CASE Outlook

Douglas Tayler
Director of User Research
INPUT

CASE
(Computer-Assisted Systems Engineering)

Market and Opportunity

INPUT

NOTES:

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Overview

- Definitions
- User Perspective
- CASE Tools
- Market Directions
- Conclusions

INPUT

NOTES:

JJ88-DT4-2

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CASE Definitions

- Software Development and CASE
- Systems Development Lifecycle and CASE
- Categories of CASE Tools

INPUT

NOTES:

JJ88-DT4-3

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Software Development and CASE

Software Development

	In-House		Products	
	Small	Large	Small	Large
Systems Software				
Applications Software				

INPUT

NOTES:

JJ88-DT4-4

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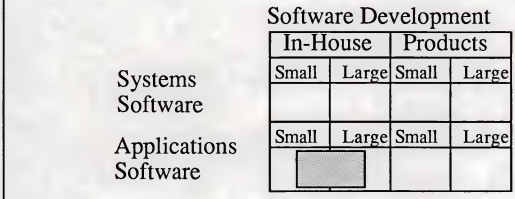
CASE Opportunity
Software Crisis



INPUT

NOTES:

JJ88-DT4-5

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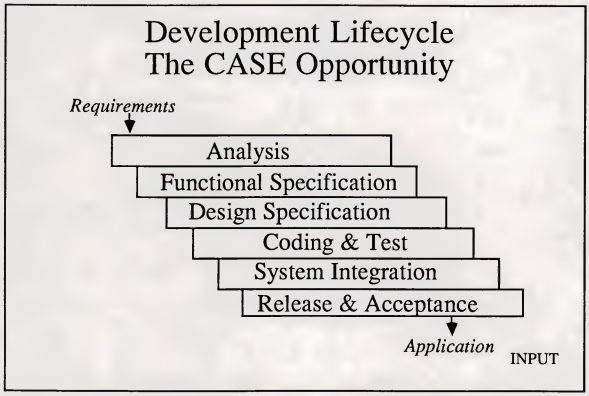

NOTES:

JJ88-DT4-6

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Categories of CASE Tools

- Lifecycle Management
- Design
- Code Generation
- Documentation
- Maintenance

INPUT

NOTES:

JJ88-DT4-7

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CASE - User Perspective

- Backlog Problem Not Improving
- Productivity Problem Real
- Concern About Discipline Requirements
- Cautious About CASE

INPUT

NOTES:

JJ88-DT4-8

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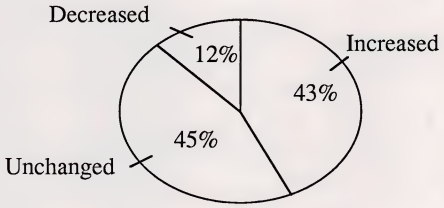
Applications Backlog
1988 Versus 1987



INPUT

NOTES:

JJ88-DT4-9

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Application Development—Key Issues

Issue	Responses (Percent)
Productivity and Quality	38
Use of Technology	16
Responsiveness	14
Development Process	11
Organization and Direction	10
Other	11

INPUT

NOTES:

JJ88-DT4-10

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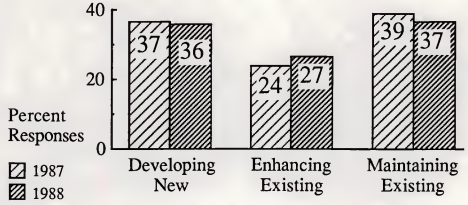
Application Development Resources: Allocation of Internal Resources



INPUT

NOTES:

JJ88-DT4-11

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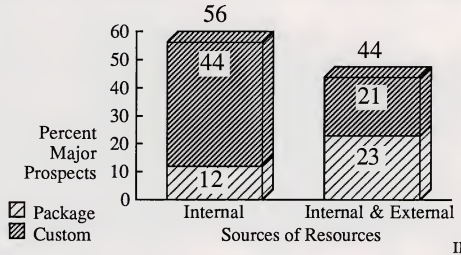
Application Development Resources: Source of Resources for Major Projects



INPUT

NOTES:

JJ88-DT4-12

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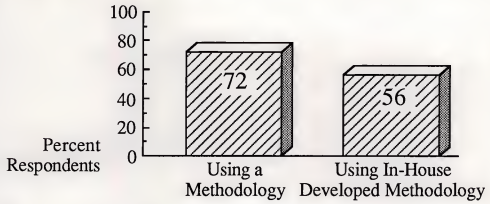
Systems Development Methodologies



INPUT

NOTES:

JJ88-DT4-13

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CASE—User Perspective Summary

- Real Productivity Problem
- Lingering Resistance to Disciplined Development Processes
- Two Problems
  - Existing Applications - 2/3rds
  - New Development - 1/3rd
- Slow to Become Systems Engineers

INPUT

NOTES:

JJ88-DT4-15A,B

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CASE Tools

New Development

Lifecycle Management	
Design	Code Generation
Documentation	

Maintenance

- Translators
- Analyzers
- Comparators
- Restructurers

INPUT

NOTES:

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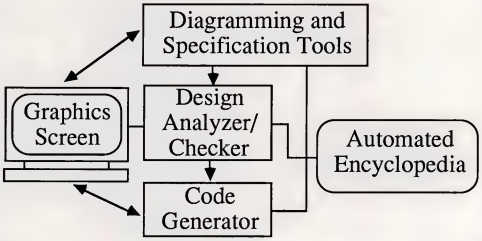
Complete CASE System



INPUT

NOTES:

JJ88-DT4-16A

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CASE Tools Advantages

- Assist in Project Management
- Assist in Design
- Improve Documentation
- Assist in Data Modeling
- Enforce Development Standards

INPUT

NOTES:

JJ88-DT4-17

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CASE Tools Advantages

- Assist in Development of Code
- Assist in Development of Test Cases
- Assist in Debugging
- Assist in System Release
- Assist in Maintenance

INPUT

NOTES:

JJ88-DT4-18

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Types of CASE Tools Maintenance

- Code Analyzers
- Restructurers
- Cross Reference Analyzers
- Translators for Consistency of Compilers
- Data Standardization Tools

INPUT

NOTES:

JJ88-DT4-19

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Types of CASE Tools Maintenance

- Data Manipulation Tools
- File Comparators
- Source Comparators
- Test Analyzers
- Documentation Tools

INPUT

NOTES:

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CASE Market Directions

- Market Status
- Vendor Directions
- Leading Vendors
- Forecast

INPUT

NOTES:

JJ88-DT4-21

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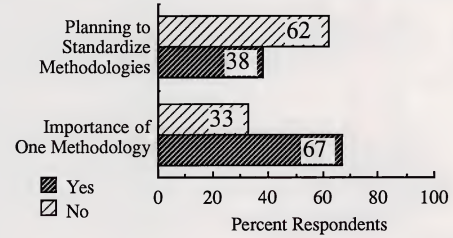
Vendor Problem
Systems Development Methodologies



INPUT

NOTES:

JJ88-DT4-23

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Vendor Directions

- Technology Push
  - PC Orientation
  - Integrated Products
- Modest Standards Efforts
  - Prohibits Ease of Interface
  - No International Body Involved

INPUT

NOTES:

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Vendor Directions

- Extensive Alliance Formation
  - Front End - Back End & Vice Versa
  - Professional Services—Front-End Vendors
  - OEM Relationships
- Looking for Full Lifecycle Offering
  - Cost of Entry/Development Going Up

INPUT

NOTES:

JJ88-DT4-26A,B

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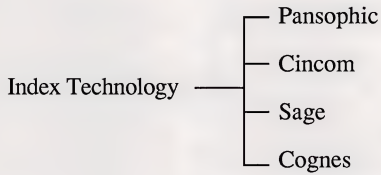
Vendor Alliances
Front End - Back End



INPUT

NOTES:

JJ88-DT4-27

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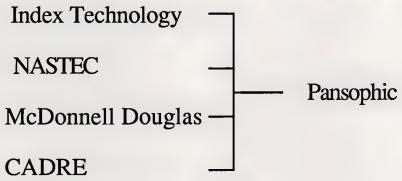
Vendor Alliances
Front End - Back End



INPUT

NOTES:

JJ88-DT4-28

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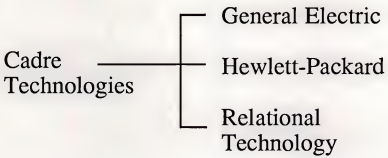
Vendor Alliances
CASE Vendor—OEM



INPUT

NOTES:

JJ88-DT4-30

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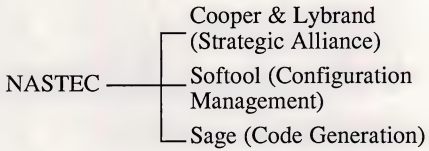
Vendor Alliances
Full Lifecycle



INPUT

NOTES:

JJ88-DT4-31

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CASE Market Leaders—1987

Company	Share (Percent)
Index	14
KnowledgeWare	8
NASTEC	8
CADRE	7
Cortex	7

INPUT

NOTES:

JJ88-DT4-33A

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CASE Market Leaders—1987

Company	Share (Percent)
LBMS	6
Sage	6
McDonnell	4
Softlab	4
TI	3

INPUT

NOTES:

JJ88-DT4-33B

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CASE Market and Opportunities—Conclusions

- Emerging Market - Relatively Long Cycle
- User Acceptance Will Grow at Modest Rate
- Continued Alliance Formation
  - Merger/Acquisition
  - True Leaders Emerge
- Standards Needed, but Little Progress to Date
- Front-End Products = $1 Billion

INPUT

NOTES:

JJ88-DT4-36A,B

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CASE-User Requirements for Success

- Understand the Impact on the Development Culture
- Well Disciplined Methodology
- Active Use of Structured Techniques
- Experimentation With CASE
- Well Defined CASE Objectives

INPUT

NOTES:

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CASE-Vendor Requirements for Success

- Use Relationships to Address Lifecycle
- Employ an Open Architecture
- Provide Consulting Support
- Support Standards

INPUT

NOTES:

JJ88-DT4-38

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DT4-0

CASE Outlook

Doug Tayler
Director, User Research
INPUT

DT4-1

CASE (Computer-Assisted Systems Engineering)

Market and Opportunity

INPUT

DT4-2

Overview

Topics

- Definitions
- User Perspective
- CASE Tools
- Market Directions
- Conclusions

INPUT

DT4-3

CASE Definitions

- Software Development and CASE
- Systems Development Lifecycle and CASE
- Categories of CASE Tools

INPUT

Software Development and CASE

DT4-4

Software Development

	In-House		Products	
	Small	Large	Small	Large
Systems Software				
Applications Software				

INPUT

CASE Opportunity Software Crisis

DT4-5

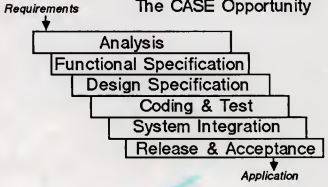
Software Development

	In-House		Products	
	Small	Large	Small	Large
Systems Software				
Applications Software				

INPUT

DT4-6

Development Lifecycle
The CASE Opportunity



Categories of CASE Tools

DT4-7

- Lifecycle Management
- Design
- Code Generation
- Documentation
- Maintenance

INPUT

CASE - User Perspective

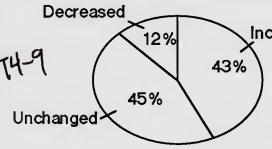
DT4-8

- Backlog Problem Not Improving
- Productivity Problem Real
- Concern About Discipline Requirements
- Cautious About CASE

INPUT

Applications Backlog 1988 Versus 1987

DT4-9



INPUT

Application Development–Key Issues

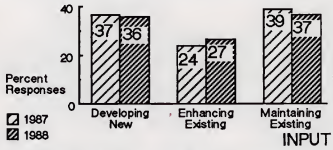
DT4-10

Issue	Responses (Percent)
Productivity and Quality	38
Use of Technology	16
Responsiveness	14
Development Process	11
Organization and Direction	10
Other	11

INPUT

Application Development Resources: Allocation of Internal Resources

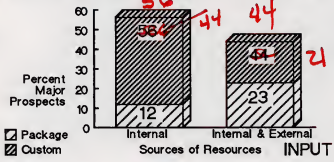
DT4-11



INPUT

Application Development Resources: Source Of Resources For Major Projects

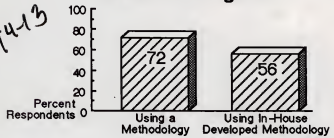
DT4-12



INPUT

Systems Development Methodologies

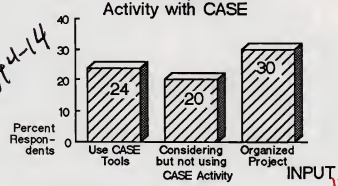
DT4-13



INPUT

User Perspective Activity with CASE

DT4-14



INPUT

CASE–User Perspective Summary

DT4-15A

- Real Productivity Problem
- Lingering Resistance to Disciplined Development Processes

INPUT

CASE–User Perspective Summary

DT4-15B

- Two Problems
  - Existing Applications - 2/3rds
  - New Development - 1/3rd
- Slow to Become Systems Engineers

INPUT

CASE Tools

DT4-16

New Development

Lifecycle Management	
Design	Code Generation
Documentation	

Maintenance

- Translators
- Analyzers
- Comparators
- Restructurers

INPUT

CASE Tools Advantages

DT4-17

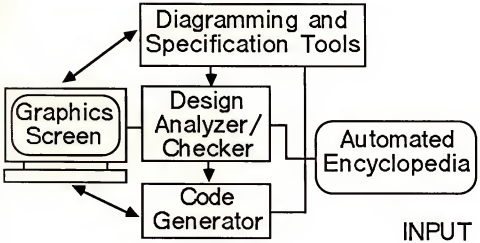
- Assist in Project Management
- Assist in Design
- Improve Documentation
- Assist in Data Modeling
- Enforce Development Standards

INPUT

MAKE DIFF. COLOR THAN REST

Insert New

Complete CASE System



OTA-16A

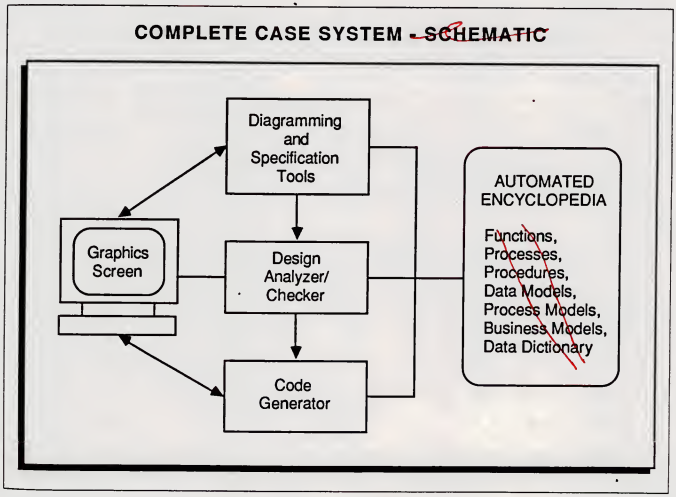
Evolution s are reviewed more thoroughl

However, connectivity between A towards complete CASE systems that offer full life cycle support and flexibility for future development.

In terms of ADTs, complete CASE systems provide a total development environment of RDBMS, a central data dictionary or repository, 4GLs and two-dimensional graphical programming languages. Complete CASE systems allow the software engineers to build a graphical image of the derived application on his/her workstation and then automatically generate the code to produce it.

The characteristics of complete CASE systems are illustrated in a schematic given as Exhibit III-3.

EXHIBIT III-3



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DT4-18

CASE Tools Advantages

- Assist in Development of Code
- Assist in Development of Test Cases
- Assist in Debugging
- Assist in System Release
- Assist in Maintenance

NOTE DIFF. COLOR

INPUT

Types of CASE Tools Maintenance

DT4-19

- Code Analyzers
- Restructurers
- Cross Reference Analyzers
- Translators for Consistency of Compilers
- Data Standardization Tools

INPUT

Types of CASE Tools Maintenance

DT4-20

- Data Manipulation Tools
- File Comparators
- Source Comparators
- Test Analyzers
- Documentation Tools

INPUT

CASE Market Directions

- Market Status
- Vendor Directions
- Leading Vendors
- Forecast

DT4-21

INPUT

Market Status

CORRECTION MADE

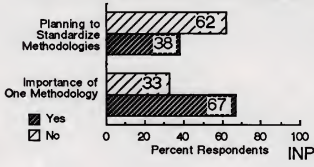
- Remains in Emerging Phase
  - 3% to 5% penetration
  - Rapid Growth - 100% a Year for 1985-87
  - No Dominant Vendors

DT4-22

- User Caution
  - Pilot Versus General Use
  - Wait and See Attitude

INPUT

Vendor Problem
Systems Development Methodologies



DT4-23

INPUT

Market Status

DT4-24

- Large Vendor Population
  - 40+ Active & 40+ Announced Vendors
  - Potential of Hundreds
- New Entries Likely
  - IBM–No Announced Product
  - 4GL & DBMS Vendors
  - Professional Services Vendors

INPUT

INPUT

Vendor Directions

DT4-25

- Technology Push
  - PC Orientation
  - Integrated Products
- Modest Standards Efforts
  - Prohibits Ease of Interface
  - No International Body Involved

INPUT

Vendor Directions

- Extensive Alliance Formation
  - Front End - Back End & Vice Versa
  - Professional Services–Front-End Vendors
  - OEM Relationships

DT4-26A

INPUT

Vendor Directions

- Looking for Full Lifecycle Offering
  - Cost of Entry/Development Going Up

DT4-26B

INPUT

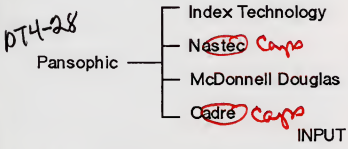
Vendor Alliances
Front End - Back End

DT4-27

INPUT

Vendor Alliances
Front End - Back End

DT4-28



INPUT

Vendor Alliances
Full Lifecycle

DT4-31

INPUT

DT4-29

Vendor Alliances
Professional Services-Front End

Arthur Young	KnowledgeWare
Coopers & Lybrand	Nastec Cayo
Deloitte Haskins & Sells	Index Technology

INPUT

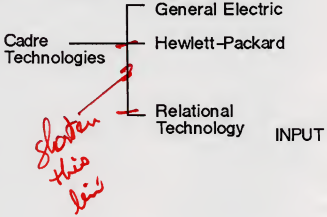
Market Directions Leading Vendors

DT4-32

Integrated Systems	Arthur Anderson TI
Design Tools	Index Tech. KnowledgeWare
Code Generation Tools	Sage Pansophic
Maintenance Tools	Language Tech. Bachman

DT4-30

Vendor Alliances
CASE Vendor-OEM



INPUT

CASE Market Leaders-1987

DT4-33A

Company	Share (Percent)
Index	14
KnowledgeWare	8
Nastec Cayo	8
Cadre	7
Cortex	7

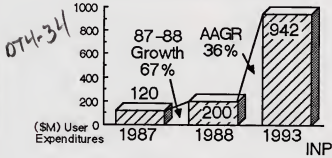
INPUT

CASE Market Leaders–1987

Company	Share (Percent)
LBMS	6
Sage	6
McDonnell	4
Softlab	4
TI	3

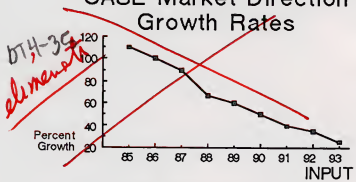
INPUT

Case Market Forecast, 1987–1993 Front-End Usage Expenditures



INPUT

CASE Market Direction Growth Rates



INPUT

CASE Market and Opportunities–Conclusions

- Emerging Market – Relatively Long Cycle
- User Acceptance Will Grow at Modest Rate
- Continued Alliance Formation
  - Merger/Acquisition
  - True Leaders Emerge

INPUT

CASE Market and Opportunities–Conclusions

- Standards Needed, but Little Progress to Date
- Front-End Products = $1 Billion
  - Total Market = ??????

INPUT

CASE-User Requirements for Success

- Understand the Impact on the Development Culture
- ~~Active~~ Well Disciplined ~~Development~~ Methodology
- Active Use of Structured Techniques
- Experimentation With CASE
- Well Described CASE Objectives

CASE-Vendor Requirements for Success

- Use Relationships to ~~Extend~~ Address Lifecycle
- Employ an Open Architecture
- Provide Consulting Support
- Support Standards

INPUT

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CASE
Outlook

Doug Tayler
Director, User Research

CASE
(Computer Assisted Systems Engineering)

Market and Opportunity

DT4-1

Topics

* Definitions
* User Perspective
* CASE Tools
* Market Directions
* Conclusions

CASE Definitions

* Software Development and CASE
* Systems Development Life Cycle and CASE
* Categories of CASE Tools

Software Development and CASE

	Software Development			
	In-House		Products	
	Small	Large	Small	Large
Systems Software				
	Small	Large	Small	Large
Applications Software				

CASE Opportunity
Software Crisis

Software ~~Usage~~ Development

	In-House		Products	
	Small	Large	Small	Large
Systems Software				
	Small	Large	Small	Large
Applications Software				

Case Opportunity
Systems Development Life Cycle

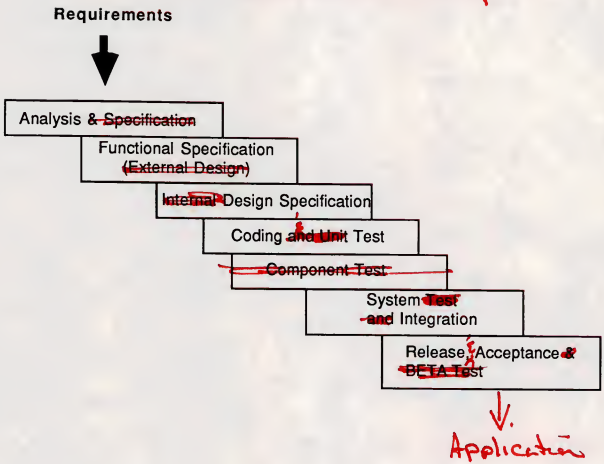
See Attached

~~EXHIBIT III-3~~

Development Lifecycle

THE "WATERFALL' MODEL OF THE SOFTWARE LIFECYCLE

The CASE Opportunity



Requirements

- Analysis ~~& Specification~~
- Functional Specification ~~(External Design)~~
- ~~Internal~~ Design Specification
- Coding ~~and Unit~~ Test
- ~~Component Test~~
- System ~~Test and~~ Integration
- Release, Acceptance ~~& BETA Test~~

Application

6

Repeat - Case

Categories of CASE Tools

* Life Cycle Management
* Design
* Code Generation
* Documentation
* Maintenance

CASE - User Perspective

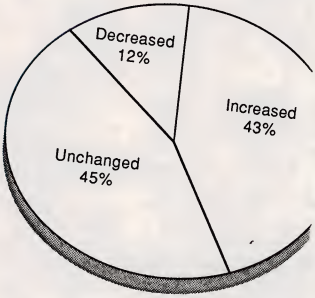
* Backlog Problem Not Improving
* Productivity Problem Real
* Concern About Discipline Requirements
* Cautious About CASE

Applications Backlog
1987 Versus 1988

USE MCAS IX-1

9

APPLICATIONS BACKLOG 1988 VERSUS 1987



Application Development - Key Issues

USE MCAS IX-2

APPLICATION DEVELOPMENT— KEY ISSUES

Issue	Responses (Percent)
Productivity and Quality	38
Use of Technology	16
Responsiveness	14
Development Process	11
Organization and Direction	10
~~Costs~~ other	11 ~~8~~
~~Maintenance~~	~~3~~

ONE SLIDE

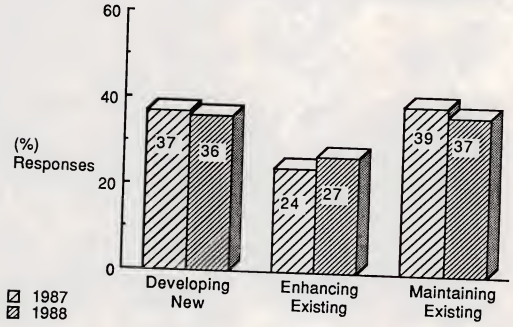
10

Application Development Resources
Allocation of Internal Resources

USE MCAS IX-3

11

APPLICATION DEVELOPMENT RESOURCES: ALLOCATION OF INTERNAL RESOURCES



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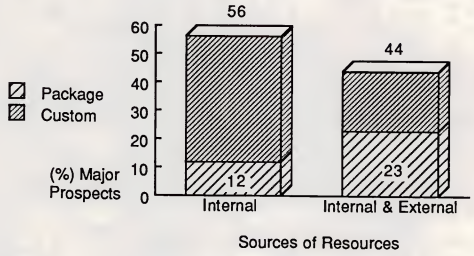
Application Development Resources
Source For Major Projects

USE MCAS-IX-4

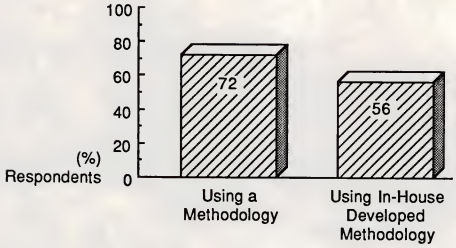
APPLICATION DEVELOPMENT RESOURCES: SOURCE OF RESOURCES FOR MAJOR PROJECTS



Systems Development Methodologies

USE MCAS IX-5

SYSTEM DEVELOPMENT METHODOLOGIES



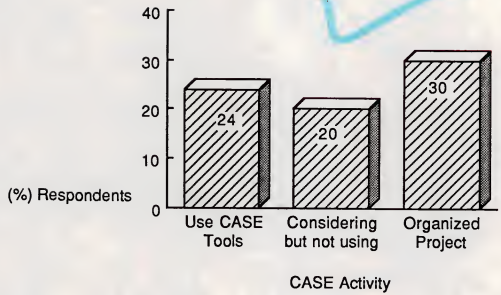
User Perspective
Activity With CASE

USE MCAS IX-6

USOK PERSPECTIVE

Application Development Issues

ACTIVITY WITH CASE



CASE - User Perspective
Summary

* Real Productivity Problem

* Lingering Resistance to Disciplined Development Processes

* Two Problems
  - Existing Applications - 2/3rds
  - New Development - 1/3rd

* Slow to Become Systems Engineers

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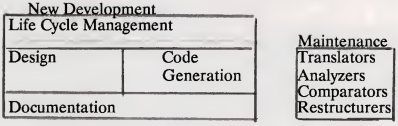
CASE Tools


New Development
Life Cycle Management
Design
Code Generation
Documentation
Maintenance
Translators
Analyzers
Comparators
Restructurers

CASE Tools
Advantages

* Assist in Project Management
* Assist in Design
* Improve Documentation
* Assist in Data Modeling
* Enforce Development Standards

Note: make the last line a different color.

CASE Tools
Advantages

* Assist in Development of Code
* Assist in Development of Test Cases
* Assist in Debugging
* Assist in System Release
* Assist in Maintenance

Note: make the last line a different color.

Types of CASE tools
Maintenance

* Code Analyzers
* Restructurers
* Cross Reference Analyzers
* Translators for Consistency of Compilers
* Data Standardization Tools

Types of CASE tools
Maintenance

* Data Manipulation Tools
* File Comparators
* Source Comparators
* Test Analyzers
* Documentation Tools

CASE
Market Directions

* Market Status
* Vendor Directions
* Leading Vendors
* Forecast

Market Status

* Remains in Emerging Phase
  - 3 to 5% penetration
  - Rapid Growth - 100% a Year for 1985-87
  - No Dominant Vendors

* User Caution
  - Pilot Versus General Use
  - Wait and See Attitude

Vendor Problem
Systems Development Methodologies

Bar Chart

Y axis: two bars for each label

1. Planning to Standardize Methodologies
   Yes 38%
   No 62%

2. Importance of One Methodology
   Yes 67%
   No 33%

X axis: Percent of Respondents

Market Status

* Large Vendor Population
  - 40+ Active & 40+ Announced Vendors
  - Potential of Hundreds
* New Entries Likely
  - IBM - No Announced Product
  - 4GL & DBMS Vendors
  - Professional Services Vendors

Vendor Directions

* Technology Push
  - PC Orientation
  - Integrated Products
* Modest Standards Efforts
  - Prohibits Ease of Interface
  - No International Body Involved

Vendor Directions

* Extensive Alliance Formation
  - Front END - Back End & Vice Versa
  - Professional Services - Front End Vendors
  - OEM Relationships
* Looking for Full Life Cycle Offering
  - Cost of Entry/Development Going Up

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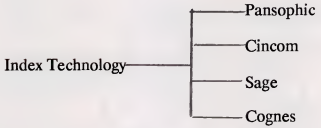
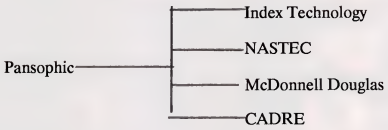
Vendor Alliances
Front End - Back End



Vendor Alliances
Front End - Back End

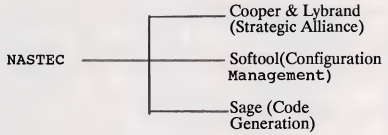


Vendor Alliances
Professional Services - Front End

Arthur Young ---------- Knowledgeware
Coopers & Lybrand ------- NASTEC
Deloitte Haskins --------- Index Technology
& Sells

Vendor Alliances
CASE Vendor - OEM

Vendor Alliances
Full Life Cycle



Market Directions
Leading Vendors

Integrated Systems	Arthur Anderson TI
Design Tools	Index Tech. Knowledgeware
Code Generation Tools	Sage Pansophic
Maintenance Tools	Language Tech. Bachman

CASE Market Leaders - 1987

Company	Share(%)	Company	Share(%)
Index	14	LBMS	6
Knowledgeware	8	Sage	6
NASTEC	8	McDonnell	4
CADRE	7	Softlab	4
Cortex	7	TI	3

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Market Forecast
CASE Front End Tools
1988-1993

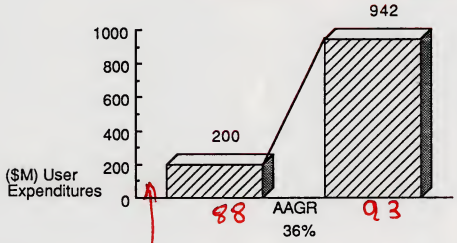
USE MCAS VII-1 as modified on attached

CASE Market Directions
Growth rates

Note: Se Attached

CASE MARKET FORECAST, 1988-1993

Front End User Expenditures



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87

CASE Market and Opportunity
Conclusions

* Emerging Market - Relatively Long Cycle
* User Acceptance Will Grow at Modest Rate
* Continued Alliance Formation
  - Merger/Acquisition
  - True Leaders Emerge
* Standards Needed, But Little Progress To-Date
* Front End Products = $1 Billion
  - Total Market = ??????

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CASE-User Requirements for Success

* Understand the Impact on the Development Culture
* Active, Well Disciplined, Development Methodology
* Active Use of Structured Techniques
* Experimentation With CASE
* Well Described CASE Objectives

CASE-Vendor Requirements for Success

* Use Relationships to Extend Life cycle
* Employ an Open Architecture
* Provide Consulting Support
* Support Standards