

Information Systems  
Program

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1988 Planning Report

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## Topics

- Research Methodology
- IS Environment—1987 versus 1988
- Information Systems Budget
- Application Development—  
Issues & Trends
- Directions into the 1990's

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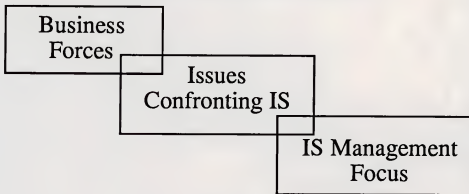
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# Driving Forces, Issues & Focus

*Some Fundamental Changes*



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Information Systems  
Environment  
1987 versus 1988

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Driving Forces

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## Driving Forces—1987

- Rising Expectations of Senior Management
- Cost-Sensitive Business Environment
- Ability to Conceptualize More Complex Applications
- Expanding Wealth of Powerful Technology
- Unstable Organizational Environment

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## Driving Forces 1987 Versus 1988

1987	Rising Expectations of Senior Management Cost-Sensitive Business Environment
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1988	"Bottom Line" Return
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## Driving Forces 1987 Versus 1988

1987	Ability to Conceptualize More Complex Applications
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1988	Rapid Response and Deployment
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## Driving Forces 1987 Versus 1988

1987	Expanding Wealth of Powerful Technology
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1988	Expanding Wealth of Powerful Technology
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## Driving Forces 1987 Versus 1988

1987	Growing Interaction Between Large Corporations
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1988	International Competition
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## Driving Forces 1987 Versus 1988

1987	Unstable Organizational Environment
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1988	Unstable Organizational Environment
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## Driving Forces—1988

- "Bottom Line" Return
- Rapid Response and Deployment
- Expanding Wealth of Powerful Technology
- International Competition
- Unstable Organizational Environment

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Information Systems  
Environment  
1987 versus 1988

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Major Issues

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## Major Issues—1987

- Business Contribution
- Connectivity
- Development Productivity
- Data Management
- Integration
- User Involvement

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## Major Issues 1987 Versus 1988

1987	Business Contribution
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1988	Rising Management Expectations "Mission Critical" Systems
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## Major Issues 1987 Versus 1988

1987	Connectivity
	Development Productivity



1988	Managing the Technology Investment
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## Major Issues 1987 Versus 1988

1987	Data Management Integration
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1988	Integration—Data and Applications
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## Major Issues 1987 Versus 1988

1987	User Involvement
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1988	User Demands for Increasingly Complex Solutions
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## Major Issues—1988

- Rising Management Expectations
- User Demands for Increasingly Complex Solutions
- Managing the Technology Investment
- Integration—Data and Applications
- Development Productivity
- "Mission Critical" Systems

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## Major Issues

### Survey Results

Issue	% Responses
General Economy	1
Industry Specific	10
Organization	4
Technology	27
Managing IS	25
IS Direction	9
Applications Needs	14

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## Information Services Vendor Shortcomings

Issue	% Responses	
Integration	4	
Connectivity	11	
Standards	3	
Application Solutions	12	
Development Environment	6	
Support	29	
On-Time Delivery	6	
Cost Control	9	
Industry Knowledge	5	
NO PROBLEMS	15	INPUT

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# Information Systems Budget

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## 1987-1989 Trends

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## Factors Affecting IS Budget

Factor	(Percent)	'88	'89
Economy		4	5
Industry Climate		4	4
Organization Climate		23	22
IS Staff Costs		16	14
Technology Costs		39	45
Organization		6	3
Competition		1	1
Major Projects		7	6

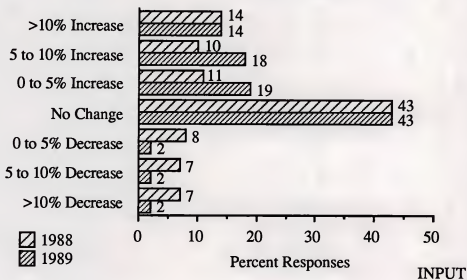
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## Information Systems Organization Changes in Staff

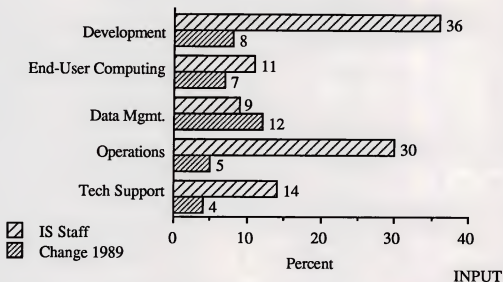


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## Information Systems Organization Distribution of Staff



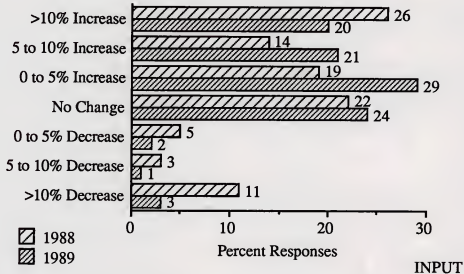
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## Information Systems Budget Growth Rates



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## Information Systems Budget Budget Distribution and Growth

(Percent)

Category	'87	'88	'88   '89 (Growth)	'89
Personnel	41	38	-7	2
Computer Hardware	25	26	4	4
Communications	9	11	22	5
External Product & Services	14	15	7	2
Other	11	10	-9	0

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## Information Systems Budget Computer Hardware

(Percent)

Category	'87	'88	'88   '89 (Growth)	
			'88	'89
Mainframes	43	45	5	4
Minicomputers	13	12	-8	2
Micros	9	9	0	7
Mass Storage	18	17	-6	1
Other	17	17	0	1

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## Information Systems Planned Computing Technologies

(Percent)

Development	12	Networking	14
AI/Expert Sys	8	Voice/Image	18
Applications	11	LAN/Dist Proc	8
Office Systems	4	Data Base	9
EDI	5	Intelligent WS	11

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## Information Systems Budget External Products and Services

(Percent)

Category	'87	'88	'88   '89 (Growth)
Prof Services	13	13	0   -1
Proc Services	5	4	-20   1
Software	31	33	6   0
Turnkey Systems	2	7	250   0
Maintenance	36	36	0   2
Other	13	7	-46   0

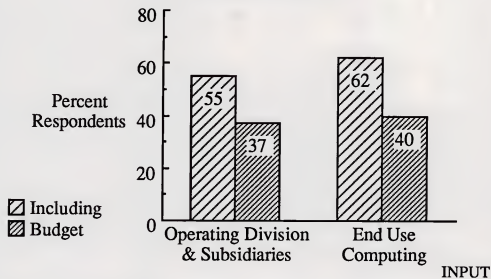
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## Information Systems Budget— What It Includes



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## Information Systems Budget Conclusions

- Increased Growth in 1989 Over 1988
  - 5% versus 4%
  - Modest Personnel Growth
  - Mainframe and Micro Growth
- Unclear Forecast for External Products and Services
- Budget Shifting to the End User

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# Application Development

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## Issues and Trends

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## Application Development Key Issues

Issue	% Responses
Costs	8
Productivity & Quality	38
Responsiveness	14
Development Process	11
Organization & Direction	10
Maintenance	3
Use of Technology	16

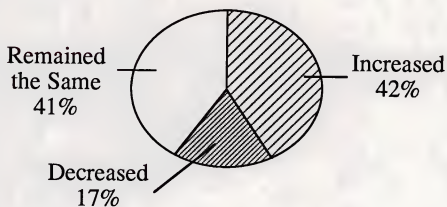
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## Application Development Backlog



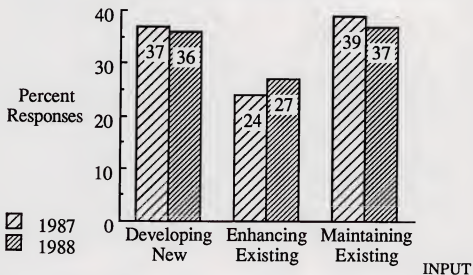
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## Application Development Resources Allocation of Internal Resources

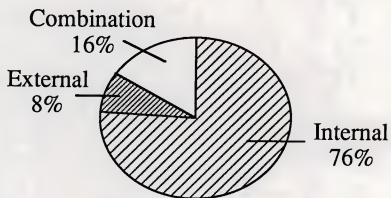


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## Application Development Resources Source of Resources—All Development



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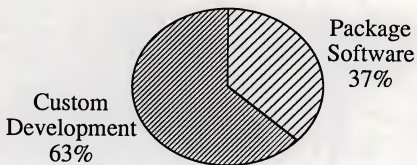
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## Application Development Resources Source of Resources—All Development



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Application Development—Major Projects  
Source of Resources—Major Projects  
(Percent)

Source of Resources	Package Software	Custom Development	TOTAL
Internal	22	78	56
Combined	52	48	43
External	100		1
TOTAL	35	65	100

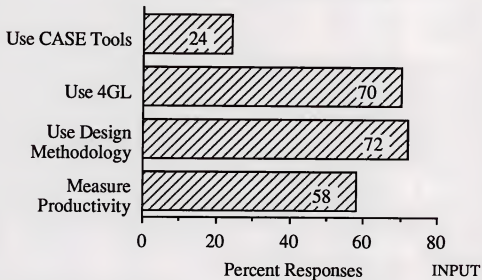
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## Application Development— Addressing Productivity



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## Application Development—End-User Production Systems Development

Question	Responses (Percent)
User Depts with IS Staffs	37
Developing Production Systems	52
Type of Computer:	
Mainframe	47
Mini	28
PC	74
Percent of Total Development	20

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## Application Development Conclusions

- The Challenge Grows
- New Technology Being Tried
  - CASE
  - Relational DBMS
- Use of Outsiders and Package Software Will Grow
- End User Assuming an Active Role

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Information Systems

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Directions into the 1990s

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# Information Systems

Required Changes of Emphasis  
1988 - 1993

Data Processing    →    Information Flow

Information Quantity → Information Quality

Automation of    →    Improvement of  
Process                                  Process

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## User Involvement in the 1990s

- Controlling Strategic Information Decisions
- Doing Majority of the Application Development
- Managing the Processing at Tier 2 and 3
- Working from a Broad Base of Experience

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## Information Systems Role in the 1990s

- Advisor versus Operator
- Consultant versus Developer
- Design the Architecture,  
Not the Application
- Run the Network,  
Not the Processing Points

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## Information Systems Responsibilities—1990s

- Corporate Strategic Support
- Architecture Engineering
- Application Planning, Not Development
- Data Architecture and Core Data Base Management
- Network Management
- Corporate Processing, Not Distributed Processing

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## Information Systems Organization—1990s

- Smaller Corporate Staff
- Expert Based—Technology and Business
- Consultant Style
  - Information Engineers
  - Solution Builders
- Champions for Technology

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# Data Base Management

## Current Trends and Challenges

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(Research in Process)  
June 1988

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## Objectives

- Identify Data Management Trends and Issues
  - Technology
  - Responsibility
  - Resources

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## Objectives

- Track Progress with Relational DBMS
  - By Information Systems
  - By End User
- Track Progress with Distributed DBMS
- Set Objectives for Data Management in 1990s

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## Research Demographics

- Data Administration Managers
- 100 F500-Size Corporations

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## Research Demographics

- 10 Industries

Discrete Mfg

Banking & Finance

Transportation

Utilities

Retail

Process Mfg

Insurance

Medical

Services

Wholesale Dist'n

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## Topics

- DBMS Environment
- Data Management Function
- Relational DBMS Application
- Distributed DBMS Application
- Future Research

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# DBMS Environment How It Is Changing

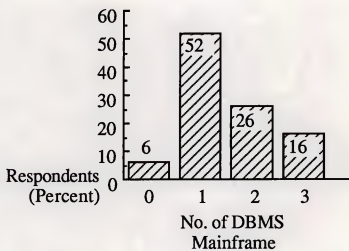
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## Mainframe DBMS Environment



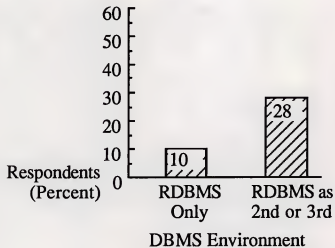
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## Mainframe DBMS Environment



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## Minicomputer DBMS Environment

- DBMS Use
  - 58% Are Using
  - 32% Are Not Using
  - 10% Did Not Know
- RDBMS Use
  - 25% Are Using
  - 43% of Those Using DBMS

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## Considering New Data Bases

- 30% Have New DBMS Under Consideration
- All Are Relational
- Most Often Mentioned Are:
  - DB2
  - Oracle
  - Ingress

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# Data Management Function How Is It Changing?

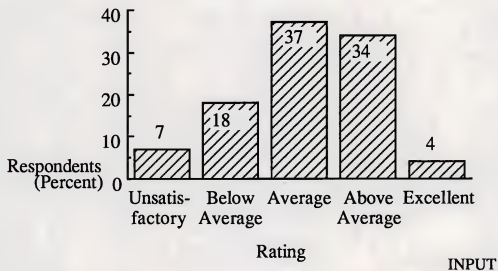
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## Effectiveness of Data Management Function



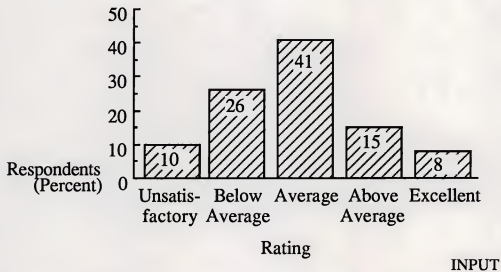
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## Effectiveness of Data Dictionaries

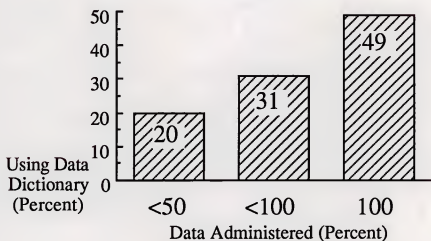


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## Use of Data Dictionaries Data Administered



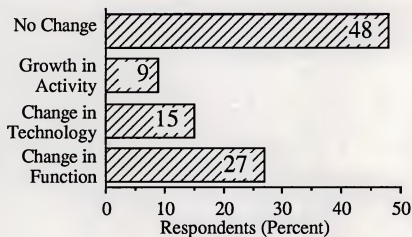
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## Data Management Changing Responsibilities



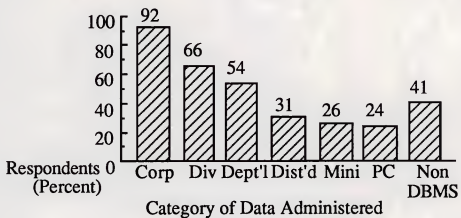
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## Data Administration Breadth of Responsibility



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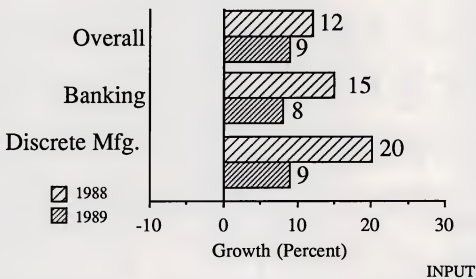
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## Data Administration Staff Growth Rates

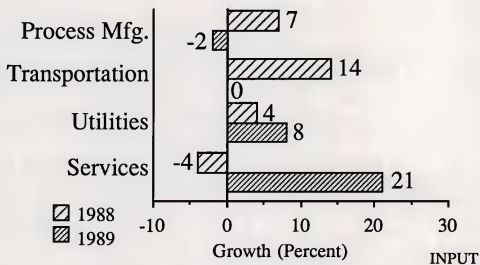


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## Data Administration Staff Growth Rates

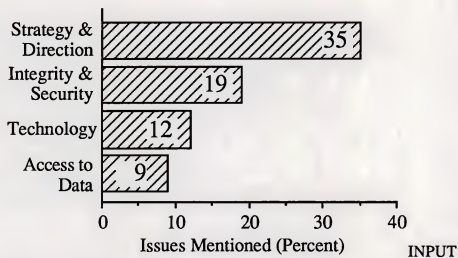


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## Data Management Key Issues

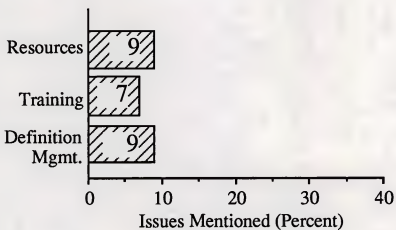


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## Data Management Key Issues



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## Key Issues Strategy & Direction

- Managing Distributed Data
- Ownership—User versus IS Responsibilities
- Managing Growth and Technology

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## Key Issues Strategy & Direction

- Planning for New Technology
- Management Support for Data Management Process

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## Data Management Function Conclusions

- YES, the Function Is Changing
- Broader Data Responsibilities
- Growing Staff
- Looking for an Expanded Strategy
- Major Change Is Still to Come

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# Relational DBMS Application

Who Is Using It?  
and  
How Is It Being Used?

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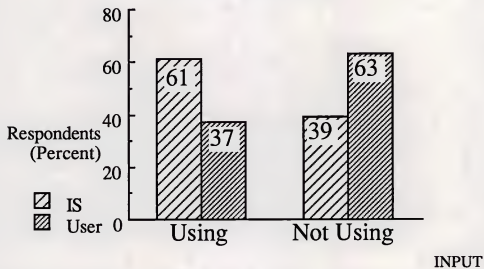
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## Relational DBMS Application Who Is Using It?

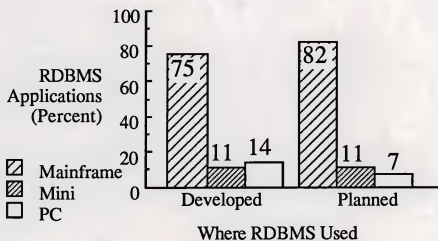


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## Relational DBMS Application Where Is It Being Used?



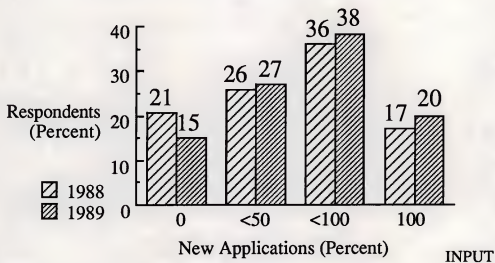
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## Relational DBMS Application Magnitude of Mainframe Use

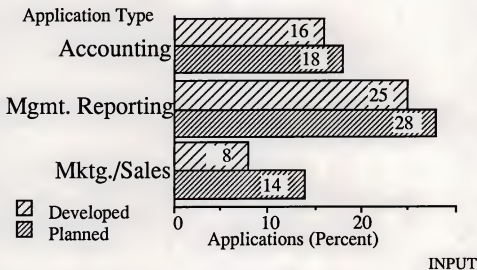


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## Relational DBMS Application How Is It Being Used?



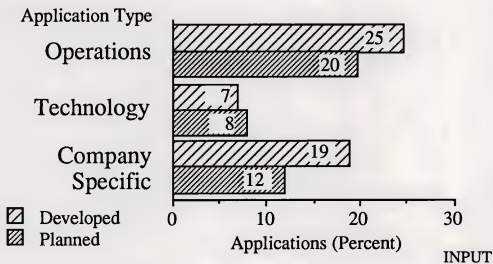
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## Relational DBMS Application How Is It Being Used?

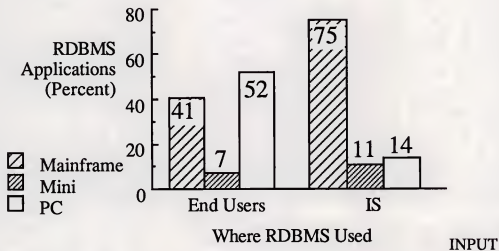


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## Relational DBMS Application Where Are End Users Using It?

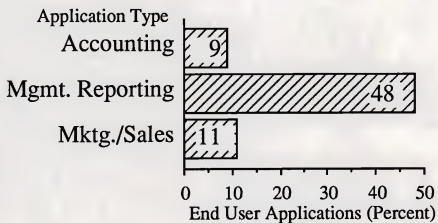


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## Relational DBMS Application How Are End Users Using It?



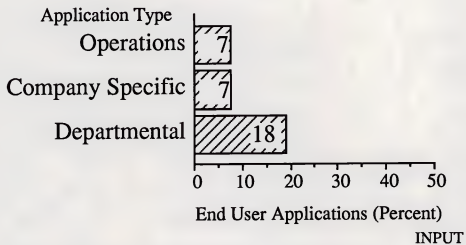
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## Relational DBMS Application How Are End Users Using It?



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## Relational DBMS Application Conclusions

- Relational DBMS Technology Has Arrived
  - It Is out of the Pilot Stage
  - The Shift to Relational Is Speeding Up
- Users Seem to Be Adopting Relational

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## Relational DBMS Application Conclusions

- Application Focus Is on Data Access and Analysis
  - Financial Reporting
  - Departmental Computing
- Learning Curve Will Soon Be Conquered

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# Distributed DBMS Application

## Is It Being Used?

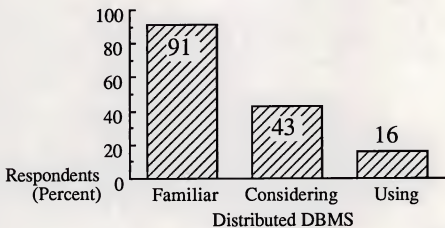
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## Distributed DBMS Application What Is the Activity Level?



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## Distributed DBMS Application Sample Applications

- Customs Clearance
- Shop Floor
- Retail Branch Operations
- Computer Aided-Engineering
- Inventory Tracking
- Departmental Reporting

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## Distributed DBMS Application Conclusions

- There Is Some Experimentation
- Planning Activity Has Started
- More Smoke Than Fire

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## Future Research

What Do INPUT Clients Need To Know?

- About Data Management in the 1990s
- About Using Relational DBMS
- About End Users Apply DBMS Applications
- About Planning for Distributed DBMS

INPUT

NOTES:

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## Data Management Current Trends & Challenges Conclusions

- The Role Is Changing
- New DBMS Technology Is Being Used
- The End User Is Developing with RDBMS
- IS Management Needs to Increase Emphasis

INPUT

NOTES:

USM2-DT2-32





# Systems Integration: A Development Strategy

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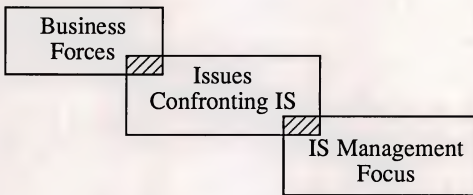
NOTES:

USM2-DT3-1



# Driving Forces, Issues & Focus

*Some Fundamental Changes*



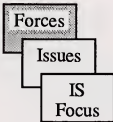
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## Business Forces



- "Bottom Line" Return
- Rapid Response & Deployment
- International Competition
- Growing Technology Investments
- Unstable Organizational Environments

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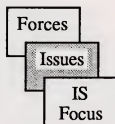
NOTES:

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# Issues Confronting Information Systems

*1987 INPUT Annual User Survey*



- Rising Management Expectations
- Expanding Wealth of Technologies
- Intercompany Electronic Interaction
- User Demand for Increasingly Complex Applications
- "Mission-Critical" Systems

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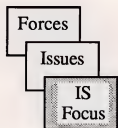
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# IS Management Focus

*1987 INPUT Annual User Survey*



- Business Contribution
- Development Productivity
- User Involvement
- Integration (Data/Applications)
- Connectivity (Infrastructure)

INPUT

NOTES:

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## Blocking Factors

- Infrastructure Gridlock
- Lack of Qualified In-House Personnel
- Existing Applications Portfolio

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## IS Management Focus

Area	Requirements
Integration	Applications/Data/ Technology
Management of IS	Productivity of IS Simplification of Support User-Managed Development
Support of Mission-Critical Systems	

INPUT

NOTES:

USM2-DT3-7



# IS Management Focus

Changing Emphasis

1987 - 1992

---

Data Processing    → Information Flow

Information       → Information  
Quantity           Quality

Automation of     → Process  
Process            Improvement

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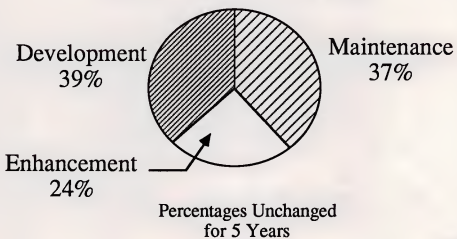
USM2-DT3-8





# Solving the Problem

*Current Applications Staff Buried*  
*1987 INPUT User Survey*



INPUT

NOTES:

USM2-DT3-9



## Solving the Problem

*Increasing Use of Outside Resources*  
*1987 INPUT User Survey*

- Professional Services
- Software Products/Packages
- Network Services
- **SYSTEMS INTEGRATION**

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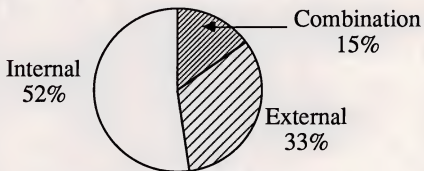
NOTES:

USM2-DT3-10



## Source of Development Resources

*Banking & Finance, Insurance,  
Government*



External up 15% since Last Survey

INPUT

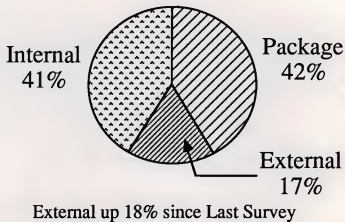
NOTES:

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## Source of Development Resources

*Manufacturing, Distribution,  
Transportation*



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# Systems Integration

*"The Provision of a Total Solution  
to a Multidisciplinary Information  
Systems Requirement"*

Applications

Infrastructure

INPUT

NOTES:

USM2-DT3-13



## Systems Integration Characteristics

- Total IS Solution from Design through Implementation
- Single-Source Control with Significant Program Management Responsibility
- Single-Source Accountability

INPUT

NOTES:

USM2-DT3-14



## Systems Integration Characteristics

- Application of Complex Multidisciplinary Tasks
- Assumption by Contractor of Risk

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NOTES:

USM2-DT3-14a



## Systems Integration Case Study Ashland Chemical

- Integrated Plan Operations System
- 2 Plants
- Order Entry, Inventory, Logistics,  
Accounting, MIS

INPUT

NOTES:

USM2-DT3-15





## Ashland Chemical—Roles

Systems Integrator	Company
Project Specification	Hardware Environment
Project Management	Infrastructure
CASE Methodology	50% of Programming
Applications Software	
Customization	

INPUT

NOTES:

USM2-DT3-16



## Ashland Chemical—Contract

*Systems Integrator:* Arthur Andersen

*Size:* \$5.5 Million      *Duration:* 30 Months

*Terms:* Time & Materials & Cost Plus

*Schedule:*

Feasibility	7/84	Award	9/85
Bid	10/84	Completion	1989

INPUT

NOTES:

USM2-DT3-17



## Ashland Chemical— Components

Software Products	\$ 0.7 M	13%
Professional Services	\$ 4.8 M	87%

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NOTES:

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## Systems Integration Case Study Paper Manufacturer

- Four Large & Many Smaller Non-Integrated Systems
- Multiple Mills
- Create One Integrated/Distributed Millwide System
  - Scheduling
  - Process Control
  - Materials Management

INPUT

NOTES:

USM2-DT3-19





## Paper Manufacturer—Roles

Systems Integrator	Company
Specification/Project Mgt. Hardware/Systems Software Applications Development Subcontractors - Hardware - Consultant	Interface to IBM Central Network

INPUT

NOTES:

USM2-DT3-20



## Paper Manufacturer—Contract

*Systems Integrator:* Oil Systems

*Size:* \$6.0 Million      *Duration:* 21 Months

*Terms:* Fixed Price

*Schedule:*

Feasibility	4/86	Award	9/87
Bid	8/87	Completion	6/89

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NOTES:

USM2-DT3-21



## Paper Manufacturer— Components

Equipment	\$3.1 M	52%
Professional Services	\$1.6 M	27%
Software Development	\$0.5 M	8%
Other	\$0.8 M	13%

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NOTES:

USM2-DT3-22



## Systems Integration Case Study— K-Mart

- Replace Existing POS System in 50% of Stores
- Develop Single Nationwide POS Plan
- Install PC-Based POS System at All Stores
- Integrate into Corporate Network

INPUT

NOTES:

USM2-DT3-23





## K-Mart—Roles

Systems Integrator	Company
Project Management	Feasibility
Design/Integration	Hardware Acquisition
Software Development	Corporate Network Interface
Overnight Processing	

INPUT

NOTES:

USM2-DT3-24



## K-Mart—Contract

*Systems Integrator:* Electronic Data Systems

*Size:* \$143 Million

*Terms:* Fixed Price

*Schedule:*

Feasibility	6/85	Award	6/86
Bid	2/86	Completion	1990

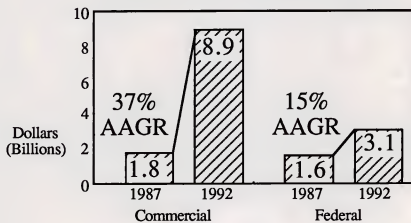
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NOTES:

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### Systems Integration Expenditure Forecasts (U.S.)



INPUT

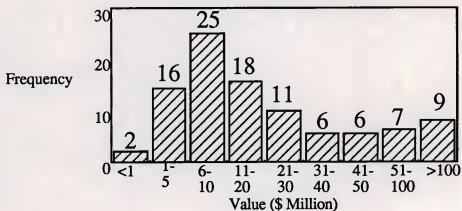
NOTES:

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### Distribution of Projects by Value Federal & Commercial

*INPUT, 1987 SI Program*



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USM2-DT3-27





## Leading Providers—Systems Integration Services

	Total	Federal	Commercial
Vendor	IBM	EDS	IBM
	EDS	CSC	AA & Co.
	AA & Co.	IBM	EDS
	CSC	MM-DS	CDC
	CDC	BCS	
	Unisys		

INPUT

NOTES:

USM2-DT3-28



## Leading Providers—Systems Integration Services

	Total	Federal	Commercial
\$MM	3,400	1,600	1,800
Cum. %	49	50	47

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NOTES:

USM2-DT3-29



## Systems Integration Case Studies

Yield Information On:

- The Motivating Factors
- Vendor Selection Criteria
- Probability for Success

INPUT

NOTES:

USM2-DT3-30



## Factors Motivating IS Management

- Limited In-House Expertise/Negative Experience
- Single-Source Solution Preferred
- Vendor "Partners" Desired
- Solutions are not Preconceived
- Recommended by Outside Consultants

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NOTES:

USM2-DT3-31





## Vendor Selection Criteria

Factor	Weight (Percent)
Technical Credibility of Solution	40
Risk Avoidance	
- Experience/Capabilities	30
- Project Management Approach	10
Cost:	20

INPUT

NOTES:

USM2-DT3-32



## The Risk Equation

"Over 35% of All Development Projects  
Fail to Meet Delivery Date or Cost  
Objectives."

INPUT

NOTES:

USM2-DT3-33



## The Risk Equation

### Factors Include:

- Interference with Current Operations
- Lack of Experience with Required Technologies
- Financial Exposure
- Internal Lack of Focus

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USM2-DT3-33a



## Summary

- Changing Environments Are Motivating the Trend to Systems Integration
- Opportunities for Successful Deployment

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USM2-DT3-34





### Systems Solutions are Changing

Factor	Traditional	Future
Complexity	Modest	Significant
Technology	Standard	Multiple
Organization	Single Dept.	Multi-departmental
Orientation	Automation	Improvement
Value	Operational	Strategic

INPUT

NOTES:

USM2-DT3-35



### Development Processes Evolving

Factor	Traditional	Future
Responsibility	Info. Systems	User Driven
Risk	Tactical	Strategic
Project Mgt.	Info. Systems	IS and Vendor
Appl. Knowledge	Internal	Internal/ External
Solution	Single Vendor	Multivendor

INPUT

NOTES:

USM2-DT3-36



## Opportunities for Successful Deployment

### *Lack of In-House Capability*

- Large Backlog
- Technical Expertise
- Integration Mgt. Experience
- Applications Expertise

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USM2-DT3-37



# Opportunities for Successful Deployment

## *Solution Complexity*

- Solution Undefined
- New Technologies
- Network-Based Design
- Multivendor Environment

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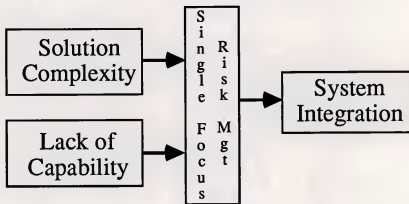
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## Opportunities for Successful Deployment



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