 (\$M)	1991 (\$M)	1992 (\$M)	1993 (\$M)	CAGR 1988- 1993 (Percent)
Total Human Resources Sector	1,777	16	2,059	2,302	2,539	2,764	3,027	3,312	10
Processing Services	988	21	1,195	1,363	1,529	1,697	1,898	2,121	12
Transaction Processing Services	988	21	1,195	1,363	1,529	1,697	1,898	2,121	12
Systems Operations	0	NA	0	0	0	0	0	0	NA
Application Software Products	689	21	755	824	889	941	998	1,055	7
Mainframe	323	5	339	350	360	350	340	330	0
Minicomputer	308	7	329	360	385	409	429	451	6
Workstation/PC	88	51	87	114	144	182	229	274	26
Turnkey Systems	100	9	109	115	121	126	131	136	4

Table 1. Mean (SD) age, height, weight, and body mass index (BMI) of the 100 children in the study

Measure	Mean (SD)
Age (years)	10.2 (0.5)
Height (cm)	145.2 (10.1)
Weight (kg)	38.5 (10.2)
BMI (kg m <sup>-2</sup> )	18.6 (3.2)

Table 2. Mean (SD) age, height, weight, and body mass index (BMI) of the 100 children in the study, stratified by gender

Measure	Boys (n = 50)	Girls (n = 50)
Age (years)	10.2 (0.5)	10.2 (0.5)
Height (cm)	146.5 (10.3)	143.9 (9.9)
Weight (kg)	40.1 (10.5)	36.9 (9.9)
BMI (kg m <sup>-2</sup> )	18.8 (3.3)	18.4 (3.1)

Table 3. Mean (SD) age, height, weight, and body mass index (BMI) of the 100 children in the study, stratified by BMI

Measure	Underweight (n = 10)	Normal weight (n = 40)	Overweight (n = 30)	Obese (n = 20)
Age (years)	10.2 (0.5)	10.2 (0.5)	10.2 (0.5)	10.2 (0.5)
Height (cm)	142.5 (8.5)	145.5 (10.0)	147.5 (10.5)	148.5 (10.5)
Weight (kg)	32.5 (5.5)	38.5 (10.0)	42.5 (10.5)	48.5 (10.5)
BMI (kg m <sup>-2</sup> )	16.5 (1.5)	18.5 (3.0)	20.0 (3.5)	22.5 (4.0)

Table 4. Mean (SD) age, height, weight, and body mass index (BMI) of the 100 children in the study, stratified by BMI and gender

Measure	Underweight (n = 10)	Normal weight (n = 40)	Overweight (n = 30)	Obese (n = 20)
Age (years)	10.2 (0.5)	10.2 (0.5)	10.2 (0.5)	10.2 (0.5)
Height (cm)	142.5 (8.5)	145.5 (10.0)	147.5 (10.5)	148.5 (10.5)
Weight (kg)	32.5 (5.5)	38.5 (10.0)	42.5 (10.5)	48.5 (10.5)
BMI (kg m <sup>-2</sup> )	16.5 (1.5)	18.5 (3.0)	20.0 (3.5)	22.5 (4.0)

Table 5. Mean (SD) age, height, weight, and body mass index (BMI) of the 100 children in the study, stratified by BMI and gender

Measure	Underweight (n = 10)	Normal weight (n = 40)	Overweight (n = 30)	Obese (n = 20)
Age (years)	10.2 (0.5)	10.2 (0.5)	10.2 (0.5)	10.2 (0.5)
Height (cm)	142.5 (8.5)	145.5 (10.0)	147.5 (10.5)	148.5 (10.5)
Weight (kg)	32.5 (5.5)	38.5 (10.0)	42.5 (10.5)	48.5 (10.5)
BMI (kg m <sup>-2</sup> )	16.5 (1.5)	18.5 (3.0)	20.0 (3.5)	22.5 (4.0)

HR-B

## Appendix: Reconciliation of 1987-1988 Forecasts

Several significant changes contrast the 1988 human resources forecast, shown in Exhibit B-1, with the 1987 version. First, INPUT forecasts a 7% reduction in the size of the processing services market in 1988, based on recognition of lower revenue levels from leading vendors than were previously estimated.

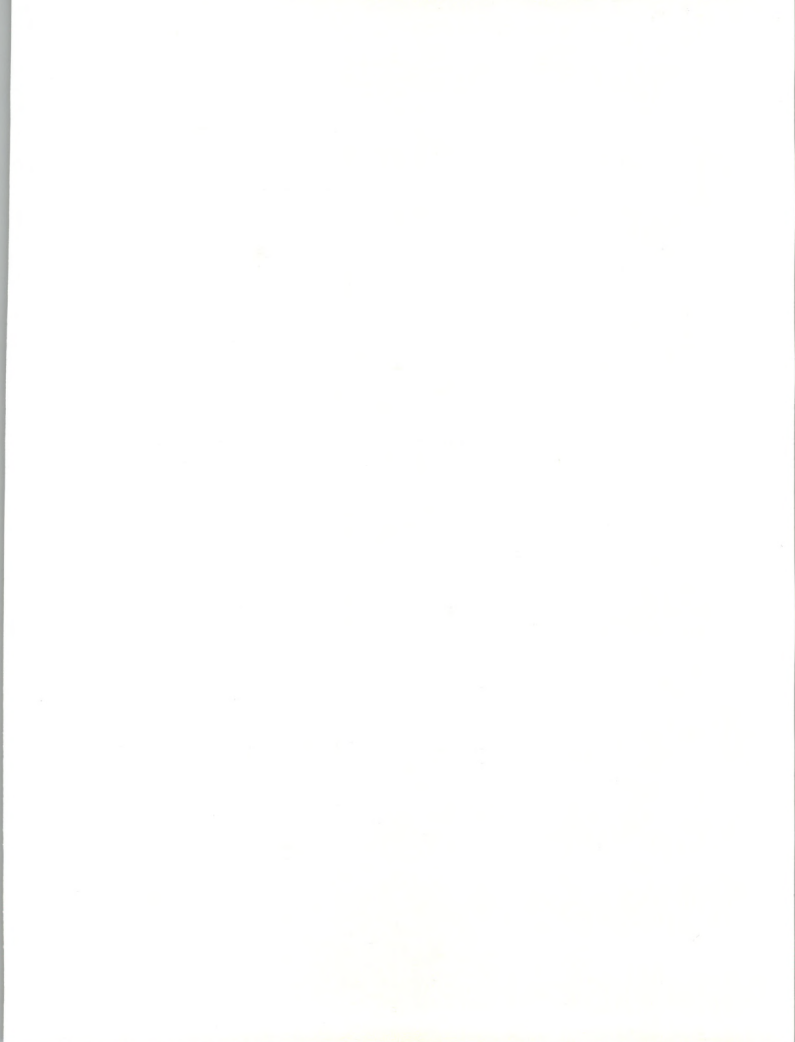
Applications software expenditures were increased for 1988, and turnkey systems expenditures reduced, reflecting a swing in recent years from hardware-oriented solutions by software companies in this sector.





**HUMAN RESOURCES SECTOR  
DATA BASE RECONCILIATION OF MARKET FORECAST  
BY DELIVERY MODE**

Delivery Mode	1987 Market			1992 Market			1987-1992 CAGR Fcst. in	1988-1993 CAGR Fcst. in
	1987 Fcst. (\$ M)	1988 Rpt. (\$ M)	Variance as Percent of 1988 Rpt.	1987 Fcst. (\$ M)	1988 Rpt. (\$ M)	Variance as Percent of 1987 Fcst.	1987 Rpt. (%)	1988 Rpt. (%)
Processing Services	1,061	990	(7)	1,935	1,900	(2)	13	12
Applications Software	628	690	10	900	1,000	11	7	7
Turnkey Systems	235	100	(57)	300	130	(56)	5	5
Total Sector	1,924	1,780	(8)	3,135	3,030	(3)	10	10



# About INPUT

INPUT provides planning information, analysis, and recommendations to managers and executives in the information processing industries. Through market research, technology forecasting, and competitive analysis, INPUT supports client management in making informed decisions.

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Formed as a privately held corporation in 1974, INPUT has become a leading international research and consulting firm. Clients include more than 100 of the world's largest and most technically advanced companies.

## INPUT OFFICES

### North America

#### Headquarters

1280 Villa Street  
Mountain View, CA 94041  
(415) 961-3300  
Telex 171407 Fax (415) 961-3966

#### New York

Parsippany Place Corp. Center  
Suite 201  
959 Route 46 East  
Parsippany, NJ 07054  
(201) 299-6999  
Telex 134630 Fax (201) 263-8341

#### Washington, D.C.

8298 Old Courthouse Road  
Vienna, VA 22182  
(703) 847-6870 Fax (703) 847-6872

### International

#### Europe

Piccadilly House  
33/37 Regent Street  
London SW1Y 4NF, England  
(01) 493-9335  
Telex 27113 Fax (01) 629-0179

#### Paris

29 rue de Leningrad  
75008 Paris, France  
(16) 44-80-48-43  
Fax (16) 44-80-40-23

#### Japan

FKI, Future Knowledge Institute  
Saida Building,  
4-6, Kanda Sakuma-cho  
Chiyoda-ku,  
Tokyo 101, Japan  
(03) 864-4026 Fax (03) 864-4114

