Vol # 1

BUSINESS SYSTEMS PLANNING: AN IMPLEMENTATION APPROACH

by

JOHN ROBERT VACCA

B.B.A., Washburn University, 1976
M.B.A., Emporia State University, 1978

A MASTER'S THESIS

submitted in partial fulfillment of the

requirements for the degree

MASTER OF SCIENCE

Department Of Computer Science

KANSAS STATE UNIVERSITY
Manhattan, Kansas

1982

Approved by:

Vic Walkenhorst
Major Professor

CERTIFICATE OF COPYRIGHT REGISTRATION

FORM TX

UNITED STATES COPYRIGHT OFFICE

This certificate, issued under the seal of the Copyright Office in accordance with the provisions of section 410(a) of title 17, United States Code, attests that copyright registration has been made for the work identified below. The information in this certificate has been made a part of the Copyright Office records.

Ralph Oman

REGISTER OF COPYRIGHTS
United States of America

REGISTRATION NUMBER

TXu 105-742

TX TXU

EFFECTIVE DATE OF REGISTRATION

JUL 26 1982

Month Day Year

DO NOT WRITE ABOVE THIS LINE. IF YOU NEED MORE SPACE, USE CONTINUATION SHEET (FORM TX/CON)

1 Title

TITLE OF THIS WORK: BUSINESS SYSTEMS PLANNING: AN IMPLEMENTATION APPROACH *(Vols. I and II)

If a periodical or serial give: Vol. ..... No. ..... Issue Date .....

PREVIOUS OR ALTERNATIVE TITLES:

PUBLICATION AS A CONTRIBUTION: (If this work was published as a contribution to a periodical, serial, or collection, give information about the collective work in which the contribution appeared.)

Title of Collective Work: ..... Vol. ..... No. ..... Date ..... Pages .....

2 Author(s)

IMPORTANT: Under the law, the "author" of a "work made for hire" is generally the employer, not the employee (see instructions). If any part of this work was "made for hire" check "Yes" in the space provided, give the employer (or other person for whom the work was prepared) as "Author" of that part, and leave the space for dates blank.

1

NAME OF AUTHOR: JOHN R. VACCA

Was this author's contribution to the work a "work made for hire"? Yes ..... No ✓

DATES OF BIRTH AND DEATH: Born 1947 (Year) Died ..... (Year)

AUTHOR'S NATIONALITY OR DOMICILE: Citizen of USA (Name of Country) or Domiciled in ..... (Name of Country)

AUTHOR OF: (Briefly describe nature of this author's contribution) TEXT

WAS THIS AUTHOR'S CONTRIBUTION TO THE WORK:

Anonymous? Yes ..... No ✓
Pseudonymous? Yes ..... No ✓

If the answer to either of these questions is "Yes," see detailed instructions attached.

2

NAME OF AUTHOR:

Was this author's contribution to the work a "work made for hire"? Yes ..... No .....

DATES OF BIRTH AND DEATH: Born ..... (Year) Died ..... (Year)

AUTHOR'S NATIONALITY OR DOMICILE: Citizen of ..... (Name of Country) or Domiciled in ..... (Name of Country)

AUTHOR OF: (Briefly describe nature of this author's contribution)

WAS THIS AUTHOR'S CONTRIBUTION TO THE WORK:

Anonymous? Yes ..... No .....
Pseudonymous? Yes ..... No .....

If the answer to either of these questions is "Yes," see detailed instructions attached.

3

NAME OF AUTHOR:

Was this author's contribution to the work a "work made for hire"? Yes ..... No .....

DATES OF BIRTH AND DEATH: Born ..... (Year) Died ..... (Year)

AUTHOR'S NATIONALITY OR DOMICILE: Citizen of ..... (Name of Country) or Domiciled in ..... (Name of Country)

AUTHOR OF: (Briefly describe nature of this author's contribution)

WAS THIS AUTHOR'S CONTRIBUTION TO THE WORK:

Anonymous? Yes ..... No .....
Pseudonymous? Yes ..... No .....

If the answer to either of these questions is "Yes," see detailed instructions attached.

3 Creation and Publication

YEAR IN WHICH CREATION OF THIS WORK WAS COMPLETED: Year. 1982

(This information must be given in all cases.)

DATE AND NATION OF FIRST PUBLICATION:

Date ..... (Month) (Day) (Year)

Nation ..... (Name of Country)

(Complete this block ONLY if this work has been published.)

4 Claimant(s)

NAME(S) AND ADDRESS(ES) OF COPYRIGHT CLAIMANT(S):

JOHN R. VACCA
3810 NW 37th ST. TERR,
TOPEKA, KANSAS 66618

TRANSFER: (If the copyright claimant(s) named here in space 4 are different from the author(s) named in space 2, give a brief statement of how the claimant(s) obtained ownership of the copyright.)

Complete all applicable spaces (numbers 5-11) on the reverse side of this page

DO NOT WRITE HERE

*Added from copies.

TXu 105-742

EXAMINED BY:	APPLICATION RECEIVED:
CHECKED BY:	24 SEP 1982
CORRESPONDENCE: ☑ Yes	DEPOSIT RECEIVED:
DEPOSIT ACCOUNT FUNDS USED: ☐	REMITTANCE NUMBER AND DATE: 315033 JUL 26 82

FOR COPYRIGHT OFFICE USE ONLY

DO NOT WRITE ABOVE THIS LINE. IF YOU NEED ADDITIONAL SPACE, USE CONTINUATION SHEET (FORM TX/CON)

PREVIOUS REGISTRATION: (5 Previous Registration)

- Has registration for this work, or for an earlier version of this work, already been made in the Copyright Office? Yes..... No ✓
- If your answer is "Yes," why is another registration being sought? (Check appropriate box)
  - ☐ This is the first published edition of a work previously registered in unpublished form.
  - ☐ This is the first application submitted by this author as copyright claimant.
  - ☐ This is a changed version of the work, as shown by line 6 of this application.
- If your answer is "Yes," give: Previous Registration Number ..... Year of Registration .....

COMPILATION OR DERIVATIVE WORK: (See instructions) (6 Compilation or Derivative Work)

PREEXISTING MATERIAL: (Identify any preexisting work or works that this work is based on or incorporates.)

MATERIAL ADDED TO THIS WORK: (Give a brief, general statement of the material that has been added to this work and in which copyright is claimed.)

MANUFACTURERS AND LOCATIONS: (If this is a published work consisting preponderantly of nondramatic literary material in English, the law may require that the copies be manufactured in the United States or Canada for full protection. If so, the names of the manufacturers who performed certain processes, and the places where these processes were performed *must* be given. See instructions for details.) (7 Manufacturing)

NAMES OF MANUFACTURERS	PLACES OF MANUFACTURE

REPRODUCTION FOR USE OF BLIND OR PHYSICALLY-HANDICAPPED PERSONS: (See instructions) (8 License For Handicapped)

- Signature of this form at space 10, and a check in one of the boxes here in space 8, constitutes a non-exclusive grant of permission to the Library of Congress to reproduce and distribute solely for the blind and physically handicapped and under the conditions and limitations prescribed by the regulations of the Copyright Office: (1) copies of the work identified in space 1 of this application in Braille (or similar tactile symbols); or (2) phonorecords embodying a fixation of a reading of that work; or (3) both.

a ☐ Copies and phonorecords b ☐ Copies Only c ☐ Phonorecords Only

DEPOSIT ACCOUNT: (If the registration fee is to be charged to a Deposit Account established in the Copyright Office, give name and number of Account.)

Name: .....

Account Number: .....

CORRESPONDENCE: (Give name and address to which correspondence about this application should be sent.) (9 Fee and Correspondence)

Name: JOHN R. VACCA

Address: 3810 NW 37th ST. TERR, (Apt.)

TOPEKA, (City) KANSAS (State) 66618 (ZIP)

CERTIFICATION: * I, the undersigned, hereby certify that I am the: (Check one) (10 Certification (Application must be signed)

☑ author ☐ other copyright claimant ☐ owner of exclusive right(s) ☐ authorized agent of: .....
(Name of author or other copyright claimant, or owner of exclusive right(s))

of the work identified in this application and that the statements made by me in this application are correct to the best of my knowledge.

Handwritten signature: (X) John R. Vacca

Typed or printed name: JOHN R. VACCA Date: 7-21-82

MAIL CERTIFICATE TO (11 Address For Return of Certificate)

(Certificate will be mailed in window envelope)

JOHN R. VACCA (Name)

3810 NW 37th ST. TERR, (Number, Street and Apartment Number)

TOPEKA, (City) KANSAS (State) 66618 (ZIP code)

17 U.S.C. § 506(e): Any person who knowingly makes a false representation of a material fact in the application for copyright registration provided for by section 409, or in any written statement filed in connection with the application, shall be fined not more than $2,500

SPEC
COLL
LD
2668
.TH
1982
V32
vol. 1
c. 2

A11203 570209

ACKNOWLEDGMENTS

Sincere appreciation is extended to Dr. Roger Hartley, Dr. Myron Calhoun, and Professor Edwin Basham for their encouragement, suggestions, and helpful criticisms given during the preparation of this study, which resulted in countless improvements.

Special thanks are given to IBM Corporation for providing the necessary methodology and various other materials used in this study.

Sincere appreciation is extended to all of the Santa Fe Railroad personnel who encouraged me in this effort; and especially to Chuck Green, Manager of Data Base Services, and Steve Yallen, Director of Administrative Services, whose encouragement and assistance made this study possible.

I am especially grateful for the professional services of Helen Wiedle who provided the word processing resources for this project.

I am deeply grateful to my wife, Linda, and my daughter, Wendy for their patience, help, and encouragement during the preparation of this study.

TABLE OF CONTENTS

Page

List of Tables xxv

List of Figures. xxvii

List of Graphs xxviii

List of Plates xxx

Volume

I

Part

I. INTRODUCTION 1

Chapter

1. INTRODUCTION. 1

1.1 The Problem 5

1.1.1 Purpose of the Study. 5

1.1.2 Importance of the Study 6

1.1.3 Delimitations of the Study. 7

1.2 Methods and Procedures. 8

II. REVIEW OF RELATED LITERATURE 13

Introduction 13

Chapter

2. BUSINESS SYSTEMS PLANNING -- PRINCIPLES, CONCEPTS, AND METHODOLOGY OVERVIEW. 15

2.1 BSP Concepts. 15

2.1.1 Goals and Objectives of the Business. 15

2.1.2 Management Needs. 15

2.1.3 Consistency of Information Throughout the Organization. 16

2.1.4 Organization and Management Change. . 17

Volume — Page

Part

Chapter

2.1.5 Strategy Implementation 18

2.2 Major Activities of the BSP Study 20

2.2.1 Obtaining the Commitment. 21

2.2.2 Proper Study Preparation. 23

2.2.3 The Kickoff Meeting 23

2.2.4 Identifying the Business Processes. . 24

2.2.5 Data Class Grouping 24

2.2.6 Business Analysis and the Relationships of Systems. 25

2.2.7 Ascertaining the Executive Perspective 25

2.2.8 Analyzing Business Problems 26

2.2.9 Identifying Information Architecture. 26

2.2.10 Establishing Architecture Priorities. 27

2.2.11 Management of Information Systems . . 27

2.2.12 Recommendations and Action Plan Development 28

2.2.13 Final Report and Executive Presentation. 28

2.3 Obtaining the Commitment. 29

2.3.1 Selecting the Study Scope 29

2.3.2 Establishing the Study Objectives . . 30

2.3.3 BSP Study Business Reasons. 31

2.3.4 Study Team Selection. 32

2.4 Study Preparation 35

2.4.1 Study Team Orientation. 36

Volume — Page

Part

Chapter

2.4.2 Data Gathering. 36

2.4.3 Team Education. 38

2.4.4 The Study Work Plan Development . . . 38

2.4.5 BSP Control File. 39

2.4.6 Study Report. 39

2.4.7 Executive Interview List. 45

2.4.8 Executive Briefing Session. 46

2.4.9 Control Room Preparation. 46

2.4.10 Administrative Support. 47

2.4.11 Executive Sponsor Review. 47

2.5 Summary 48

3. BUSINESS SYSTEMS PLANNING -- METHODOLOGY DETAILS 49

3.1 Beginning the Study 49

3.1.1 Executive Sponsor's Opening 49

3.1.2 Study Work Plan Review. 49

3.1.3 Review of the Business. 50

3.1.4 Review of Information Systems 51

3.2 Review of the Business Processes. 51

3.2.1 Defining Processes. 52

3.2.2 Life Cycle. 52

3.2.3 Process Identification Overview . . . 53

3.2.4 The Use of Outputs. 59

3.2.5 Approach Expansions and Variations. . 60

Volume Page

Part

Chapter

3.3 Describing Data Classes 62

3.3.1 The Business Entity Method. 62

3.3.2 The Business Process Method 64

3.3.3 Regrouping and Cross-analyzing. . . . 64

3.3.4 Processes to Data Classes 66

3.4 Current Systems Support 66

3.4.1 I/S Support of Processes. 66

3.4.2 Current Data Usage Review 67

3.4.3 Summary of Current Systems Support. . 68

3.5 Executive Perspective 68

3.5.1 Interview Schedule Confirmation . . . 69

3.5.2 Confirming the Interview Schedule . . 69

3.5.3 Preparation of General Questions. . . 70

3.5.4 Role Assignment for Team Members. . . 71

3.5.5 Commence the Interview. 72

3.5.6 Summarize Interview Notes 74

3.6 Assessing Findings and Conclusions. 74

3.6.1 Interview Data Summary. 74

3.6.2 Categorizing Interview Data 76

3.6.3 Interface Processes to Data 77

3.6.4 Summary of Assessing Findings and Conclusions 77

3.7 Information Architecture Review 78

3.7.1 Creating the Architecture Diagram . . 78

3.7.2 Flow of Data. 79

Volume — Page

Part

Chapter

3.7.3 Identifying Subsystems. 79

3.7.4 Prerequisite Analysis 80

3.7.5 Use of the Information Architecture . 80

3.8 Evaluating Architecture Priorities. 80

3.8.1 Evaluate Selection Criteria 81

3.8.2 Criteria and Systems Analysis 82

3.8.3 System Prerequisites Identification . 82

3.8.4 Recommendations, Documentation, and Presentation of Systems 82

3.8.5 Financial Justification 83

3.9 Specific BSP Study Recommendations and Action Plans. 83

3.10 Preparing the Study Report and Executive Presentations 82

3.10.1 Preliminary Report Outline. 85

3.10.2 Preparation of Report 85

3.10.3 Medium Presentation 86

3.10.4 Presentation to Executives. 86

3.11 Summary 87

4. BUSINESS SYSTEMS PLANNING -- FOLLOW-ON ACTIVITIES OVERVIEW 89

4.1 Management Information Systems. 91

4.2 Architecture Follow-on Effort Requirements. 94

4.3 Developing and Implementing the High-Priority System 97

4.4 Summary 99

Volume — Page

Part

Chapter

5. PLANNING, MEASUREMENT, AND CONTROL OF MANAGEMENT INFORMATION SYSTEMS. 100

5.1 The MIS Purpose 100

5.2 MIS Module Activities Flow. 101

5.3 MIS Outputs 104

5.4 The Management System -- How Effective Is It? 105

5.4.1 Effectiveness in the I/S Business . . 106

5.4.2 The Total Management System 106

5.4.3 Monitoring the Total Management System 107

5.5 Decision Support For Management Information Systems 108

5.5.1 Planning for Data Systems 108

5.5.2 Strategic Planning In MIS 109

5.6 Information Systems -- Why Do They Fail?. . 111

5.6.1 A Descriptive Model For Information Systems 112

5.6.2 Testing the Propositions of The Descriptive Model 112

5.6.3 User Attitudes and Perceptions of Information Services Staff and Systems 113

5.6.4 Use of Information Systems by the Decision Maker. 114

5.6.5 The Descriptive Model of Information Systems 114

5.6.6 Successful Information Systems. . . . 115

Volume — Page

Part

Chapter

5.7 Planning, Developing, and Managing Management Information Systems. 116

5.7.1 Executive Preparation for MIS 116

5.7.2 System Design 117

5.7.3 System Implementation 117

5.8 Risk Analyses, Risk Factors, and Strategies. 118

5.8.1 Risk Analysis Implementation. 118

5.8.2 Application of Risk Analysis Implementation. 119

5.8.3 Risk Analysis Implementation Success. 120

5.9 Business Systems Planning Through Data Base Planning 121

5.9.1 Integrating Business Plans With Systems Plans 121

5.9.2 Data Base Performance and Stability . 122

5.9.3 Developing the Data Base Management Systems Through the View of the User. 123

5.9.4 DBMS --- Why Has It Failed?. 124

5.9.5 Planning for Tomorrow's Information Systems 124

5.10 Summary 125

6. THE DATA DICTIONARY 130

6.1 Use of the Data Dictionary in BSP 130

6.2 An Approach in Using Release 3 of IBM's Data Dictionary to Support BSP. 131

6.3 The Data Dictionary, What Is It?. 132

6.4 The Data Dictionary, Why Consider It? . . . 137

Volume — Page

Part

Chapter

6.5 BSP Subject Categories, Attributes, and Relationships 137

6.6 BSP Data Dictionary Facilities. 141

6.7 BSP Data Model Installation 141

6.8 Analysis and Inquiry Reports. 142

6.9 Developing a Global Keyword Glossary. . . . 143

6.10 Identifying Useful Reports. 146

6.11 PAF Programs. 147

6.12 The Data Dictionary, Why Use It?. 148

6.13 BSP Study Preparation 148

6.14 Summary 150

7. DISTRIBUTED INFORMATION SYSTEMS 153

7.1 Planning for Distributed Information Systems 154

7.2 Documenting Distribution Requirements . . . 155

7.3 Distribution Decisions. 156

7.4 Implementation and Creation of the Resource Plan 158

7.5 Dynamic Aspects of Operational Control. . . 158

7.6 Security/Privacy Administration Function. . 161

7.7 Deficiency of EDP Controls -- Who Is To Blame?. 164

7.8 Summary of Distributed Information Systems. 166

Summary of The Review of the Literature 168

III. PRESENTATION AND INTERPRETATION OF DATA 170

Volume Page

Part

Chapter

8. BUSINESS SYSTEMS PLANNING STUDY ACTIVITIES OVERVIEW. 176

8.1 Major Activities. 176

8.1.1 Gaining the Commitment. 177

8.1.2 Defining the Study Objectives 182

8.1.3 BSP Study Obstacles 183

8.1.4 Supporting the Study Team 184

8.2 Preparation Plan. 187

8.2.1 Allocation and Preparation Activities. 191

8.2.2 Data Accumulation 191

8.2.3 BSP Education Plan. 192

8.2.4 The Study Work Plan 192

8.2.5 The Control File. 193

8.2.6 The Study Report. 193

8.2.7 Invitation Letter 194

8.2.8 Briefing Session. 195

8.2.9 Executive Sponsor Review Meeting. . . 195

9. BUSINESS SYSTEMS PLANNING METHODOLODY DETAILS OVERVIEW. 197

9.1 The Opening Meeting 197

9.1.1 Purpose of the Opening Meeting. . . . 198

9.1.2 Executive Sponsor's Opening 198

9.1.3 Work Plan Review. 202

9.1.4 Business Related Information. 202

9.1.5 Study Preparation Summary 203

Volume — Page

Part

Chapter

9.2 Business Processes. 203

9.2.1 Business Process Definition 207

9.2.2 Predefinition of Business Processes . 207

9.2.3 Resource Management 208

9.2.4 Overview of Process Identification. . 208

9.2.4.1 Products/Service Identification. 209

9.2.4.2 Resource Processes Support. . 210

9.2.4.3 Process Grouping. 211

9.2.5 Business Process Output 216

9.2.6 Business, Product, Service Diversity. 216

9.2.6.1 External Assistance 217

9.2.6.2 Optional Methods for Identifying Business Processes 217

9.2.6.3 Business Process Model. . . . 217

9.3 Data Class Definition 218

9.3.1 The Business Approach 222

9.3.2 The Process Approach. 222

9.3.3 Cross-Referencing and Regrouping. . . 222

9.4 Business Systems Analysis 223

9.4.1 Data Processing Support 224

9.4.2 Current Data Usage. 228

9.5 Interviewing and Interview Analysis 229

9.5.1 Executive Identification. 234

9.5.2 Interview Schedule Confirmation . . . 234

Volume — Page

Part

Chapter

9.5.3 Interview Questions 234

9.5.4 Role Assignment for Team Members. . . 235

9.5.5 Holding the Interview 236

9.5.6 Interview Documentation 236

9.6 Business Problems 237

9.6.1 Interview Data Summarization. 237

9.6.2 Interview Data Classification 241

9.6.3 Data to Processes Relation. 241

9.7 Identifying Information Architecture. . . . 242

9.7.1 Architecture Diagram Development. . . 246

9.7.2 Data Flow Determination 246

9.7.3 Identifying Subsystems. 247

9.7.4 Prerequisite Analysis 247

9.8 Architectural Priority Establishment. . . . 248

9.8.1 Selection Criteria Establishment. . . 252

9.8.2 Criteria and List Systems Applications. 253

9.8.3 Identification of System Prerequisites 253

9.8.4 Subsystems Recommendations. 254

9.9 Review of Management Information Systems (MIS) 254

9.9.1 Purpose of Management Information Systems 258

9.9.1.1 MIS Module Objectives 258

9.9.1.2 Inputs to MIS 259

Volume — Page

Part

Chapter

9.9.2 Flow of MIS in a BSP Study. 259

9.9.2.1 Generating I/S Objectives . . 260

9.9.2.2 MIS Support of Architectural Priorities. 261

9.9.2.3 I/S Support Problems and Non-I/S Problems. 261

9.9.2.4 Current Problems in Management Information Systems 262

9.9.2.5 Consolidating MIS Changes . . 262

9.9.3 MIS Output Summarization. 262

9.10 Planning the Recommended Follow-on Project. 263

9.11 Final Report and Executive Presentation . . 267

9.11.1 Preliminary Report Outline. 271

9.11.2 Primary Report Writing Responsibility. 271

9.11.3 Report Presentation 272

9.11.4 The Executive Presentation. 272

10. BUSINESS SYSTEMS PLANNING: FOLLOW-ON PROJECTS, DATA DICTIONARY, AND DISTRIBUTED INFORMATION SYSTEMS. 274

10.1 Follow-on Project Orientation. 274

10.1.1 Continuation of BSP Study Through Follow-on Activities. 275

10.1.1.1 Follow-on Activities Preparation 279

10.1.1.2 Project Team Member Orientation 279

10.1.2 MIS Effective Support of the Business 280

Volume — Page

Part.

Chapter

10.1.2.1 MIS Follow-on Projects. . . . 281

10.1.2.2 The Activities of an I/S Business. 281

10.1.3 Information Architecture Project. . . 282

10.1.3.1 Subsystem Description 282

10.1.3.2 Examining the Current Systems 283

10.1.3.3 Data Base Generation. 283

10.1.4 High-priority System Development. . . 284

10.2 Data Dictionary: A Tool to Support Business Systems Planning 284

10.2.1 Data Dictionary Implementation. . . . 285

10.2.2 Data Dictionary Facilities. 290

10.2.3 Subject Categories. 295

10.2.4 BSP Data Model. 301

10.2.5 BSP Data Dictionary Reports 305

10.3 Distributed Information Systems: Operational Controls. 309

10.3.1 EDP Audits: Why Do They Fail? 317

11. BUSINESS SYSTEMS PLANNING -- A FINANCIAL ANALYSIS APPROACH. 323

11.1 Financial Analysis Findings 324

11.2 Financial Analysis Results. 324

11.3 The Sample. 325

11.4 Information Resource Management 326

11.5 Managing the Information Agent: Financial Performance Overview. 327

11.6 Top Management Involvement and Commitment . 328

Volume — Page

Part

Chapter

11.7 Managing Information Resources to Leverage the Productivity of Other Resources . . . 332

11.8 Integration of New Technology 333

11.9 Summary 333

II

IV. SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS. 335

12. SUMMARY. 337

12.1 Activities. 338

12.1.1 Commitment. 338

12.1.2 Study Objectives. 339

12.1.3 Study Obstacles 339

12.1.4 Study Team Support. 339

12.2 Plan Preparation. 340

12.2.1 Activity Preparation and Allocation . 340

12.2.2 Accumulation of Data. 341

12.2.3 Education Plan. 341

12.2.4 Work Plan 341

12.2.5 File Control. 341

12.2.6 Report. 342

12.2.7 Letter of Invitation. 342

12.2.8 Briefing. 342

12.2.9 Review Meeting With the Executive Sponsor 342

12.3 Summary of the Initial Meeting. 343

12.3.1 Purpose of the Initial Meeting. . . . 343

Volume Page

Part

Chapter

12.3.2 Executive Sponsor's Initial Meeting . 343
12.3.3 Plan. 343
12.3.4 Preparation Summary 343
12.4 Summary of Business Processes 344
12.4.1 Defining the Business Process 344
12.4.2 Managing the Resources. 344
12.4.3 Process Identification Summary. . . . 344
12.4.3.1 Grouping Process. 345
12.4.4 Diversification of Product/Services . 345
12.4.4.1 Outside Assistance. 345
12.4.4.2 Model of Business Process . . 346
12.5 Data Class Definition Summary 346
12.5.1 Business Entity 346
12.5.2 The Process Concept 346
12.5.3 Regrouping and Cross-analyzing. . . . 346
12.6 Analysis of Business Systems. 347
12.6.1 The Support of Data Processing. . . . 347
12.6.2 Current Automated Data. 348
12.7 Interview Analysis. 348
12.7.1 General Questions 349
12.7.2 Assignment of Roles for Team Members. 349
12.7.3 Conducting the Interview. 349
12.7.4 Documentation of the Interview. . . . 349
12.8 Problems of the Business. 350

Volume — Page

Part

Chapter

12.9 Defining the Information Architecture . . . 350

12.9.1 Determination of Data Flow. 350

12.10 Establishment of a Controlled Environment . 351

12.10.1 Establishing Selection Criteria . . . 351

12.10.2 System Prerequisites. 351

12.11 MIS 352

12.11.1 MIS Flow in the BSP Study 352

12.11.1.1 I/S Objectives Generation . . 352

12.11.1.2 MIS Support 353

12.11.1.3 I/S and Non-I/S Support Problems. 353

12.11.1.4 MIS Current Problems. 353

12.12 Presentation and Final Report 353

12.12.1 Report Writing. 353

12.12.2 Presentation of the Report. 354

12.12.3 Presentation to the Executives. . . . 354

12.13 Project Orientation Follow-on 354

12.13.1 Continuation of the BSP Study 354

12.13.1.1 Preparation of Follow-on Activities. 355

12.13.1.2 Orientation of Project Team Members 355

12.13.2 Effective Support of MIS in the Business. 355

12.13.2.1 Follow-on Projects for MIS. . 356

12.13.2.2 I/S Business Activities . . . 356

Volume — Page

Part

Chapter

12.13.3 Architecture Projects 356
12.13.3.1 Generation of Data Bases. . . 356
12.13.4 System Development. 357
12.14 Data Dictionary Facilities to Support BSP . 357
12.14.1 Objective Subject Category. 358
12.14.2 Organizational Subject Category . . . 358
12.14.3 Problem Category. 358
12.14.4 Solutions Subject Category. 358
12.14.5 Datafile Category 358
12.14.6 Memo Category 359
12.14.7 The Data Model. 359
12.15 Operational Controls in Distributed Information Systems 359
12.15.1 EDP Audits. 360
12.16 Financial Analysis. 361
13. CONCLUSIONS. 362
13.1 The Main BSP Activities 362
13.2 BSP Preparation Plan. 362
13.3 The BSP Opening Meeting 363
13.4 BSP Business Processes. 363
13.5 BSP Data Class Definition 364
13.6 Business Systems Planning Analysis. 365
13.7 BSP Interview Analysis. 365
13.8 BSP Business Problems 365

Volume — Page

Part

Chapter

13.9 BSP Information Architecture Identification. 366

13.10 BSP Architectural Priority Establishment. . 367

13.11 BSP/MIS 367

13.12 BSP Planning and Follow-on Project. 368

13.13 BSP Follow-on Project Orientation 368

13.14 BSP/Data Dictionary 369

13.15 Operational Controls for Distributed Information Systems 371

13.16 Financial Analysis Conclusions. 372

14. RECOMMENDATIONS. 374

14.1 Concepts. 374

14.2 Activities of the BSP Study 375

14.3 Obtaining the BSP Study Commitment. 375

14.4 BSP Study Preparation 377

14.5 BSP Beginning 379

14.6 Business Processes for BSP. 380

14.7 The BSP Data Classes. 380

14.8 The BSP Executive Perspective 381

14.9 BSP Findings and Conclusions. 382

14.10 BSP Architecture Review 382

14.11 BSP Architecture Priorities 383

14.12 BSP Recommendation and Plans. 383

14.13 BSP Report and Presentation 384

14.14 BSP Architecture Follow-on Requirements . . 384

Volume — Page

Part

Chapter

14.15 BSP High-Priority System. 385

14.16 Additional Managerial and Systems Considerations. 385

14.16.1 Systems 385

14.16.2 Current Management Report 386

14.16.2.1 Enhancement of Management Reports 386

14.16.2.2 Development of General Management Information. . . 386

14.16.3 Information Systems Architecture Recommendations 387

14.16.4 Subsystems Implementation Recommendations 388

14.17 BSP Planning, Measurement, and Control of MIS 388

14.17.1 BSP/MIS Purpose 388

14.17.2 BSP/MIS Activities Flow 389

14.17.3 BSP/MIS Outputs 390

14.17.4 The Effectiveness of MIS. 390

14.17.5 MIS Decision Support. 390

14.17.6 Why Do Information Systems Fail?. . . 391

14.17.7 MIS Planning, Development, and Management. 391

14.17.8 Risk Analyses, Factors, and Strategies. 392

14.17.9 Data Base Planning Through BSP. . . . 392

14.18 Data Dictionary Support of BSP. 393

14.18.1 BSP Study Support Tool. 393

Volume — Page

Part

Chapter

14.18.2 Minimum Requirements for the BSP Study Support Tool. 394

14.18.3 Facilities to Support BSP Studies . . 394

14.18.4 BSP Reports 395

14.18.5 NETWORK Reports 395

14.18.6 STRUCTURE Report. 396

14.18.7 SUMMARY Report. 396

14.18.8 SELECT Report 396

14.18.9 Future Data Dictionary Research . . . 397

14.19 BSP in the Distributed Information Systems of the Future 399

14.19.1 Information Architecture. 400

14.19.2 Recommendations for Sizing Distributed Systems 401

14.19.3 Computer Security Safeguards. 402

14.19.3.1 Security/Privacy Administration Functions. . 402

14.19.4 Deficiences and Recommendations of the Management of EDP Control . . . 403

14.19.5 Office of the Future. 406

14.19.5.1 Office Management Changes . . 406

14.19.5.2 Services in the Paperless Executive Office. 416

14.20 General Recommendations 419

BIBLIOGRAPHY. 423

APPENDIXES. 429

A. Letter and Questionnaire. 430

B. List of Two-hundred and Twelve U. S. Corporations that Responded to the Survey by Geographical Area. 489

C. List of Two-hundred and Twelve Small, Medium, Large U.S. Corporations that Responded to the Survey by Annual Sales. 509

D. List of Eighty-eight Computer Security Safeguards and Vulnerability Category Abbreviations with Associated Meanings For Detecting and Preventing Intentional Computer Misuse 519

GLOSSARY. 569

List of Tables

Table		Page
III.1	Questionnaire Response by Two-hundred and Twelve Corporations in the United States Where Business Systems Planning Programs are Being Implemented. . .	172
8.1	Major Activities by One-hundred and Twelve U.S. Corporations	178
8.2	Preparation Plan by One-hundred and Twelve U.S. Corporations	188
9.1	The Opening Meeting by One-hundred and Twelve U.S. Corporations	199
9.2	Business Processes by One-hundred and Twelve U.S. Corporations	204
9.2.2	Business Processes by One-hundred and Twelve U.S. Corporations	212
9.3	Data Class Definition by One-hundred and Twelve U.S. Corporations	219
9.4	Business Systems Analysis by One-hundred and Twelve U.S. Corporations.	225
9.5	Interviewing and Interview Analysis by One-hundred and Twelve U.S. Corporations	230
9.6	Business Problems by One-hundred Twelve and U.S. Corporations	238
9.7	Identifying Information Architecture by One-hundred and Twelve U.S. Corporations	243
9.8	Architectural Priority Establishment by One-hundred and Twelve U.S. Corporations	249
9.9	Review of Management Information Systems by One-hundred and Twelve U.S. Corporations	255
9.10	Planning the Recommended Follow-on Projects by One-hundred and Twelve U.S. Corporations	264
9.11	Final Report and Executive Presentation by One-hundred and Twelve U.S. Corporations	268
10.1	Follow-on Project Orientation by One-hundred and Twelve U.S. Corporations	276

Table		Page
10.2	Data Dictionary: A Tool to Support BSP by One-hundred and Twelve U.S. Corporations	287
10.2.2	Data Dictionary Facilities by One-hundred and Twelve U.S. Corporations.	291
10.2.3	Subject Categories by One-hundred and Twelve U.S. Corporations	296
10.2.4	BSP Data Model by One-hundred and Twelve U.S. Corporations	302
10.2.5	BSP Data Dictionary Reports by One-hundred and Twelve U.S. Corporations.	306
10.3	Operational Controls by One-hundred and Twelve U.S. Corporations	311
10.3.2	EDP Audits: Why Do They Fail by One-hundred and Twelve U.S. Corporations	319

List of Figures

Figure		Page
2.1	Top-down Analysis With Bottom-up Implementation	19
2.2	BSP Study Flow	22
2.3	Sample Study Team Organization	33
2.4	BSP Study Control Points	40
2.5	Task Control Sheet: Commitment and Preparation	41
2.6	Task Control Sheet: Pre-interview	42
2.7	Task Control Sheet: Interviewing	43
2.8	Task Control Sheet: Analysis & Recommendations	44
3.1	Definition of Business Processes	54
3.2	Business Process Matrix	61
3.3	Information Life-cycle	63
3.4	Input-process-output Examples	65
3.5	Data Reduction Steps	75
4.1	Flow of MIS in a BSP Study	96
5.1	Data Base System	102
6.1	Data Flow	134
6.2	Information Architecture	135
6.3	Global Keyword Glossary	145
7.1	Information Requirements Summary	157
7.2	Development of a Distributed Information System Plan	159

List of Graphs

Graph		Page
III.1	Questionnaire Response	173
8.1	Major Activities	180
8.2	Preparation Plan	190
9.1	The Opening Meeting.	201
9.2	Business Processes	206
9.2.1	Business Processes	214
9.3	Data Class Definition.	221
9.4	Business Systems Analysis.	227
9.5	Interviewing and Interview Analysis.	232
9.6	Business Problems.	240
9.7	Identifying Information Architecture	245
9.8	Architectural Priority Establishment	251
9.9	Review of Management Information Systems	257
9.10	Planning the Recommended Follow-on Projects. . . .	266
9.11	Final Report and Executive Presentation.	270
10.1	Follow-on Project Orientation.	278
10.2	Data Dictionary: A Tool to Support BSP	289
10.2.2	Data Dictionary Facilities	293
10.2.3	Subject Categories	298
10.2.4	BSP Data Model	304
10.2.5	BSP Data Dictionary Reports.	308
10.3	Operational Controls	313
10.3.1	EDP Audits: Why Do They Fail	321
11.1	Return on Equity: Five Year Average.	329

Graph		Page
11.2	Return on Total: Capital Five-year Average	330
11.3	Net Profit Margin: Five-year Average	331

List of Plates

Plate		Page
B.1	One-hundred and Twelve U.S. Corporations that Responded to the Survey by State	490
B.2	Sixty-eight Midwest Corporations that Responded to the Survey by Region and State.	495
B.3	Fifty-eight Eastern Corporations that Responded to the Survey by Region and State.	500
B.4	Twenty-seven Western Corporations that Responded to the Survey by Region and State.	503
B.5	Fifty-nine Southern Corporations that Responded to the Survey by Region and State.	508

VOLUME I

PART I

INTRODUCTION

Chapter 1

INTRODUCTION

Business activity until recently, has taken the typical approach of developing data processing applications by independently undertaking each one by itself. Today, the rapidly changing business environment makes it necessary for executive management to have up-to-date information available at all times, so that through meaningful analysis and resource allocation tradeoffs they can manage their business more effectively.

Regardless of the type, purpose, or organizational structure of business, the activity of the business is directed and controlled by some type of information processing system. Control and direction over business activities can now be accomplished by Business Systems Planning (BSP), which is a

> structured approach to assist a business in establishing an information systems plan to satisfy its near- and long- term information needs [39, p. i].

The origin of Business Systems Planning came about through the inefficient implementation of large information systems in the 1960's, by International Business Machines Corporation (IBM), and those of other companies. IBM finally realized that a disciplined approach was needed, using proven principles and methodologies. In 1966 a business-wide information Systems Control and Planning Department was established at IBM's Data Processing Group headquarters. The Data

Processing Group was a total business unit comprising the engineering, manufacturing, marketing, and service divisions responsible for all of IBM's domestic data processing business.

Until the Control and Planning Department was established, IBM had little overall direction in the internal use of computers. In fact, little coordination took place between divisions; most data processing activities were confined to locations and units within divisions. Consequently, each manufacturing plant and marketing region developed and operated its own system. Although the individual systems carried out similar functions, they differed in design and performance; they could not be used interchangeably and could not communicate with each other. The result was a redundancy of data processsing resources required to develop and maintain such systems. Even with this large expenditure of resources by each division, the systems were mainly satisfying the local department needs of the business, rather than doing an overall data processing job. When steps were taken to improve the data processing within a division (for example, development of a consolidated order entry system within the marketing division), little serious attention was given to an effective interface of that system with inputs from engineering and outputs to manufacturing. The business was not getting the return on investment from data processing that it could have because the information needs of the business, and particularly those of the general manager responsible for the business, were not being accommodated.

The first effort of the Control and Planning Department was to inventory and profile the systems existing within the business and the plans for the future. At the same time, recognizing that the data

processing effort must be directed toward satisfying business needs and not solely toward individual functions and departments, the control and planning department established a set of information system strategies covering five major areas:

1. Fixed data responsibility.
2. Single source and parallel distribution of data.
3. Central control and planning of information systems.
4. Organizational independence of data.
5. Resource sharing of data, equipment, and communications [39, p. 2].

With the knowledge of what was being done with data processing, and the direction established through the set of strategies, the department defined a network of information systems and assigned responsibilities for the development of the systems. These systems addressed the operational, functional, and general management needs for information.

As the definition and design efforts for the business-wide network of information systems got under way in the late 1960's, many of IBM's customers showed interest in learning how they might better manage their information system resources. In an effort to assist these interested customers, IBM established the Business Systems Planning (BSP) program in 1970.

To conduct the program, the nucleus of the control and planning department that developed the internal information systems plan was transferred to the Data Processing Division headquarters. This group proceeded to document proven methodologies and institute a training program to educate regional and branch office personnel and customers in the approach. Executive briefings and seminars were established to show customer executives the potential benefits of the

approach and the reasons why their involvement was vital to successful implementation of the information systems.

The methods used in developing this information systems plan and the lessons learned have since been used by many IBM customers. Application of BSP methodology has helped them to formulate their information system plans and control mechanisms and to improve their use of information and data processing resources. Studies using the BSP methodology and guidelines have been conducted successfully by profit and nonprofit organizations of varying size, in many industries.

1.1 The Problem

In many corporations, both large and small, the typical approach to the development of data processing applications has been to independently undertake each one by itself. Also, particularly in new or developing companies, it is not uncommon to find that not enough thought has been given to the potential value that lies in sharing information across application boundaries or supplying it to management for purposes of improved control. The result has been redundancy of data, excessive use of data processing resources, and insufficient return on the data processing investment as certain business information needs have gone unfulfilled.

1.1.1 Purpose of the Study

The purpose of this study is to develop an ideal strategic information systems plan to help implement the Business Systems Plan-

ning concept, with special emphasis on its support of both the short- and long- term information needs in the daily operations of U.S. Corporations. Unlike other information system plans (Capacity Systems Planning, Master Action Plans, and Information Systems Management) that represent only the best thinking at a particular time, Business Systems Planning creates an environment within which a corporation will be able to react to future changes in priorities and direction without disruptions in systems design.

In addition, the study will help to guide corporations in obtaining and managing the information necessary to support the efficient and economic management of their business.

The criteria used in this study is based upon the IBM Business Systems Planning (BSP) methodology. The planning criteria is oriented toward the processes of a business, rather than organizational entities, so the resulting information systems plan can survive organizational restructuring. (See PART II, Review of Related Literature, for specific discussions of BSP methodology and various other Management Information Systems concepts).

Furthermore, the BSP criteria will help to analyze information needs from the general management view of the business ("top-down"), in order to develop an information architecture that can then be built a piece at a time (from the "bottom-up").

1.1.2 Importance of the Study

The relative importance of implementing the BSP concept is based upon a conviction that the success of any business-wide information system depends on:

1. Obtaining executive commitment and involvement.
2. Setting I/S objectives that support those of the business itself.
3. Understanding the business from the view point of general management.
4. Adopting a top-down approach to studying the business (that is, working from the overall to the detail level) and a bottom-up approach to implementation.
5. Creating a plan that is evolutionary, that is, one that builds from existing systems modularity to an integrated architecture.
6. Putting in place those information management functions required to adequately manage the Information Systems resources [39, p. 1].

Evaluating the overall importance of Business Systems Planning requires identifying a modular approach to implementation, providing confidence that each module will fit and function properly in an integrated network and will interface properly with the present operating systems until they too can be included in that network. In addition, the plan should also allow for better decisions concerning the efficient and effective commitment of Information Systems development resources.

1.1.3 Delimitations of the Study

This study was delimited to assisting selected U.S. Corporations in explaining the implementation approach and presenting specific guide lines for conducting a BSP study. The application of BSP to the industries in the private sector who have recognized the need for a Company wide Informations Systems, but have been unable to develop them for one or more reasons will also be discussed.

With respect to current operational systems, this study was delimited to their justification and effective performance, for their specific intent, even though their maintenance and interfaces may have

become unmanageable. The disussion which follows emphasizes an approach based on:

1. Understanding all the activities in a BSP study.

2. Getting the proper executive commitment before starting a BSP study.

3. Identifying the activities that take place before the BSP starts its concentrated study.

4. Evaluating the details of the methodology, culminating in writing of the final report and the making of recommendations to the business executives.

1.2 Method and Procedures

The procedure for completion of this research study involved the study of related literature (PART II) and various methods being used to implement Business Systems Planning in industry (PART III). PART IV contains the summary, conclusions, and recommendations for further work. The step-by-step method of procedure was as follows:

The basic concepts of BSP were learned through on-the-job experience; through attendance at Washburn University's School of Business (Topeka, Kansas); through attendance at Emporia State University's Graduate School of Business (Emporia, Kansas); through attendance at Kansas State University's Graduate School to fulfill the requirements for the Master of Science Degree in Computer Science; through extensive library research; and review of related IBM manuals.

A study of the Business Systems Planning implementation approach was done through library research, personal interviews with

Santa Fe Railroad and IBM Corporation personnel, telephone interviews, and others knowledgeable in the area of BSP.

Two-hundred and twelve letters and questionnaires (see Appendix C, p. 509) were sent to small, medium, and large U.S. Corporations that were known to be developing new or existing methods of implementing the BSP concept (or some other Strategic Planning Methodology) [21,22,23,27], requesting copies and asking questions about their implementation procedures and data models. (see Appendix A, p. 430). One-hundred and twelve usable questionnaires were returned.

The classification of the two-hundred and twelve corporations into small, medium, and large, was accomplished by using the News Front/Business Trends Corporate Analysis publication [53], which covers 50,000 Leading U.S. Corporations in all 21 manufacturing and 37 non-manufacturing S.I.C Industry Categories. The News Front/Business Trends study--the largest single editorial research project of any general business publication--analyses the corporations in each S.I.C. industry, ranking them by annual sales in the following manner: Small corporations--$3-$20 million; Medium corporations--$20-$99; and, Large corporations--over $100 million in sales.

Furthermore, a classification by geographical area (See Appendix B and Plates B.1-B.5., p. 489) was conducted of the two hundred and twelve corporations to determine which areas of the U.S. are better suited to provide the best Business Systems Planning environment. The corporations were classified in the following manner: East, West, Midwest, and South. In addition, Dun & Bradstreet's: Million Dollar Directory [31] was used to classify the corporations through the extraction of the business address of each company.

A statistical analysis was conducted of the 112 usable questionnaires that were returned, using the Statistical Analysis Systems (SAS/GRAPH) software package. SAS/GRAPH is an interactive computer graphics system for producing color plots, bar charts, graphs, slides, and other displays on screens and plotters [56].

A financial analysis was also conducted on the two-hundred and twelve U.S. corporations surveyed, to determine "how effectively they manage their information resource", by the use of the following criteria: "No Business Systems Planning," "Other Strategic Planning Methodology", "Partial Business Systems Planning," and "Formal Business Systems Planning" (see p. 323). This analysis was tailored after the study made by A. T. Kearney Management Consultants (an international management consulting firm) of 40 top companies to ask the question: "how does a company plan, organize, monitor and control the people, equipment, systems and money which combine to produce effective decision making information" [24]. In addition, the financial analysis used such financial indices (indicators) as return on total capital, return on equity, and net profit margin, to determine how profitable a corporation was in managing their information resources based upon the above criteria. The financial ratios were obtained from Value Line Investment Survey [67], Moody's [52], and annual reports.

Finally, a glossary (see p. 569) was designed to provide a better understanding of the essential facts about the most frequently used words of this thesis. It will be most useful to the layman who wishes to verify the meaning of the most frequently used words by everyone in the "data processing" field.

The information obtained from the above mentioned sources in this study was used extensively to develop new BSP implementation procedures in addition to already existing ones in industry.

PART II

REVIEW OF RELATED LITERATURE

PART II

REVIEW OF RELATED LITERATURE

Introduction

A study of related literature led to publications by International Business Machines (IBM), authors of the Business Systems Planning - Information Systems Planning Guide, data processing periodicals, research publications by the U.S. Department of Commerce, Transcripts from PBS (Public Broadcasting Service) broadcasts, related textbooks, and research studies. The survey concerned revised Business Planning procedures, new methods of implementing BSP by U.S. Corporations, and the advantages and/or disadvantages encountered by U.S. Corporations in employing the new BSP concepts.

PART II is organized in such a way that individuals already familiar with BSP can go directly to the material they require, while others may progress serially through principles, concepts, methodology overview, methodology details, follow-on activities overview, Management Information Systems, Data Dictionary, and Distributed Information Systems.

Chapter 2 provides an overview of all the activities in a BSP study; deals with getting the proper executive commitment before starting a BSP study; and, discusses the activities that take place before the BSP team starts its concentrated study. It also outlines the considerations that must be made in the management of the study.

Chapter 3 covers the details of the methodology, culminating in the writing of the final report and the making of recommendations to the business executives.

Chapter 4 gives an introduction to the follow-on activities so that an action plan for them may be developed during the BSP study.

Chapter 5 deals with those activities required to adequately review the Management Information Systems (MIS) function so as to recommend immediate changes and to specify MIS activities that are part of the BSP follow-on projects.

Chapter 6 discusses the potential benefits to be gained by the use of the Data Dictionary in the Business Systems Planning. It also deals with Release 3 of the IBM Data Dictionary, which offers an integrated approach to data resources management by supporting the activities in the entire spectrum from the BSP study, data base administration, systems design, development and on down to the maintenance.

Chapter 7 analyzes the major elements and issues that must be considered in planning for a distributed information system, and provides an approach to compiling a detailed plan for a given system after the BSP study.

Chapter 2

BUSINESS SYSTEMS PLANNING -- PRINCIPLES, CONCEPTS, AND METHODOLODY OVERVIEW

2.1 BSP Concepts

Business Systems Planning is often thought of as a structured approach or methodology. Based upon some fundamental concept and good understanding, the BSP methodology can give the BSP study team members:

1. An understanding of the "why's" behind the methodology.
2. Confidence in applying variations to meet specific situations.
3. The ability to communicate the objectives and recommendations to top management.

2.1.1 Goals and Objectives of the Business

An Information System must support the goals and objectives of the business. Therefore, this concept underlies the "top-down" approach of the BSP methodology.

Since an I/S (Information System) can be an essential part of the business, it is important that it support the organization's business needs and objectives. W.R. King has indicated that BSP, then, can be thought of as a vehicle or process to translate business strategy into I/S strategy [19, p. 11].

2.1.2 Management Needs

An I/S strategy should address the needs of all levels of management within the business. According to IBM, this strategy has several suggestions relative to the I/S structure:

1. It is important to recognize the varying characteristics of information as needed by different activities and management levels.
2. The emphasis in I/S should be in support of management decision making [39, p. 5].

Planning and the control are the keys to decision making, a framework for I/S based upon these activities can be utilized. R.N. Anthony proposed that three distinct but concurrent planning and control levels exist in any organization:

1. Strategic Planning, the process of deciding on objectives of the organization, on the resources used to attain these objectives, and on the policies that are to govern the acquisitions, use, and disposition of resources.
2. Management Control, the process by which managers assure that resources are obtained and used efficiently in the accomplishment of the organization's objectives.
3. Operational Control, the process of assuring that specific tasks are carried out effectively and efficiently [29, p. 23].

2.1.3 Consistency of Information Throughout the Organization

An I/S should provide consistency of information throughout the organization. When applied to new business problems, of a broader scope, information derived from data processing applications usually is not necessarily consistent.

Since the data requirements for different applications are rarely the same, new data files are usually required, as computer applications are added. Therefore, in most organizations varying in form, definition, and time, data does exist in some form or another.

Reports frequently don't "match" between using departments and managers, usually because of potential data inconsistencies. During

interdepartmental decision-making or at higher reporting levels where consolidation of malfunction activities are important, data inconsistency does become a problem.

A different philosophy must then be adopted relative to data management, in order to begin to address the data consistency problem. Therefore, when data is of considerable overall value to an organization, it should be managed accordingly. This is commonly referred to as managing data as a resource.

2.1.4 Organization and Management Change

An I/S should be able to live through organizational and management change. However, data processing systems and applications can become immediately obsolete upon a reorganization or management change.

Organizational and management change must be independent of the organizational structure, and it cannot be realized without the proper support vehicle for I/S. Therefore, a business process is a BSP vehicle (a basic activity and decision area irrespective of any reporting hierarchy or specific management responsibility).

Inventory control can be used as one example of a business process. "The process by which proper internal control over inventories dictates that the goods be properly ordered, received, controlled, segregated, requisitioned, and used, and that the remaining inventories be properly counted, priced, extended, and totaled.

One of the most important parts of the BSP methodology is defining the organization's business processes. The method for defining the business processes is based upon resources, planning and

control levels. Therefore, it is convenient to define the resources, along with an organization's business processes.

After the business processes are identified to describe the major activities performed and decisions made by the business in the course of managing the resource throughout its life cycle, they are organized into a process hierarchy. The situation above encompasses strategic planning, management control, and operational control, that takes into account the process definitions. Therefore, it is possible to define all the business processes that take place within any organizational segment for all the resources.

2.1.5 Strategy Implementation

An I/S strategy should be implemented by a subsystem within a total information architecture. The concept of implementating I/S strategy by a subsystem has several "concepts" and "implications" associated with it. First of all, to build any single project, the total I/S usually appears to be too big to support the entire business unit's needs.

Therefore, it appears that a top-down I/S planning with bottom-up implementation, should be the basic concept to help implement I/S strategy using a subsystem within a total information architecture (Figure 2.1). This basic concept will help solve the many problems associated with "bottom-up" evolution of systems and the entire business unit's needs. So, a top-down planning process (the BSP approach), the long-range I/S goals and objectives are then identified.

Although consisting of considerably more steps and detail, the

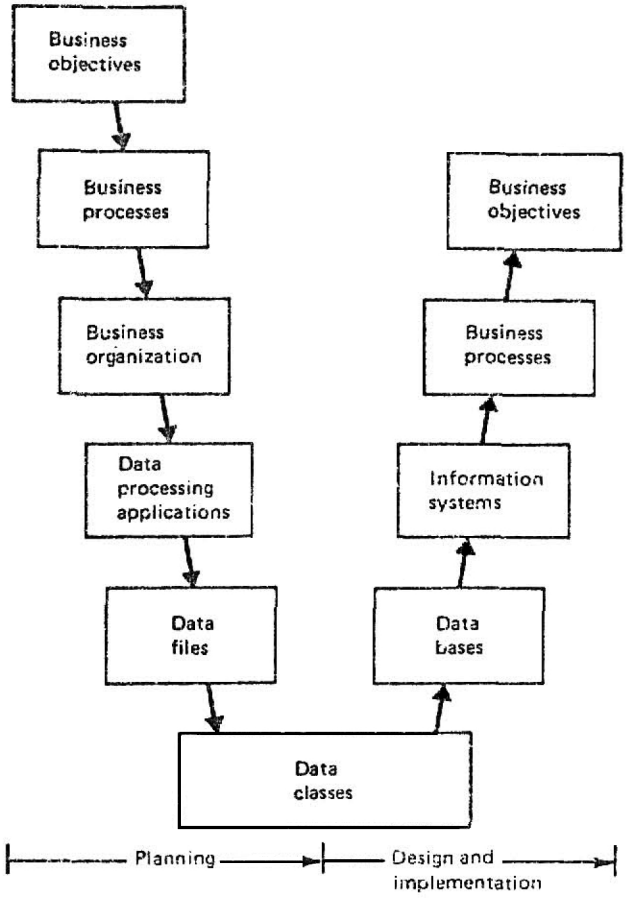


Figure 2.1

Top-down analysis with bottom-up implementation
[39, p. 9]

BSP methodology is consistent with the philosophy of "top-down" analysis with "bottom-up" implementation.

The formulation of a recommended information architecture, is a significant piece of BSP methodology. Individual modules can then be identified, prioritized, and built as scheduled by the I/S plan from the information architecture.

Processes that are operational in nature will be supported by most of the identified I/S areas. Thus, the "operational control" level of planning and control is related to the decision areas inherent in the processes.

In summation, Information Systems (upon which the BSP methodology is based) have a number of basic concepts and philosophies that are relative. Flexibility is very essential in BSP methodology. That is, in order to adapt to specific situations, certain steps and techniques could be altered without detriment to the final outcome. Therefore, these basic concepts should be considered unbroken, because, they are in effect BSP.

2.2 Major Activities of the BSP Study

Business Systems Planning should be put into perspective, since it is part of an overall cycle for providing the business with required information. Therefore, BSP is a methodology for identifying the business requirements.

Without regard to the total requirements of the business unit, projects, in the past, and in many businesses today, are defined to

address a functional area of the business. Therefore, to avoid the fractionalization of data and inconsistencies of systems, BSP can provide overall direction for the total business before projects are undertaken.

The BSP study progresses from the very broad world in which the business exists down to the data required to run the business (see Figure 2.1, p.19). Therefore, the business processes and business objectives are then supported by the Information Systems that has been defined in such a way as to categorize data into data classes.

There are two major activities that precede a BSP study and eleven in the study itself, as shown in Figure 2.2. None of the activities can be omitted, even though they may be carried out in varying degrees.

2.2.1 Obtaining the Commitment

Unless a top executive sponsor and some other executives are committed to being involved in a BSP study, it should not be started. Therefore, the success of the study then, must depend upon the executives providing the information requirements and business understanding to the team, which reflects their view of the business.

To minimize future misunderstandings, it is important at the outset of the study to get an agreement on the scope and objectives and on its expected deliverables, since approval of recommendations commits the company for several years to a certain direction in the use of its data processing resources.

The selection of the team leader, and executive who will work full time in the study and direct team activities is the most impor-

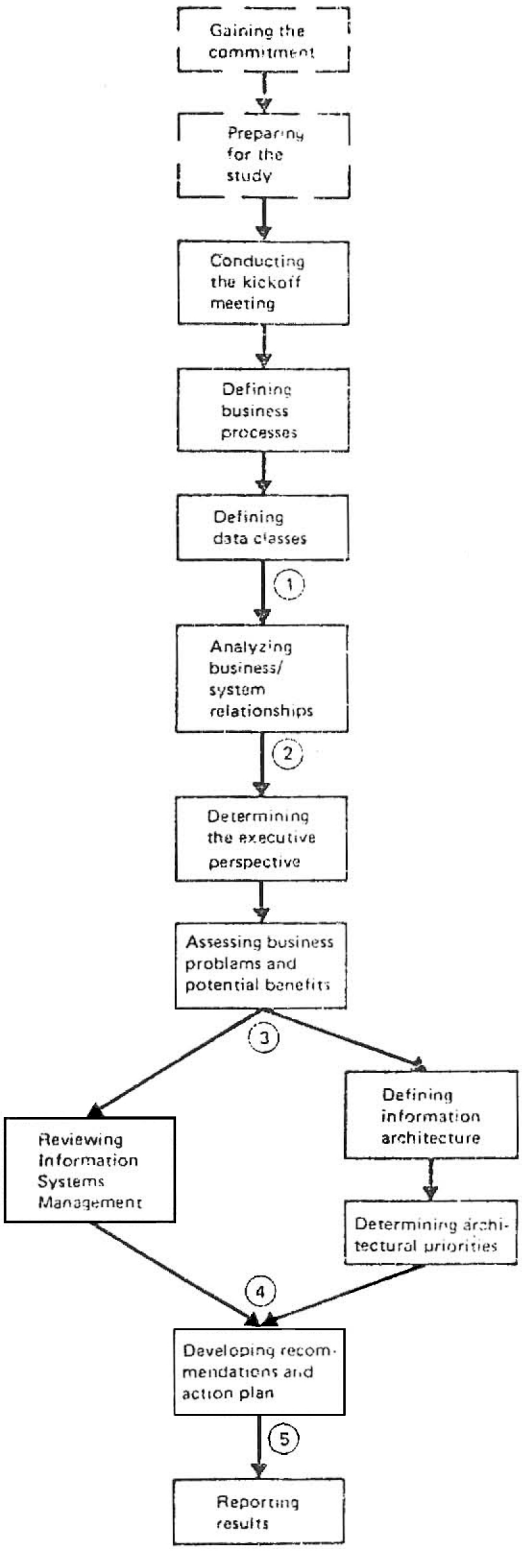


Figure 2.2

BSP Study Flow
[39, p. 25]

tant action following the commitment. The team leader sees that input from other executives is interpreted correctly, and that contact with them is on the proper level.

2.2.2 Proper Study Preparation

In instituting proper study preparation, considerable saving of time, avoidance of frustration, and higher qualities of output can be gained. In addition, the expectations of the executive participants and the team should be outlined in a specific manner.

So, as to allow for the scheduling of interviews and of providing information to the study team, interviews are selected as soon as possible. Information on the company and on data processing support, is also gathered before the study kickoff, to allow for maximum efficiency on the part of the team in working together full time during the study.

In order for the team to work together, display relevant material on the walls, and conduct interviews, a control room should be established.

According to IBM, the study control book should be the major output containing:

1. A study work plan.
2. A schedule of interviews.
3. A schedule of checkpoint reviews with the sponsor.
4. An outline of the final report from the BSP study.
5. Business and Information Systems data, analyzed and charted, and ready for the kickoff period [39, p. 13].

2.2.3 The Kickoff Meeting

The kickoff meeting includes the BSP study itself and the

full-time participation of the team members, which consists of three presentations, as seen by IBM:

1. The executive sponsor reiterates the objectives, expected outputs, and perspective of the study with relation of other company activities and objectives.
2. The main purpose of the kickoff comes next, which is to provide that each team member is conversant with the information that has been gathered and to discuss those facts that are not part of the information supplied.
3. The Information Systems director or one of his managers makes a presentation, giving the team a view of data processing, analogous to what was presented for the business [39, p. 13].

The above presentations, give the team an overall understanding of the business and the present and planned data processing support, in addition to the facts that have been already gathered and made readily available to the team.

2.2.4 Identifying the Business Processes

The identification of the business processes is the most important activity during the study. IBM suggests that everyone on the team must be able to understand, identify, and write the descriptions of the processes since they form the basis for:

1. Executive interviews.
2. The information architecture.
3. Problem analysis.
4. Data class identification.
5. Various follow-on activities [39, p. 14].

2.2.5 Data Class Grouping

The grouping of data into logically related categories defines the data classes. The definition of the data classes, helps the business to develop data bases over time with a minimum of redundancy

and in a manner that allows systems to be added without a major revision to the databases [1, p. 176].

2.2.6 Business Analysis and the Relationships of Systems

In order to develop recommendations for future action, "business analysis and systems relationships" show how data processing currently supports the business. In order to identify voids and redundancies, help clarify responsibilities, and further the understanding of the business processes, the currently existing organizations, business processes, information systems (applications), and data files must be analyzed.

Using combinations of the four elements above, various matrices have been developed as the main analysis tools. The organization/process matrix (see Appendix A, of the questionnaire) is the key matrix for the executive interviews. Its intercepts denote current data processing support, decision makers, and major and minor organizational responsibility for a process. "Business analysis" and "systems relationships" will help the team to determine requirements for information support and prepare them for discussion with executives.

2.2.7 Ascertaining the Executive Perspective

An integral part of the top-down approach is determining the executive perspective. IBM feels that its purpose is to:

1. Validate the work done by the team.
2. Determine the objectives.
3. Problems.
4. Information needs and their value.
5. Gain executive rapport and involvement [39, p. 14].

The major output of the above activity consists of the following list developed by IBM:

1. Notes from the interview.
2. An update of the control room charts.
3. New or improved rapport between the executive and the BSP study team [39, p. 14].

2.2.8 Analyzing Business Problems

During the fact-gathering step, some of the business problems are supplied as input. Now, in order to give guidance to the setting of project priorities and to show clearly that better information will help to solve difficulties, the problems must now be analyzed and related to the business processes.

The business problems should now be divided into those which are Information System support problems and those which are non I/S problems, as one of the last activities. Meanwhile, Information Systems support problems will continue to be addressed in the BSP study and by the follow-on activities, while the non I/S problems will be delineated and given to the executive sponsor to follow up on.

2.2.9 Identifying Information Architecture

The major movement of examining the present to a synthesis of the future is represented by defining the information architecture. It is in this activity that future Information Systems and their accompanying data are sketched.

The automated portions of processes are viewed as systems. Therefore, the computerized part of the total inventory of data in the business is the data bases [5, p. 107;6, p. 19].

Furthermore, the task of defining information architecture deserves the attention of the whole team, because it involves drawing a blueprint for the future.

2.2.10 Establishing Architecture Priorities

The team must establish priorities for the development of the systems and data bases, since a total information architecture cannot be developed and implemented at one time. Therefore, the team establishes which subsystems will be defined during the follow-on project, by deciding which of the data bases should be designed and implemented first [9, p. 118].

By developing a list of projects from the subsystems of the information architecture, and then establishing a set of criteria and rating the prospective projects against them, "prioritization" is accomplished. A major contributor to this process is the analysis of the business problems.

2.2.11 Management of Information Systems

The establishment of a controlled environment in which the information architecture can be developed, implemented, and operated efficiently and effectively, is the purpose of Management Information Systems (MIS). During the BSP study, the Information Systems functions were examined by IBM to identify:

1. Any changes that could be made immediately to enhance success in the follow-on projects.
2. Changes that are necessary to properly manage and implement the high-priority information architecture projects.
3. Major activities that will become projects in the follow-on to the BSP study [39, p. 15].

The Information Systems support problems from the executive interviews, the MIS problems as identified by the I/S director, and the technologies and skill requirements of the first system or systems, are the major inputs. Furthermore, additional and/or changes to the present Information Systems functions are identified and put in priority sequence, as they are required for planning, developing, and implementing.

2.2.12 Recommendations and Action Plan Development

Assisting management in its decisions regarding the recommended follow-on projects, is the purpose of the action plan. Follow-on projects are generated by Information Systems management recommendations and architectural priorities.

The identification of the steps preparatory to starting each of the follow-on activities, is another major part of the action plan. So that management can give the direction necessary to move immediately into preparatory activities, the steps must be examined and sized before start dates can be put on the follow-on projects.

2.2.13 Final Report and Executive Presentation

To obtain executive management commitment and involvement for implementing recommendations from the BSP study, is the purpose of the final report and executive presentation. It is possible that the format of a report may have to be modified slightly on the basis of the study results, even though it was agreed upon before a study was started.

Preparation of a report is listed by IBM as follows:

1. It should include an executive summary.
2. The supporting detail, such as descriptions of the business processes, should be contained in the appendices.
3. It should be possible to extract highly confidential or sensitive material easily and still have the balance of the report usable by all people participating in the follow-on activities [39, p. 15].

The executive presentation and the distribution of the final results to those people designated by the sponsor, are generated by the report. All other relevant material that is not part of the report should be indexed and filed for ready availability in follow-on projects, after the executive presentation (which is normally given by the team leader).

2.3 Obtaining the Commitment

The commitment of the business to complete all the relevant activities and heed the recommendations of the study team, is what determines the success of a Business Systems Planning Study.

There may be a problem in obtaining access to executive management to explain the objectives and expected results of a BSP study in some organizations. As an example, IBM considers the following actions however, if there is a problem:

1. Arrange an executive visit to another business that has successfully completed a BSP study.
2. Conduct an executive orientation session specifically for your executives.
3. Conduct an executive planning session.
4. Invite the executive to an executive information session [39, p. 16].

2.3.1 Selecting the Study Scope

For the purpose of this thesis, the selection of the scope of

the organization to be studied, is normally done by the executive sponsoring the study. In order for the participants to recognize the boundaries within which their activities will be concentrated, the business unit must be defined.

IBM has found that the selected segment should generally:

1. Extend to the upper levels of the organization.
2. Include more than one major function.
3. Be of significant importance to the organization (in that it contributes a major portion of the revenues, profits and/or services [39, p. 16]).

Businesses in whose activities are more simply structured, tend to gain less from a BSP study than those that are arranged by multiple functional units.

In performing a BSP study, most companies choose a major operating division, a group of divisions, or the entire organization. It should also be possible to define boundaries for the study scope and measurements for assessing effectiveness in each case.

2.3.2 Establishing the Study Objectives

The definition of the study objectives should now be completed. Furthermore, good objectives should also be stated clearly and concisely.

IBM proposes that a study team's objectives may be to specifically:

1. Provide a formal, objective method for management to establish Information Systems priorities without regard for provincial interests.
2. Provide for the development of Information Systems that have a long life, protecting the systems investment.
3. Provide that the data processing resources are managed for the most efficient and effective support of the business goals.
4. Increase executive confidence that high-return Information Systems will be produced.

5. Improve the relationship between the Information Systems Department and the users by providing systems responsible to the users' requirements and priorities.
6. Identify data as a corporate resource that should be planned and controlled in order to be shared effectively by everyone.
7. Identify those data processing functions, such as query, report generation, and personal computing, that the user department personnel may perform for themselves when adequately supported by the data processing department [39, p. 16].

2.3.3 BSP Study Business Reasons

Certain businesses may have a more difficult time in doing a BSP study, than others will, for the following reasons as listed by IBM:

1. Major reorganization or transfer of control taking place.
2. Geographical diversity, necessitating significant travel time.
3. More than 20 executives who must be interviewed.
4. Multiple independent suborganizations with autonomous decision-making powers and with unique lines of products/service serving diverse markets [39, p. 17].

The above reasons, should be indicated according to IBM, in a report containing:

1. Scope of the study.
2. Study objectives.
3. Positive contributions of a BSP study.
4. Obstacles to successful completion.
5. Recommendation either to proceed with BSP or postpone it [39, p. 17].

The report should then be presented by the current participants to an executive of the organization to gain agreement on all issues. Therefore, it is suggested by IBM that a meeting should result in a commitment to the following, if the report recommends proceeding with BSP:

1. Appoint a study team leader.
2. Provide the study team resources as appropriate.
3. Establish open communications of the business facts and plan between executives and team members.

4. Write a study announcement letter to executives of the organization [39, p. 18].

2.3.4 Study Team Selection

The selection of team members is very important, since the study team is responsible for determining the information needs of the entire business and recommending the nature of its data processing operations for years to come.

IBM indicates that the chosen people should:

1. Have several years' experience within the organization, a sound knowledge of their own area, and an appreciation of the rest of the business.
2. Be able to understand and deal analytically with problems.
3. Be willing to commit to conclusions and recommendations that will have a far-reaching effect on the organization.
4. Be perceived by other management within the organization as competent and responsible businessmen whose opinions will carry considerable weight.
5. Be from upper and middle management [39, p. 18].

Individuals who are already in high demand and difficult to make available, are the best people for the study team.

The "organization and responsibilities" of the study team is very important. A sample study team organization structure is shown in Figure 2.3.

The following outlined fundamental responsibilities need to be assigned, even while minor variations are possible:

I. Executive Sponsor.
   - A. Sign the study announcement letter.
   - B. Visibly and verbally endorse and support the study effort by making introductory remarks at the executive orientation.
   - C. Review the state of the business with the study team at the start of the study.
   - D. Participate in an interview.
   - E. Review progress and findings during the study.
   - F. Act as the communications contact between the study team and other executives in the organization as appropriate.
   - G. Receive the final report and made necessary decisions.

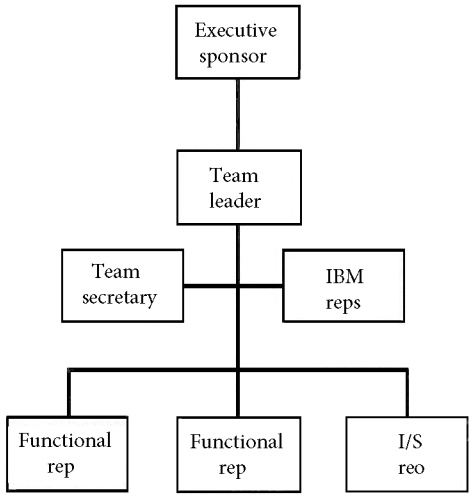


Figure 2.3

Sample Study Team Organization

[39, p. 19]

II. Team Leader.
   A. See that the study is successfully completed.
   B. Provide overall direction, make key business judgements and act as liaison with other executives of the organization.
   C. Direct the study effort on a day-to-day basis and organize all necessary administration for the team.
   D. Take a lead role in executive interviewing.

III. Team Members.
   A. Participate in at least some, if not all interviews.
   B. Analyze the data collected and executive perspectives expressed during the study.
   C. Draw conclusions and perform report writing tasks.

IV. Team Secretary.
   A. Do typing, filing, and general secretarial services.
   B. Assist in getting graphics, such as matrices and information architecture.
   C. Confirm and follow up on executive interview schedules.

A BSP study is best performed on a full-time basis, since it is so intensive in nature. Part-time studies on the other hand are often characterized by deadline and continuity problems, even though they may appear to be easier to resource and may be successful.

If the study team is full time, the resources required should fall within the following limits according to IBM:

1. Number of team members 4-7.
2. Number of weeks 6-8 [39, p. 20].

Study objectives, as well as significant variations in organizational types and sizes, can help to explain the wide variations above.

The person who is selected by the executive sponsor to lead the team, will eventually determine how successful the study will become. Therefore, the team leader will have a broad perspective of the business and will be knowledgeable in business matters.

Furthermore, IBM indicates that the team leader activities will include:

1. Conducting the study team orientation session.
2. Conducting a business review for team members at the start

of the study.
3. Setting and confirming executive session schedules.
4. Managing the logistics of the study, including day-to-day administration.
5. Providing guidance and business perspective.
6. Resolving conflicts and impasses.
7. Providing resource material.
8. Maintaining the schedule.
9. Making the presentation to management at the completion of the study [39, p. 18].

A study announcement letter should then be composed by the team leader, and signed by the chief executive officer, where it should then be distributed to the executive who controls the major functions within the scope of the study.

The letter should cover the following list as illustrated by IBM:

1. Objectives and scope of the study.
2. Team leader and team members.
3. Potential value to the organization.
4. Need for functional executives to be involved.
5. Need for candor and cooperation of executives [39, p. 20].

2.4 Study Preparation

The team leader and the executive sponsor, normally perform the final selection of "team members". Continuity for the activities that will follow the BSP study is provided by the Information Systems representative on the study team.

The team leader also has the responsibility of preparing the "preparation plan". The major tasks according to IBM are:

1. Obtain and equip the control room.
2. Review the study objectives.
3. Outline the final report.
4. Determine the facts to be gathered.
5. Select and orient interviews and develop a schedule.
6. Develop a study work plan.

7. Complete the task control sheets (see Figures 2.5 to 2.8, p. 41 to 44).
8. Set up a study control file.
9. Establish administrative support.
10. Review the status with the sponsor.
11. Prepare for starting the study [39, p. 21].

2.4.1 Study Team Orientation

IBM proposes that a half-to full-day orientation session to brief the study team should be held by the team leader on such topics as:

1. BSP overview.
2. Review of activities to date.
3. Study schedule and preparation plan [39, p. 20].

The allocation of preparation activities should also be discussed by the team leader. Furthermore, the team should divide the activities among themselves.

2.4.2 Data Gathering

The team should establish a reference library of both business and Information Systems documentation in order to provide a basis of information. The following two types of data outlined below will be available:

I. General Business.
   A. Environment.
      1. Economy.
      2. Government regulations.
      3. Labor.
      4. Consumerism.
      5. Completion.
      6. Industry position.
      7. Industry trends.
      8. Suppliers.
      9. Technology.
   B. Objectives.
      1. Statement of company mission.
      2. Major goals and objectives for the business.

3. Objectives for each of the major functions and product lines.

C. Organization.
   1. Organization charts for the total company.
   2. Organization charts for each of the people to be interviewed showing:
      a. Position.
      b. Names.
      c. Number of people.
      d. Expense budget.
      e. Expected changes.

D. Planning.
   1. Planning process and planning calendar.
   2. Business plans showing major projects.
   3. Resources.
   4. Schedules.
   5. Financial.

E. Control and Measurement.
   1. Names and general contents of all major business measurements and controls such as:
      a. Reports.
      b. Project initiation and funding.
      c. Type project control.

F. Operations.
   1. Products and markets.
   2. Geographic distribution of the company showing major physical locations and a general indication of functions performed there.
   3. Financial statistics.
   4. Sizing statistics showing:
      a. Number of vendors.
      b. Number of employees.
      c. Orders.
      d. Customers.
      e. Shipments.
      f. Purchase orders.
      g. Related information.

G. Information Systems Support.
   1. Availability to the user of major applications and processing facilities, such as:
      a. Terminals.
      b. Programming languages.
      c. Text processing.
      d. Word processing.
      e. Financial and business planning systems.
      f. Query services.

II. Information Systems.
   A. Operation Mode.
   B. Requirements for Systems Justification.
   C. History of major projects started in the last two years.
   D. Descriptions of the current system:
      1. Title.
      2. Major functions performed.

3. Major input and output.
4. Users supported.
5. Technology.
6. Age.
7. Summary of known weaknesses.
8. Summary of committed enhancements.
9. Source.
10. Critical factors.

E. Planned data bases and systems [57, p. 34].
F. Sizing statistics such as:
1. Number of programs.
2. Jobs per period.
3. Users.
4. Files.
5. Data elements.
6. Turnover.

2.4.3 Team Education

The team members should understand the principles of the BSP methodology, in order to enable a smooth coordinated entry to the BSP study. An advantage to team members would be, an understanding of the method of implementation, plus a review of the nature of the output that can be expected.

An education plan for the team should be established by the team leader. In addition, all team members should attend the same education session.

2.4.4 The Study Work Plan Development

Appropriate planning and assignment of tasks requires an intensive study activity. In order to complete the study, a work plan documenting all known tasks and indicating a major resource allocation is required.

The work plan should schedule some study control points as shown in Figure 2.4. Any additional control points established in

each particular study should be considered by the team (see Figure 2.2, p. 22).

Activity and project control checkpoints should be combined into a single action plan, after they have been established.

The team leader is responsible for developing the plan, where it is then agreed upon by the team members.

2.3.5 BSP Control File

All the material pertaining to the study should be contained in the control file. Documents should be stored in a lockable filing cabinet, because of the nature and number of documents involved. As outlined below, the contents should include:

I. Administrative.
   A. Key correspondence.
   B. Objectives and scope of the study.
   C. Study work plan.
   D. Task control sheets(see Figures 5 to 8).
   E. Sponsor reviews.
II. Data Gathered During Presentation.
III. Master Copies.
   A. Processes.
   B. Data classes.
   C. Matrices.
IV. Analysis.
   A. Executive interview notes.
   B. Executive interview summaries.
   C. Problem analysis sheets.
   D. Findings and conclusions.
V. Report and Presentation [27].

2.4.6 Study Report

The establishment of the outline and table of contents should be done as early as possible. Specific responsibility for sections of the report should be assigned to the team members.

IBM indicates that a typical study report should contain the following topics:

Control Point	Participants	Activities
①	Study team	Review study to date, documentation standards, and team understanding of results. Confirm resource allocations for the next stage.
②	Executive sponsor	Results to date. Update the study plan. Review the executive interview objectives.
③	Executive sponsor	Report on both qualitative and quantitative results of the executive interviews. Present and validate the assessment of business problems and benefits. Update the study plan.
④	Study team	Team agreement on all major issues. Review all supporting documentation to be completed. Confirm resource allocation. Update the plan.
⑤	Executive sponsor	Review all major findings and recommendations. Demonstrate an understanding of the business and its requirements. Gain executive sponsor's agreement that the team is qualified to present the recommendations.

Figure 2.4

BSP Study Control Points
[39, p. 25]

BUSINESS SYSTEMS PLANNING

TASK CONTROL SHEET
Commitment and Preparation

Task	Scheduled Completion	Responsibility
1. Establish scope of study		
2. Establish sponsor		
3. Select team leader		
4. Develop study objectives		
5. Develop business reasons for the study		
6. Gain executive agreement		
7. Select the study team		
8. Schedule education		
9. Brief the study team		
10. Attend the Information Systems Planning class		
11. Obtain and equip the control room		
12. Schedule adjacent work area		
13. Review study objectives		
14. Outline the presentation and final report		
15. Assign portions to team members		
16. Assign responsibility for special art work		
17. Determine facts to be gathered		
18. Determine the feasibility of using a data dictionary		
19. Select interviewees		
20. Develop a study workplan		
21. Complete the task control sheets		
22. Set up a study control file		
23. Establish administrative support		
24. Develop an executive orientation		
25. Review status with the sponsor		
26. Conduct executive orientation		
27. Gather business facts		
28. Gather information systems facts		
29. Schedule executive interviews		
30. Prepare for starting the study		

Figure 2.5

Task Control Sheets
[39, p. 149]

BUSINESS SYSTEMS PLANNING

TASK CONTROL SHEET
Pre-interview

Task	Scheduled Completion	Responsibility
1. Obtain the sponsor's view		
2. Review the business facts		
3. Review the information systems facts		
4. Review the study work plan		
5. Review chapter on business processes		
6. Define the planning processes		
7. Define the measurements and control processes		
8. Identify the business resources		
9. Define the key resource processes		
10. Define the supporting resource processes		
11. Flowchart the process flow		
12. Write descriptions of processes		
13. Make a process/organization matrix		
14. Review chapter on data classes		
15. Review data types		
16. Select the business resources		
17. Identify data classes for each resource and data type		
18. Combine/separate data classes		
19. Make input-process-output charts		
20. Validate data classes		
21. Create data class/process matrix		
22. Write description of data classes and show contents		
23. Review chapter on current information systems		
24. Make a system/process matrix		
25. Make a system/organization matrix		
26. Add systems to the process/organization matrix		
27. Make a data class/present system matrix		

Figure 2.6

Task Control Sheets
[39, p. 150]

BUSINESS SYSTEMS PLANNING

TASK CONTROL SHEET
Interviewing

Task	Scheduled Completion	Responsibility
General Preparations		
1. Review chapter on executive perspective		
2. Establish expected output from interviews		
3. Confirm the interview schedule		
4. Prepare team leader's letter to interviewees		
5. Establish note-taking procedures		
6. Make charts for interviews		
7. Set up room for interviews		
8. Prepare a general set of questions		
9. Establish administrative procedures		
10. Conduct a practice interview		
11. Plan corollary activities		
Preparation for Each Interview		
12. Assign team roles		
13. Review the executive's organization		
14. Review the executive's objectives and problems		
15. Review process/organization/system matrix		
16. Prepare a set of key questions		
Conducting the Interview		
17. Lead interview discussion		
18. Take notes		
19. Discuss key questions with interviewee		
Summarize the Interview		
20. Review the interview		
21. Write up the summary		
22. Complete the problem analysis sheets		
Corollary Activities		
23. Revise process descriptions		
24. Revise data class descriptions		
25. Revise charts		
26. Send summary to interviewee		
27. Review returned summaries		
28. Control problem analysis sheet completion & distribution		
29. Mail team leader's letter and confirm interview schedules		
30. Make preliminary findings and conclusions		
31. Complete final report format		
32. Plan and control report publication		
33. Develop information architecture		
34. Review information resource management		

Figure 2.7

Task Control Sheets
[39, p. 151]

BUSINESS SYSTEMS PLANNING

TASK CONTROL SHEET
Analysis & Recommendations

Task	Scheduled Completion	Responsibility
1. Review Chapters 10 through 16 — ISP Guide		
2. Determine findings and conclusions categories		
3. Sort "problem strips" by category		
4. Write findings and conclusions statements		
5. Sort problems for architecture priorities		
6. Complete the process/data class matrix		
7. Identify the major information systems		
8. Show data flow		
9. Identify subsystems		
10. Write subsystem descriptions		
11. Analyze for prerequisites		
12. Determine selection criteria		
13. Apply criteria and list subsystems		
14. Expand the description of the recommended subsystem(s)		
15. Consider subsystem implementation options		
16. Review present Information Resource Management (IRM)		
17. Write IRM recommendations		
18. Write recommendations from the findings and conclusions (Step 4)		
19. Combine the recommendations on architecture, first systems, IRM, and program changes		
20. Define projects resulting from recommendations		
21. Develop an action plan for each project		
22. Complete the final report		
23. Present to management		
24. Gain approval		

Figure 2.8

Task Control Sheets
[39, p. 152]

1. Required appendices.
2. A follow-on projects action plan.
3. Recommendations.
4. Conclusions and findings.
5. I/S perspectives.
6. Business perspective.
7. Study methodology.
8. Scope, purpose, and objectives.
9. Executive summary [39, p. 24].

Documentation created during the study may prove valuable to functions within the business because of the nature of a BSP study. The team should endeavor to publish these documents as an ancillary output to the formal report, while the data and analyses are current.

2.4.7 Executive Interview List

A list should be prepared as early as possible of executives to be interviewed. Responsibility for the major functions included within the study scope statement will lie with the selected executives (who will normally be within the top three levels of the company).

The team leader should prepare the tentative executive list and schedule. As the team gains knowledge of the company's processes, other names may be added to the list during the study.

An executive sponsor should review and approve a list of proposed executive participants. The support of the executive sponsor should also be reemphasized, as well as the making of additions and deletions.

An invitation letter should be sent at least one week before the interview to enable the executive to prepare for the interview. The time and place for the interview should also be confirmed in the letter.

According to IBM, topics should include:

1. Required I/S support value.
2. Future I/S support requirements.
3. Current I/S support evaluation.
4. Changes.
5. Key business areas.
6. Controls and measurements.
7. Improvement opportunities.
8. Value of solving business problems.
9. Achieving required results through objectives and plans.
10. Responsibilities [39, p. 23].

2.4.8 Executive Briefing Session

Prior to the commencement of the executive perspective segment of the BSP study, the selected executive should attend a briefing session. So that the session may be delivered at the appropriate time during the study activities, the executive briefing session should select the presenters, prepare the exhibits, and prepare itself, during the preparation phase.

As proposed by IBM, the following topics should include:

1. Executive level overview of BSP.
2. Study scope.
3. Objectives of the study.
4. Business reasons for conducting the study.
5. Review of the schedule and expected output.
6. Executive involvement - why and what is expected of the executive.
7. Schedule for the start and completion of the interviews.
8. Topics to be discussed in the interview [39, p. 23].

2.4.9 Control Room Preparation

A workroom assigned for the duration of the BSP study is very dependent upon its effectiveness. The work location for the team and for the executive discussion session (away from the executive's office) will also be located within the workroom.

IBM indicates that the room should be:

1. Located away from traffic, noise, and interruptions.
2. Large enough to accommodate the study team plus one or two other people.
3. Have a large amount of wall space for the posting charts.
4. Be equipped with a telephone only if it can be disconnected during executive interviews.
5. Secure to protect confidential or sensitive material [39, p. 21].

2.4.10 Administrative Support

The study team will require typing and general administrative support. Before the major study activities are undertaken, this support should be estimated and organized.

2.4.11 Executive Sponsor Review

A successful review meeting with the executive sponsor is indicative of the study preparation completion. By this time, any issues that may have arisen during the preparation should have been resolved.

According to IBM, the items to be resolved are:

1. Study work plan with emphasis on dates to eliminate conflict with other major company activities.
2. Planned participation by the sponsor in starting the study.
3. List of executive interviewees including a tentative interview date for the sponsor.
4. Study objectives.
5. Facts to be gathered.
6. The approval process, so that the form the presentation will take can be determined, who it will have to be presented to, and in what sequence in order to gain approval.
7. Outline of the final report.
8. Outline of the executive orientation [39, p. 27].

The BSP study can now be started, since everything is now prepared.

2.5 Summary

Business System Planning is often thought of as a structured approach or methodology. BSP then should be put into perspective, since it is part of an overall cycle for providing the business with required information. Therefore, BSP is a methodology for identifying the business requirements.

The commitment of the business to complete all the relevant activities and heed the recommendations of the study team, is what determines the success of a Business Systems Planning Study. Continuity for the activities that will follow the BSP study is provided by the Information Systems representative of the study team.

Chapter 3

BUSINESS SYSTEMS PLANNING -- METHODOLOGY DETAILS

3.1 Beginning The Study

The first major activity in the formal execution of a BSP study is conducting the kickoff meeting. Understanding the business requirements, data processing support (as it exists today) and business requirements for the future, is the aim of the kickoff meeting activity.

3.1.1 Executive Sponsor's Opening

All study team members should attend the kickoff meeting. Opening the meeting, emphasizing the business reasons for initiating the study, and explaining the significance of this high priority program to the company, is the responsibility of the executive sponsor.

3.1.2 Study Work Plan Review

The work plan and the calendar developed during the study preparation phase should be reviewed by the study team leader. As a point of departure for discussing and finalizing, the work plan should be used for the following as listed by IBM:

1. Major events, major output, and schedules.
2. Individual assignments.
3. Project control [39, p. 30].

The opportunity to discuss administrative details (such as secretarial support, handling of phone messages, working hours, office security, expense charge numbers, etc.) can also be accomplished by the "study work plan review."

3.1.3 Review Of the Business

The business related information gathered during the study preparation phase should be presented in summary form by the team leader. To most team members, this information may be new and should serve to broaden the business perspective of the team as a whole.

However, more emphasis should be given to:

1. Business goals.
2. Objectives and strategies.
3. Business problems.
4. Organizations.
5. Geography.
6. Environment.
7. Information relative to understanding the major resources of the business:
    a. Cash.
    b. People.
    c. Facilities.
    d. Materials.
    e. Products.

Throughout the study, some of the material presented will be continually focused upon. The control room should have all posted information (material) relevant to the study.

3.1.4 Review of Information Systems

The material gathered during the study preparation should be presented in summary form by the director of I/S, or the team member representing I/S. How I/S is currently supporting the business, and planning to support it in the future, must be clearly understood by the study team.

Discussions with the study team should be made of all projects installed or being developed. Whether these projects have met or will meet their objectives should also be discussed.

Discussions on who has responsibility for data within the company, how data processing interfaces with its users, and the responsibility it has in the development and justification of applications is another area that should be reviewed.

During the interview, and when the team members are developing their conclusions and recommendations, a copy of the presentation should be made available to them.

The I/S function presentation should consist of the following:

1. Mission and objectives.
2. History and background of data processing.
3. Organization of the Information Systems function.
4. Overview of major applications systems installed and planned.
5. Present distribution of data processing and data ownership.
6. Functions now available to users.
7. Relationship with users.
8. Project approval process.
9. Key problems and challenges [39, p. 30].

3.2 Review of the Business Processes

IBM defines business processes as

> groups of logically related decisions and activities required to manage the resources of the business [39].

for purposes of the BSP study. Without regard to the organization responsible for the processes, they are studied and identified anyway. Defining the processes will provide or lead to the following according to IBM:

1. Information Systems that are largely independent of organizational changes.
2. An understanding of how the business accomplishes its overall missions and objectives.
3. A basis for separating the strategic planning and management control processes from operational control processes.
4. A basis for defining required information architecture, determining its scope, making it modular, and setting priorities for its development.
5. A basis for defining key data requirements [39, p. 31].

3.2.1 Defining Processes

Success is particularly relevant to the following points according to IBM:

1. All members must be present and participate throughout the exercise and there should be general agreement on the expected output before the exercise begins.
2. Note-takers should be designated right from the beginning so that decisions and definitions of processes will not be forgotten or misunderstood later.
3. Information gathered before the start of the BSP study describes and sizes the products and resources, and clearly states or provides a flow diagram of the strategic planning and management control procedures and schedules.
4. The team must understand the concept of resources and their life cycle [39, p. 31].

3.2.2 Life Cycle

The job of a manager is to efficiently and effectively support the goals of the total business by managing the resources within his

realm of responsibility. It is possible to gain a comprehensive understanding of all the business processes involved by identifying the decision processes that he goes through and the activities that he performs in managing the resources.

To logically Identify and group the processes, a four-stage life cycle of the product/service and of each of the supporting resources is used. The life cycle indicated by IBM is:

1. Stage 1 -- Requirements, planning, measurements, and control.
2. Stage 2 -- Acquisition or implementation.
3. Stage 3 -- Stewardship.
4. Stage 4 -- Retirement or disposition [39, p. 31].

Each of the life cycle stages are described by IBM as follows:

1. Requirements - Activities that determine how much of the product or resource is required, the plan for getting it, and measurement and control against the plan.
2. Acquisition - Activities performed to develop a product or service or to get the resources that are going to be used in its development.
3. Stewardship - Activities to form, refine, modify or maintain the supporting resources and to store or track the product/service.
4. Retirement - Those activities and decisions that terminate the responsibility of an organization for a product or service or signal the end use of a resource [39, p. 31].

The vehicle for structured, logical, comprehensive identification of the processes by the team is served by the life cycle.

3.2.3 Process Identification Overview

Figure 3.1 shows the three main sources for the identification of the business processes as illustrated by IBM:

1. Planning and control.
2. Production/service.
3. Supporting resources [39, p. 33].

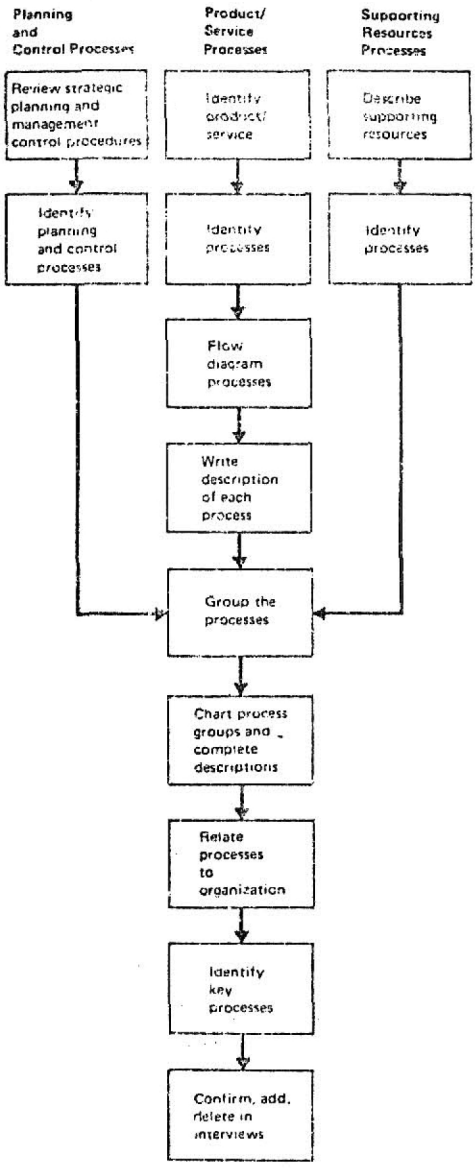


Figure 3.1

Definition of Business Processes
[39, p. 32]

A definition of product/service and supporting resources is developed when they are taken through their life cycle.

It is no longer necessary to retain the process/stage relationship for process defining, after the product and each of the supporting resources have been taken through their respective life cycles and the processes identified and subsequently grouped, but it will be helpful later in identifying data classes. Very little time should be spent in deciding in which stage a given activity appears, since the life cycle is an artificial means for directing the team in thinking.

Both management control and operational control activities are contained in the measurement and control processes identified under the requirements stage. The distinction between management control and operational control will be sharpened if the processes associated with strategic planning and management control are identified first. In addition, the redundancy in the management control processes will also be reduced.

The following Planning and Control Processes are outlined below:

I. Processes of Strategic Planning and Management Control.
   A. It should not be difficult to identify the processes involved, even with the preparatory work that was done in collecting the information on planning and the possible samples of the organization's plans.
      1. Processes will normally be grouped into strategic planning and management control.

The following IBM Product/Service Processes are outlined below:

I. Organization Product/Service Identification.
   A. Products are managed through similar business processes.

II. Processes in Each Stage of the Life Cycle of the Product/Service
   A. Start with the requirements stage and work through the succeeding stages as a general approach in identifying the processes.
      1. In getting consistency in the level of the processes identified in each of the stages, care should be exercised.
   B. One should not be surprised if the first attempt results in many more processes than are needed and also a great inconsistency in the levels, since there is no secret formula for identifying business processes.
   C. Since business processes are the basis for practically everything that follows in the BSP study, it is very important that every team member participate at all times.
      1. Far more important than any theoretical discussions on the definition of a process group or a process, logic, theory, or other diversions is getting started.

III. Product/Service Processes General Flowchart.
   A. Several purposes are served by a flowchart of the product/service processes, such as:
      1. It helps in verifying that all the processes have been identified.
      2. It helps in determining if the team really understands the business processes associated with the product/service.
      3. It serves as a model for the subsequent definition of the information architecture.
      4. It helps in identifying the processes involved in managing the supporting resources.
   B. For each of the processes, there should be a box on the flowchart.
      1. The definition of the processes should be reexamined, if other boxes seem to be required.

IV. Process Description.
   A. As they were defined by the group, a member of the team should have been making notes on the decisions and activities associated with each of the processes.
      1. This is absolutely mandatory if the process descriptions are going to reflect the knowledge of the team and the amount of time that has been spent in defining them, although this is a laborious task.
   B. Before moving into the next step, the similarities and differences between these processes and those subsequently identified must be completed first.
      1. So that it may be accomplished before a description of the supporting resources is started, the task of further defining the processes can now be assigned to most of the team members, as an advantage of rotating the note-taking among the different members.

The following supporting resource processes are outlined below:

I. Identify the Supporting Resources.
   A. That which a business consumes or uses in meeting its goals is best described as a resource:
      1. The four basic resources are:
         a. Materials.
         b. Money.
         c. Facilities.
         d. Personnel.
   B. The inclusion of some ancillary resources might make it easier for the team to get a comprehensive list of processes.
      1. The following is a list of ancillary resources:
         a. Marketplace.
         b. Vendors.
         c. Documented knowledge.
         d. Company image.
   C. The identification of the rest of the operational control processes in which the business engages is a result of a thorough examination of the activities and decisions associated with these resources.
   D. The facts that were gathered on the resources and prepared during the preparation for the BSP study should be reviewed by the team.
      1. It is well to place a chart on the wall with a short description or list of components of the resource being considered before starting to identify the processes.

II. Describe the Processes in Each Stage of the Life Cycle of Each of the Supporting Resources.
   A. Similar to the product/service, the resources are taken one at a time through the four stages.

The following consolidation and analysis of the processes is outlined below.

I. Process Grouping.
   A. The following three sources identify the processes:
      1. Strategic planning and management control.
      2. Major product/service.
      3. Supporting resources.
   B. The sources should be grouped along the following lines:
      1. Inconsistencies in level should be reduced.
      2. Where commodities occur, the processes should be combined.
   C. Sixty processes is a workable maximum.
      1. Normally 4-12 process groups will exist.

II. Complete Descriptions and Chart the Process Groups.
   A. The whole team should have the opportunity to view each process group and its processes on a chart.

1. The team should have a good understanding of all of the processes, agree on the placement of each of them under the process group, as well as the name of each.

III. Interface the Organization to the Business Processes.

A. The business processes can be related to the organizational structure of the business to help the study team identify additional people that should be interviewed and to further clarify their understanding of the business processes, once the business processes are agreed upon.
   1. This matrix may be completed by some teams before completing the process descriptions.

B. The team developes an organization/process matrix in order to relate the business processes to the organizational structure of the business.
   1. The organizational/process matrix illustrates who makes the decision in each of the processes, since this is a graphic representation of one aspect of the management system of the organization.

C. One of several matrices developed as part of the BSP methodology, is the organizational/process matrix.
   1. Matrices provide a convenient method in analyzing relationships, and this is one of the reasons of why they are used.

D. The study team uses the business processes already identified in preparing the organizational/process matrix.
   1. The team members identify the organizational entities involved in the processes, by using their knowledge and perspective of the business and the organization charts from the study preparation phase.

E. Not every organizational entity is identified since the BSP study is intended to provide a broad overview of the business.
   1. One organizational unit can be represented by "common similar organizations." Appendix A (of the questionnaire), gives an illustration of the organization/process matrix on p. 474.

F. The study team completes the matrix by indicating the degree to which each organizational entity is involved in the process, once the processes and organizational entities are arranged on the matrix.

G. After the study has been completed, some businesses have found this matrix to be valuable as an index to a management system manual.
   1. Here they develop responsibility and activity statements for each of the organizational/process intersects.

H. The study team determines the questions to be asked of the individuals responsible for the processes and validates the list of individuals to be interviewed from the information that is derived from the organization/process matrix.
   1. Each person interviewed by the team should be asked to confirm or correct the portion of the matrix

showing his responsibility or involvement in order to authenticate the matrix.

I. For a process where it normally would be appropriate, the organization/process matrix will show overlapping responsibility and decision making authority for a process.

IV. Business Success Key.

A. Identifying items to be stressed in the executive interviews, sizing the importance of the problems to be identified, and selecting the area of the business to be studied in more detail, are some of the areas that can be aided by identifying the "processes key" to business success.

1. Some of the outstanding processes will be strategic planning and management control.

3.2.4 The Use of Outputs

IBM identifies the Business Processes by the Following Output:

1. A list of process groups and their processes.
2. A typed description of each of the processes.
3. A list of the processes key to the success of the business or designated as such on the charts of process groups and processes.
4. Product/services flowcharts.
5. Team understanding of how the whole business operates and is managed and controlled [39, p. 39].

The identification of opportunities and requirements for the use of Information Systems to support the business, is in the ultimate use of the business processes.

The above is also one of the basic goals of the BSP study. Not all of the team members will be working on the follow-on projects after the BSP study, and this, they should keep in mind at all times. The processes should be defined in such a way that any experienced person can read the output and understand the work that was done in the study, bearing in mind that it should be regarded as an independent operation.

3.2.5 Approach Expansions And Variations

Other considerations and variations are also worth mentioning, although following the above procedure should result in well-defined processes and supporting material. The more well-defined processes are outlined below:

I. Product, Service, or Business.
   A. A grouping will be necessary before process identification is begun, if the various divisions or parts of the company or the product/services are too diversified to have common processes.
      1. It is still highly advantageous to look for processes that might have common information requirements.

II. Assistance.
   A. There may be voids in coverage even though the team members were selected with the aim of having their combined knowledge cover the entire business unit.
      1. The team should get outside assistance where necessary for a thorough understanding of the processes if the above is the case.

III. Other Methods for Identifying Business Processes.
   A. For the business being studied, predefined checklists of processes may be used.
      1. Care should be exercised so that the processes are well understood by all the team members and do indeed represent the activities and decisions of the business being studied, if the above method is used.

IV. Alternate Process Model.
   A. Figure 3.2 shows the simple model of the business as an alternate approach in identifying the business processes.
   B. To fit the business, the model may be expanded.
      1. The model is further explained in the following:
         a. Supply includes processes associated with producing the product and obtaining the resources necessary to provide the products or services of the business.
         b. Demand includes processes associated with making the product or service available and relates directly to external interfaces such as customers or clients.
         c. Requirements includes processes associated with determining and defining the products or services of the business.
         d. Administration includes processes associated with the overall accountability of the business.
         e. Management includes processes that tie together the other four aspects of the business.

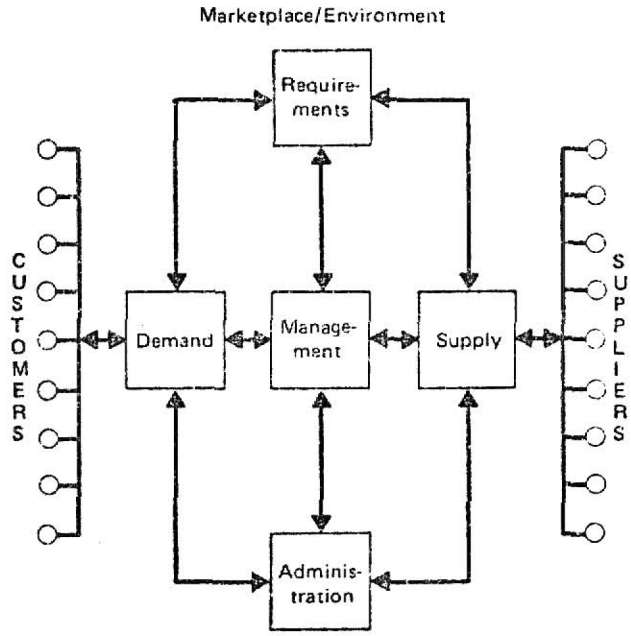


Figure 3.2

Business Process Matrix
[39, p. 39]

3.3 Describing Data Classes

A category of logically related information is a data class. The customer, vendor, product, order, inventory, etc. are examples of a data class.

Relating data to business entities and to business processes are two approaches that are used to identify data class candidates. In order to arrive at a final list of 30 to 60 data classes, the two above approaches should both be used and that their results be cross-referenced.

3.3.1 The Business Entity Method

The examination of categories or types of data maintained by a business is the first approach to identifying data classes. The types of data related to each stage of the life cycle can be defined, only if the life cycle of resources is presented in the same manner as it is shown in Figure 3.3.

The "information life-cycle" by IBM is explained as follows:

1. Planning data, which represents objectives or expectations, supports requirements activities.
2. Inventory data, which maintains the resource status, supports stewardship activities.
3. Transaction data effects changes to the inventory data caused by acquisition or disposition activities.
4. At periodic intervals, summary data is extracted from the inventory data to provide feedback on how well requirements have been met [39, p. 42].

Things that an enterprise is concerned about and keeps information on (such as customers, products, materials, personnel, etc.) are called entities. The resources around in which the business processes are defined, are also included as entities.

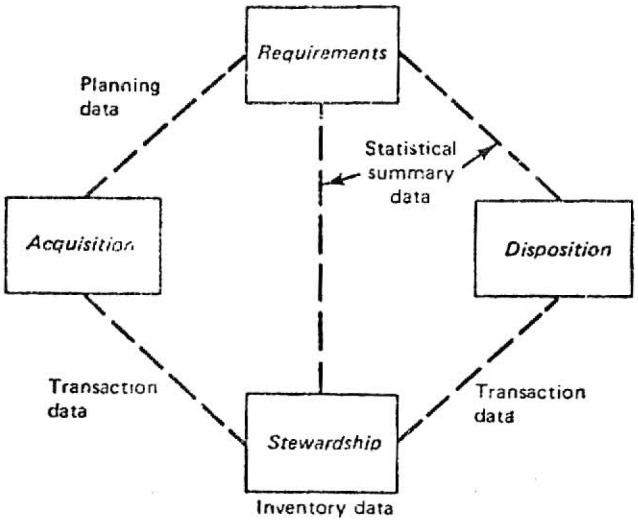


Figure 3.3

Information Life Cycle
[39, p. 42]

The first step in the business entity approach is to identify and list the business entities, since a data class may contain data relevant to part of a business entity, an entire business entity, or a group of realted business entities. By referring to the resources around which the processes were defined, a minimum starting list can be made.

A matrix is used, with the entities listed horizontally and the major types of data classes listed vertically when identifying the data classes related to those entities. In Appendix B (of the questionnaire), six types of data classes are classified by IBM as follows:

1. Plans/models.
2. Statistical/summary.
3. Inventory.
4. Transaction [39, p. 42].

3.3.2 The Business Process Method

The type of data that is created and/or used by each process is the second approach to identifying data classes. Figure 3.4 shows the construction of a series of input-process-output diagrams, one for each of the 20 to 60 processes indentified in the business process.

3.3.3 Regrouping and Cross-analyzing

It is possible to compile and manageable list of 30 to 60 data classes, by corss-analyzing Appendix B (of the questionnaire) and Figure 3.4 and regrouping on the basis of commonalities or inconsistencies.

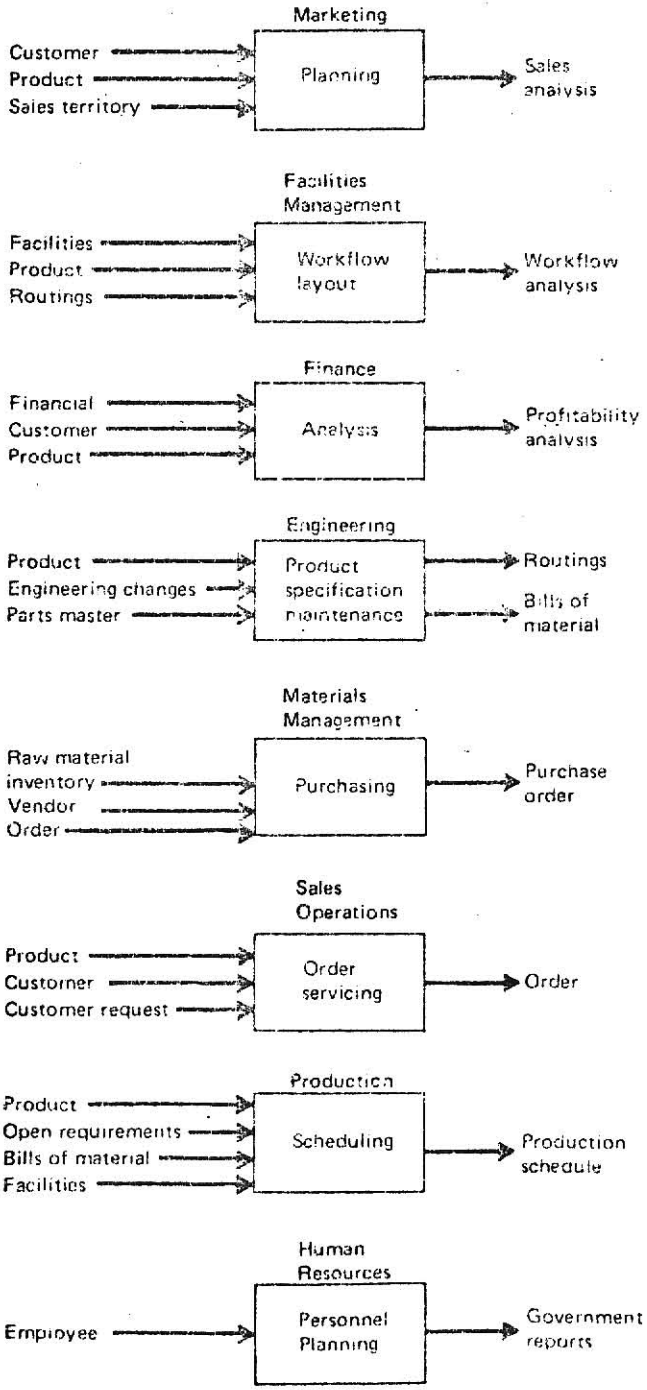


Figure 3.4

Input-Process-Output Examples
[38, p. 35]

3.3.4 Processes to Data Classes

A matrix should be created by placing the data classes opposite the business processes. To indicate which processes create the data and which use it, the letters C and U should be entered. Appendix C (of the questionnaire) shows the processes arranged in the life cycle sequence of the key resource.

3.4 Current Systems Support

In learning to look at the business in terms of the business processes and the data classes necessary to perform them, the team should develop a new perspective of the business.

In this section of the thesis the data class information will be described, and the use of data gathered and presented as part of the I/S review as well as the organization and process on the following will also be discussed:

1. I/S support of processes (Organization/Process matrix).
2. Usage of current data (System/Data File matrix) [39, p. 46].

The above matrices cannot indicate the extent of support needed or the value of this support of each of the processes, although the matrices provide an overview of the current and planned data processing support of the business. Also, these matrices are very helpful in providing the team with a broad overview of current systems and data usage, if used in a combination.

3.4.1 I/S Support of Processes

Appendix D (of the questionnaire) shows how the study team may

opt to annotate the organization/process matrix with current systems support, in order to obtain a business-wide picture of existing and planned data processing support. According to IBM, this matrix will enable the study team to identify the following:

1. Processes receiving no current systems support.
2. Processes receiving systems support in some organizational units, but not all.
3. Possible redundant systems [39, p. 46].

A number is posted to the appropriate intersections on the organization/process matrix after the team assigns a number to each of the current systems in order to create the notations. By first creating a system/organization matrix (Appendix E, of the questionnaire) or a system/process matrix (Appendix F, of the questionnaire) the above process of creating notations will be facilitated.

3.4.2 Current Data Usage Review

There needs to be an understanding of which systems utilize which portions of the data, and what data is currently automated and where it is needed by the team. This understanding is provided by Appendix G (of the questionnaire), the system/data file matrix. Appendix D (of the questionnaire) shows the data files being grouped by similarity, forming the horizontal axis of this matrix, while the systems form the vertical.

More light is shed by the matrix on how much data is shared by various systems. The need for a data base approach is pointed out by the amount of data that is shared by the various systems to provide a consistency of data [58, p. 56].

3.4.3 Summary of Current Systems Support

The use of various matrices as communications/presentation tools has become very convenient to some teams. Matrices that share a common axis (different combinations of two or more) may also be used.

An overview of the current and presently planned data processing support of the business is provided by these charts and matrices. The executive interviews should provide information regarding problems with additional needs for information, and current data processing support.

3.5 Executive Perspective

The executive interviews are the primary source of information for determining the business problem and management's need for support in overcoming their problem and/or supporting new opportunities. So, it appears that interviewing and interview analysis consume more time during the study than any other activity.

The gathering of data on specific details and the exact form of the information required by the interviewees, is not the intention of the interviews. According to IBM, the interview's purpose is to:

1. Validate responsibilities, objectives, critical success factors, and other interpretations of the team.
2. Clarify the future direction of the business, the information requirements, and the major obstacles and opportunities.
3. Identify the business problems so they may be related to business processes and data classes.
4. Propose possible solutions to the business problems and identify potential benefits [39, p. 51].

In order to conduct the interview, IBM indicates that the following tasks have to be accomplished:

1. Make general preparations for interviewing.
2. Make specific preparations for each individual interview just prior to conducting it.
3. Conduct the interview.
4. Summarize each interview and analyze the results [39, p. 51].

3.5.1 Interview Schedule Confirmation

The team identifies the executives that should be interviewed during the BSP study preparation. Managers, no more than two levels below the president should be selected by the team.

It is often difficult to assign final responsibility for a process to one specific organizational entity (as discovered during my review of related literature). A decision, however, may be reached by several organizations together.

If certain managers don't have an opportunity to participate in the study, they may oppose any recommendations that result from it. So, in some cases it is necessary to interview certain managers for potential reasons. Also, because other executives of the same level will be interviewed, it may also be advisable to interview a particular executive or executives who are not connected with the study.

3.5.2 Confirming the Interview Schedule

The study team should confirm the interview schedule, when the list of executives to be interviewed has been updated and confirmed. Time should always be allowed for interview preparation.

Higher executives should always be interviewed last. The reason for this is that the team should be working at its best before interviewing top managers, because, with time, the interviewers' techniques and procedures should improve with practice.

3.5.3 Preparation of General Questions

The study team prepares a list of general questions that apply to all interviewees before the interviews are conducted. Also, for certain executives, as needed, the team may prepare specific questions.

In order to be sure that the needed information is elicited, the interviewer must understand the purpose of the general questions. The question should be worded differently if an interviewee's response does not provide the information required.

The following is an examination of the responses that IBM feels are needed, and the purposes of the general questions:

1. Because conclusions drawn from the organization chart may not be correct, the interviewer must ask the executives what their responsibilities are.

2. The team should be sure that the executives do not indicate only their last problems, when asking about problems.

3. The additional costs that may be incurred from inaccurate and untimely information should have focused upon them, the information satisfaction, and needs questions.

4. In order to retain the benefits, the team must determine where the current information support is adequate.

5. To disclose how the effectiveness of resource allocation and use is measured, questions concerning measurement are used.

6. To disclose whether executives receive adequate information on which to base decisions, questions on what decisions are made are asked.

7. Because major Information Systems development cycles can

take from two to five years to complete, the questions on anticipated changes are important.

8. To help the study team ascertain how likely management is to accept and implement the study recommendations, questions regarding expectations for the BSP study should be asked.

9. To terminate the interview, additional thoughts and comments are appropriate.

3.5.4 Role Assignment for Team Members

The assignment of roles for team members to play during the interviews, is one of the tasks that must be performed when preparing for interviewing. When making these assignments, there are several factors to consider.

From the study team members, the interview team is usually drawn. There are usually no more than four active team members present at any particular interview, regardless of the number of people on the study team.

In each interview, a given team member need not play the same role. Therefore, one role in an interview is all that some members are assigned to. According to IBM, the following roles should be carried out:

1. The study objectives and approach to the interviewee should be presented by one interviewer.

2. To make sure that all questions are asked and that all answers are understood, a backup interviewer is needed.

3. Someone should be designated to take notes during the

interview and have them organized, typed, and presented to the interviewee afterwards for approval.

4. If the situation requires, a supplementary note-taker is also needed.

Sometimes the team member and the interviewee are members of the same department. It may not be advisable for that member to be an interviewer during that session, because of the possible sensitivity of some of the information.

Consideration should be given to individual abilities in determining who will serve in what role. Some people are fast and accurate note-takers, while others are better speakers.

The study team should meet to discuss various matters that are specific to that interview, before each interview session. The review by the study team should also include:

1. Interviewee background.
2. Interviewee responsibilities.
3. Involvement of interviewee in the process.
4. The interviewee's area of responsibility should have data processing support applied to it.
5. Due to prior interviews with other executives, specific questions should be derived to ask the next interviewee [39, p. 58].

3.5.5 Commence the Interview

The study control room should be a place where interruptions are least likely and where the matrices and charts can be displayed on the walls for reference. It would be convenient for the interviewees if the control room were close to the executive offices.

After the interviewee arrives and has been introduced to the

interview team, the following sequence of activities will normally transpire:

1. The input from previous interviews should aid in helping to update all the charts.

2. The interviewee should be seated so that he can see the main charts that will be used during the interview, after he is introduced to those he does not know.

3. Any specific questions and all general questions previously formulated are asked.

Often the interviewee needs to ask more questions than were prepared. To predict all the possible responses that an executive might offer is impossible.

To prompt an interviewee to express values quantifiably, the following are some techniques identified by IBM:

1. Have the interviewee express a potential benefit as a percentage.
2. Have the interviewee express a potential benefit in terms of a range, for example, savings of $300,000 to $500,000.
3. If the interviewee gives an exceptionally high value that might not be acceptable to other managers, suggest using 50% of the figure.
4. In a particular operational area, cite a well-known industry average.
5. Determine the company's present position in the industry and ask what it would be worth to be in a stronger position.
6. Employ in-depth logical questioning.
7. Determine the objectives against which the executive is measured and what it would be worth to achieve those objectives.
8. Determine what the company is currently spending, what the forcasts are, and how these spending levels would be affected if a certain capability were available [39, p. 59].

In order to probe more deeply into any subject area when appropriate, the interviewer must be sensitive to the responses of the executive. A key to underlying feelings, is the executive's tone of

voice and facial expressions, of which team members should be attentive to.

3.5.6 Summarize Interview Notes

The documentation of interviews should be kept current by the study team. The two study team members who are taking notes during the interview should pull the notes together and have them summarized and typed immediately after the interview has been concluded.

So that problem statements and key points appear in separate paragraphs, summaries should be formulated. For later analytical work, each problem statement and key point can be easily extracted.

To keep the wall charts as accurate as possible, any changes resulting from the interview should be posted.

Now, the study team members can begin to assess the business problems and/or opportunities as the interview summaries are returned.

3.6 Assessing Findings and Conclusions

Of extreme importance, is the reduction and use of data obtained during the BSP interview process. Figure 3.5 presents a logical flowchart of steps to reduce data.

3.6.1 Interview Data Summary

Out of each set of interview notes, the team should select the following:

1. Problems.
2. Solutions.

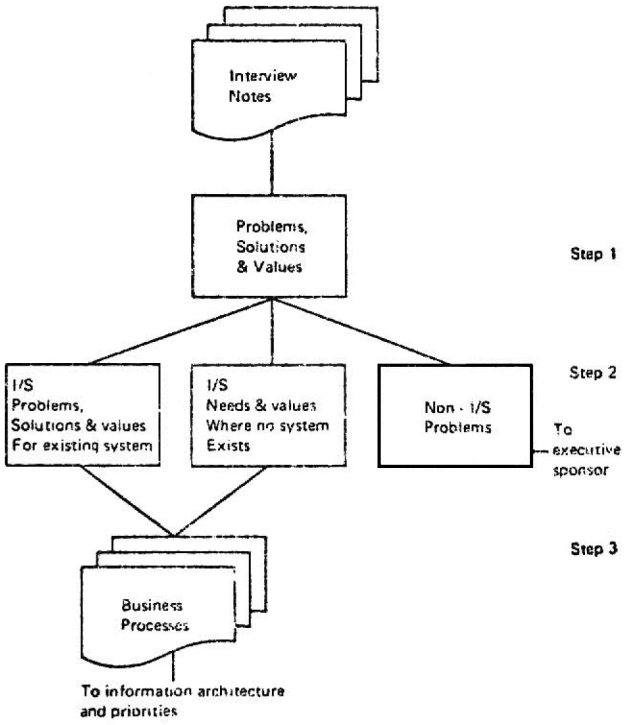


Figure 3.5

Data Reduction Steps
[38, p. 45]

3. Value statements.

4. Processes impacted.

5. Problem causing processes.

A businessman may state problems as actual root-cause problems or "perceived problems." Therefore, the starting point for problem assessment in BSP are "perceived problems."

Perceived problems must first be traced back to root causes and forwarded to end-effects, in order to assess problems objectively. Each end-effect may be quantified as far as possible, and the relative contributions of root causes to the loss represented may be assessed.

Appendix H (of questionnaire) presents the worksheet to be used in this step. As a unit, the team considers individual analysis and drafts a composite list of problems.

With double spacing between the entries, the entire composite list should now be typed. The original interviewee must have each entry code connected to him.

3.6.2 Categorizing Interview Data

The team now examines each line entry, using the interview notes and worksheets, and establishes whether it is in the classification of:

1. Values and I/S problems/solutions (established systems).

2. Values and I/S needs (no established system exists).

3. Non- I/S problems.

It is possible that a problem will have both an I/S solution and organizational solution.

At this point, it is critical that "non-I/S problems" be logically grouped and be very carefully handled. The solving of non-I/S problems should not be the mission of the BSP study team.

3.6.3 Interface Processes to Data

I/S problems/solutions or I/S needs and values should now be cut from the worksheet. For each business process group and its processes, a flipchart page should be created. At a level handy to "post" to, the "business process group and its processes" should be arranged around the control room.

On the first "posting", one should not be too worried about being too precise. To finalize the procedures, additional teamwork is required.

To ensure that all entries have been posted to the right process, the team should concentrate on one business process at a time, after all the entries have been "posted." To firmly establish the topic area and background that triggered the interview comment, it is normal to have to go back to the original validated interview notes or even the original handwritten notes. During this fine-tuning step, the need for mobility of the item entries quickly becomes more obvious.

3.6.4 Summary of Assessing Findings and Conclusions

The interview data entries can be grouped in several ways. As illustrated in Appendix I (of the questionnaire), data entries may be

related to the causing processes or the impacted processes using matrices or in some other summary formats as appropriate.

3.7 Information Architecture Review

The team should continue its analysis by determining how the data will be managed to support the process, having acquired an understanding of the business processes and the data required to support them. Data classes can be logically grouped into data bases, after they have been identified [60, p. 67].

Using a diagram that shows the relationship of data to systems and the processes supported by each, an "information architecture" is defined, in order to identify the Information Systems and subsystems areas to be developed. The blueprint that outlines for each system area, is the architecture diagram. The architecture diagram is outlined below by IBM:

1. The data created, controlled and used.
2. The relationship of system to system.
3. The systems that support a given process [39, p. 68].

By evolving through several iterations of a process/data class, the architecture is developed. Followed by subsystem identification and analysis of subsystems for prerequisites, the data flow is then added to the architecture.

3.7.1 Creating the Architecture Diagram

Appendix J (of the questionnaire) begins with the process/data class matrix where the process axis is in life cycle sequence based upon the key resource. The data axis should next be arranged by

grouping all the data classes to the left, or origin of the matrix, after being created by the first process. Continue grouping all the data classes created by the second process next to those created by the first process, until all the data classes are covered. Appendix K (of the questionnaire) illustrates all the "creates" grouped diagonally from the matrix origin to the opposite corner.

The object is to group the processes and data into major systems areas. By looking at the process groups and the data created by them, and then boxing in these groupings, the conversion of processes and data into major systems areas can now be accomplished.

3.7.2 Flow of Data

A means to represent the data flow from one system area to another is desirable when the U (usage) falls outside a systems box.

The Cs (create) and Us (usage) may be eliminated and names applied to the major systems areas, as data creation and use are indicated by boxes and arrows in Appendix L (of the questionnaire). Regarding the information architecture, such graphic illustrations have proved useful in management communications.

3.7.3 Identifying Subsystems

Again, an arbitrary classification, is the first out at identifying subsystems. The Us associated with a given process should be defined as a single usage subsystem, and each C should be defined as a "create" subsystem.

Logical combinations and/or splits can be made with the above

starting point. Where use of data is similar, usage subsystems can be combined.

A description of the functions of each of the subsystems should be written when they have been identified.

3.7.4 Prerequisite Analysis

In order to determine which subsystem must be in place before others can be created, a prerequisite analysis is needed as the final step. The interdependencies among subsystems can be analyzed by using the information architecture just developed and the team's understanding of the business.

3.7.5 Use of the Information Architecture

With respect to the data that is created by systems and subsystems, their control and use, and the processes they support, they are found to be identified by the information architecture. As a basis for the prioritizing and planning that now take place, the interdependencies have been analyzed.

3.8 Evaluating Architecture Priorities

A portion of the information architecture that is to be implemented first, should be selected and recommended to management. To begin implementation as early as possible, is the purpose of identifying and recommending such follow-on projects.

Relying primarily on a value analysis activity following the interviews is the purpose of the activity of selecting a first subsys-

tem(s). The purpose of the value analysis is to produce a priority sequence of subsystem(s) that were identified in the information architecture activity of the BSP. The following tasks are to be performed, according to IBM:

1. Determine the selection criteria.
2. Apply criteria and list subsystems.
3. Document or describe the recommended subsystems.
4. Consider implementation options [39, p. 77].

3.8.1 Evaluate Selection Criteria

I/S projects should be able to be evaluated by management in the same way other business projects are evaluated, since data is now being treated as a business resource. For evaluating new projects, it is recommended that the team use whatever justification technique presently exists within the organization.

IBM proposes grouping the major criteria into four categories, as a method for determining logical priorities:

1. Potential benefits.
    a. Tangibles.
    b. Intangibles.
    c. ROI (Return On Investments).
2. Impact.
    a. Degree of business acceptance.
    b. Probability of implementation.
    c. Technical complexity.
    d. Prerequisites.
    e. Length of implementation.
    f. Risks.
    g. Resources available.

3. Demand.

   a. Value.

   b. Effect on accomplishing overall objectives.

   c. Relationships with other systems.

   d. Political overtones.

   e. Need.

3.8.2 Criteria and Systems Analysis

For each of the four categories above, the major systems comprising the architecture can then be analyzed as potential first subsystems candidates and ranked on a scale of 1 to 10. Appendix M (of the questionnaire) is an example of a pictorial representation that emphasizes the most needed subsystems.

3.8.3 System Prerequisites Identification

The team usually prepares another matrix to identify system prerequisites during the architecture development activity phase. Furthermore, the team should review the matrix once a first subsystem has been identified.

3.8.4 Recommendations, Documentation, and Presentation of Systems

Further documentation of the recommended first system is usually required. IBM suggests that in order for the executive to evaluate the system, it should be described in sufficient detail.

The definition of more than the very highest priority systems may be impossible initially, because of resource limitations. In making later selections, the same method can be used.

3.8.5 Financial Justification

Focusing primarily on financial justification, is another method that may be used for priority selection. The team attempts to focus on tangible benefits as provided in the value statements during the executive interviews, using this technique [24, pp. 1-11].

3.9 Specific BSP Study Recommendations and Action Plans

IBM's BSP study recommendations may center on the following areas of:

1. Information architecture.
   a. Make required changes to systems currently under development.
   b. Accept the information architecture as the direction for the future and to serve as a base for future I/S planning.
   c. Make interim improvements to current systems.
2. Information Systems management.
   a. Enhance data administration to control the data resource of the organization.
   b. Improve the Information Systems planning process to more effectively support the business and utilize resources.
   c. Provide a measurement and control system to ensure the success of future implementations.
3. Distributed Information Systems-study to determine the requirements for distributing hardware, program execution, data, and program development.
4. Architecture Priorities -- Develop the high-priority systems to be implemented [39, p. 86;40].

For each associated project, there is a recommendation. Also, to help management provide proper direction, an action plan for every project should be developed identifying the key decisions and activities. From the study work product to the particular project, the action plan should give the project manager a firm basis for a smooth transition.

The following should be included in each action plan:

1. Scope of project.
2. Deliverables.
3. Schedule.
4. Potential benefits.
5. People and skills.
6. Tools and techniques.
7. Training.
8. Communications.
9. Logistics.
10. Control [39, p. 86].

From one organization to another, the amount of emphasis placed on the recommended follow-on projects varies greatly. Multiple follow-on projects will normally run concurrently.

Preparation of the study report and presentation of the study results to executive management signals the study team's final activities, after the completion of the action plan activities. The executive sponsor is now able to evaluate the recommendations, through thorough preparation of the action plans, potential benefits and costs.

3.10 Preparing the Study Report and Executive Presentations

IBM indicates that the BSP study team is now ready to complete its mission by preparing the study report and preparing and delivering an executive presentation after having:

1. Defined the information architecture.
2. Identified the architecture priorities.
3. Reviewed and assessed I/S management.
4. Developed recommendations and the action plan [39, p. 87].

In order to implement recommendations from the BSP study, further executive management commitment and involvement is obtained by the presentation of the report.

In preparing the study report and executive presentation, the following activities will be performed:

1. Report outline review.
2. Report preparation.
3. Presentation medium selection.
4. Executive presentation [38, p. 65].

3.10.1 Preliminary Report Outline

The team should prepare a preliminary report outline during the initial steps of preparing for the study and develop a work plan for conducting the study. So that the final report reflects all of the team's comments, each of its sections should be reviewed by each of the members, since the document now materializing from that outline is to be a consensus of the entire team.

Depending upon precedent and methods of presentation within the business conducting the study, the report may be structured in many ways.

For use by top management, the first few pages of the report should summarize the most significant findings, conclusions, and recommendations. Team members (and other members) who plan to participate in future follow-on activities, should have supporting details included in the appendices.

3.10.2 Preparation of Report

During the study preparation phase, the primary writing responsibility for each of the sections of the report is assigned. Changes, additions, and deletions can be made to the preliminary outline, as the study progresses.

Before the team drafts the final report, the conclusions, recommendations, and an action plan should be reviewed with the executive sponsor. To determine how best to present the recommendations, controversial areas or areas of high impact on the business may be reviewed with the executive involved.

3.10.3 Medium Presentation

The type and size of the audience and the accepted ways of making a presentation in the particular business environment, are the principle factors to consider in determining how the report should be presented. In establishing a proper direction, consultation with the executive sponsor early in the study to obtain his advice on this subject can be most helpful.

Easel flipcharts are quite adequate and popular, if the presentation is made to a small group. Viewgraphs, or slides should be considered, if the audience numbers more than a dozen.

3.10.4 Presentation to Executives

From material contained in the final draft of the report, the executive presentation can be developed completely, to inform management of the study's findings, recommendations, and secure their approval of the action plan (they are the principal aims of this presentation).

The presentation should last no longer than an hour and should be concise. IBM suggests that for the follow-on activities, the presentation should be logical and factual and should end with recommendations by taking the following form:

1. Introduction.
   a. Background and overview.
   b. Objectives.
   c. Scope.
   d. Study team.
2. Study approach.
   a. Business and I/S review.
   b. Business processes.
   c. Business/Information Systems relationship.
3. Major problem identified.
4. Conclusions and recommendations.
   a. Information architecture and priorities.
   b. MIS requirements.
5. Action plan for follow-on project activities.
   a. Description(s).
   b. Deliverables.
   c. Resource requirements.
   d. Benefits.
   e. Schedules [39, p. 87].

3.11 Summary

The first major activity in the formal execution of a BSP study is conducting the kickoff meeting. Second, the business processes are identified and defined.

Relating data to business entities and to business processes are two approaches that are used to identify data classes, as the third activity. Also, data class information should be described, along with the use of the data that is gathered and presentated during the I/S review.

The executive interviews are the primary source of information for determining the business problem and management's need for support in overcoming their problem and/or supporting new opportunities. Of extreme importance, is also the reduction and use of data obtained during the BSP interview process.

The team should continue its analysis by determining how the data will be managed to support the process, having acquired an understanding of the business processes and the data required to support them.

A portion of the information architecture that is to be implemented first, should be selected and recommended to management. Furthermore, for each associated project, there is also a recommendation.

In order to implement recommendations from the BSP study, further executive management commitment and involvement is obtained by the presentation of the report.

Chapter 4

BUSINESS SYSTEMS PLANNING -- FOLLOW-ON ACTIVITIES OVERVIEW

With the development of an action plan for the follow-on activities and a presentation for management approval to proceed in the execution of that plan, the BSP study should end. This part of the thesis gives an overview of the follow-on activities and serves the following purposes:

1. To relate the follow-on activities to the BSP study.
2. To show how to capitalize on the results of the BSP study.
3. To further explain the major follow-on projects.

The following section of the thesis helps in emphasizing the follow-on activities's importance and putting them in perspective. It also explains how to get the maximum use of the output from the BSP study. The IBM perspective on follow-on activities is outlined below:

I. Relation of Follow-on Activities to BSP Study.
   - A. The continuation and expansion of the major activities in the BSP study are the follow-on activities.
     1. Understanding, developing findings and conclusions, and making recommendations are the major thrusts of the study.
   - B. If project implementation is to be successful, there must be a great need for communications among the project teams.
   - C. Unless there is a management committee that will perform them, the functions performed by the executive sponsor for the BSP study should be performed by a steering committee for the follow-on projects.
   - D. Business Processes continue to be the vehicle for:
     1. Understanding detailed business requirements.
     2. Further defining the information architecture.
        a. With special emphasis on the definition of the first system.

II. Follow-on Activities Preparation.
   A. The follow-on activities and the emphasis placed on each of them will vary from one BSP study to another, because of the variations in the findings and conclusions that may result from the BSP studies.
      1. The following assumptions are made for the purposes of this discussion:
         a. MIS functions must be changed or added to provide a controlled environment for the development and implementation of the information architecture identified in the BSP study.
         b. The information architecture must be further defined and data bases identified [62, p. 29].
         c. The distribution of Information Systems may be a consideration.
         d. One or more major systems have been chosen for development and implementation.

III. Orientation for Project Team Members.
   A. The I/S director should provide orientation for project team members, before the beginning of each of the follow-on projects.
   B. To help determine whether team members need special education, a review of the BSP study report for the areas to be studied in the follow-on projects will be needed.
      1. The need for special education, may be in the specification of tools and techniques.
   C. The project team orientation list of topics are:
      1. Introduction by the sponsor.
      2. Objectives of the orientation.
      3. Information Systems concepts and perspectives.
      4. Data base concepts.
      5. Overview of the BSP study methodology.
      6. Detailed discussion of the BSP study.
         a. Business environment.
         b. Objectives.
         c. Major processes identified.
         d. Major problems.
         e. Current I/S support for the business.
         f. Interviews.
         g. Information architecture.
         h. Major findings and conclusions.
         i. Recommendations.
      7. Introduction to the follow-on activities.
         a. Relation to the BSP study.
         b. Relation to the BSP study deliverables.
      8. Discussion of deliverables from the follow-on activities.
      9. Explanation of follow-on projects.
      10. Introduction of tools and techniques.
      11. Introduction of preparation activities.
         a. Activities already performed.
         b. Activities to be performed by team members.

12. Interviewing strategies and selection of interviewees.
13. Use of matrices.
14. Pilots of forms, tools, techniques and interviews.
15. Introduction of HIPO (Hierarchy Plus Input-process-Output) and its use in the follow-on projects.
16. Assignment of responsibilities.
17. Development of task descriptions by team members.
18. Explanation of project control systems [39, p. 90;63, p. 39].

4.1 Management Information Systems

The keystone of effective support of the business by Information Systems is MIS [20, p. 95]. MIS can be defined as the Management of the Information Systems resources for the most efficient and effective support of the business. The following statements summarize the importance of continual emphasis on MIS, as indicated by IBM:

1. Development of the information architecture will take place over a period of years.
2. Changes to business strategies and plans and to information technology will continue throughout the development of the information architecture.
3. The processes of managing information will have to be refined and changed continually to properly plan, measure, and control required information resources.
4. The BSP study is a one-time effort that should be followed by continual information planning to fully capitalize on the results [39, p. 90].

Furthermore, the importance of continual emphasis on MIS is further outlined below:

I. MIS Perspective.
   A. MIS follow-on projects will originate from the following:
      1. Requirements to support I/S objectives.
      2. Changes resulting from the development and implementation of the first system.
      3. Recommended changes to solve I/S problems and MIS problems.
   B. Based upon the origins of the MIS follow-on projects, the following recommendations are offered by IBM:
      1. Emphasis on Information Systems planning and control and on data administration.

2. Some close-in projects, such as the establishment of a steering committee and refinements to project control.
3. A major project(s) in MIS, e.g., establishing an action plan to move to distributed data processing.

C. Determining the responsibility for continuing the I/S planning using the BSP study as a base, is perhaps the most important action to be taken after the BSP study.
   1. The overall objective of an MIS project will be to develop a long range I/S plan that will direct the design, development, and implementation of an information architecture, while the BSP study was culminated in an approved action plan.

D. The data administration should decide as early as possible on how to properly coordinate the I/S resources of the business, so that they can be used more effectively to support the business, since data management is a complex area requiring long lead times.

E. I/S planning and data administration will nearly always be part of the follow-on activity, and their importance cannot be overemphasized.

F. After the BSP study recommendations are approved and before most of the follow-on activities are started, some of the close-in projects should be done immediately.
   1. Since a steering committee should be available to direct the follow-on activities, a project control system should be in place to help the I/S director adequately control and coordinate the activities (the establishment of a steering committee and a project control system are essential).

G. MIS can also be considered a long-range activity (such as I/S planning or data administration or a combination of both) since it is a major follow-on project.

H. Just as it is important to fully understand the business before starting to fulfill the information requirements, it is equally important to fully understand all the functions of MIS before undertaking any recommended change to any part of MIS, because of the size of these projects and their interactions with all the I/S processes.
   1. BSP can be used as a mechanism to get a broad view of MIS.

II. <u>The Business as an Information Systems</u>.

A. The following are the accomplished activities for performing a BSP study in the I/S function:
   1. Facts relating to Information Systems are gathered as part of the study preparation phase.
   2. MIS responsibilities, activities, and problems are identified by the I/S director during the kickoff.
   3. Many of the findings and conclusions are already put together as a result of examining the I/S facts and problems.

4. A first MIS project is identified and an action plan established.

B. Some of these activities make a significant start in undertaking the whole I/S function, even though some of them will have to be expanded.
   1. Other steps that should be performed are listed as follows:
      a. Defining MIS Processes (the IBM document, A Management System for the Information Business, defines the process).
         (1) The resources to be considered are listed as follows:
            (a) Programs and systems.
            (b) Functional modules.
            (c) Data bases.
            (d) Hardware/software/communications facilities.
            (e) User facilities (terminals, languages, data bases).
            (f) Physical facilities.
            (g) Finance.
            (h) People.
         (2) Analyzing relationships of organizations, processes, Information Systems, and data.
         (3) Interviewing.

C. A small team led by the individual responsible for I/S planning or another person with a broad responsibility in I/S, should be responsible for conducting the remaining steps (which are the same as the BSP methodology).

D. As suggested, the BSP study of the I/S function may be done as part of the MIS follow-on project.
   1. Before the business BSP study, or immediately after it and before the start of any follow-on projects, the BSP study of the I/S function should also be considered as an effort that can be made concurrently with the business BSP study.

E. The I/S study, as an activity before the business study:
   1. Provides experience in the methodology.
   2. Offers an excellent view of I/S as input to the business study.
   3. Allows an early start on MIS projects.
   4. Can serve as a selling tool if some executives are skeptical of the methodology.

F. Two teams, closely coordinated will be required to run two studies concurrently, because BSP is so demanding of a team's time.
   1. Detraction from the major goal of understanding the business, and giving the entire study a much greater flavor of an I/S project than is desired, is the result of the added emphasis on MIS.

G. After the business study, the I/S study should be done immediately since:
   1. The required inputs are available.

2. The momentum will carry over from the business study.
3. The best environment will exist for conducting all the follow-on activities [39, pp. 90-92;64;65].

A further discussion on MIS will be presented later in Chapter 5.

4.2 Architecture Follow-on Effort Requirements

The level of detail in the BSP study, has the amount of follow-on effort required in the architecture area dependent upon it. The basic architecture definition should be completed at the beginning of a follow-on project, if the information architecture was not completely defined.

IBM has indicated that the follow-on project architecture refinement should include:

1. A confirmation of the major I/S groupings.
2. The subsystem breakout of each system.
3. Subsystem interrelation.
4. Data flow among subsystems [39, p. 92].

The information architecture project should include several other activities:

1. Examination of current data processing systems to determine how they can evolve into the new systems architecture.
2. Establishment of a continuing link between the architecture and the business plan to ensure that the I/S plan will be based upon a viable information architecture.
3. Documentation of alternative architectures that were tried or investigated and rejected, with the reasons for rejection.
4. Evaluation of the technical implications of the information architecture, including control systems data base/data communications requirements and potential distribution of both information and systems [39, p. 92].

The basis information architecture definition requirements are outlined below:

I. Refinement of Information Architecture.
   A. A description of each subsystem should be prepared, using the information architecture defined in the BSP study.
      1. Each description should include:
         a. The purpose of the subsystem.
         b. Business problems addressed.
         c. Data created and used.
         d. Dependencies on other subsystems.
         e. General requirements for implementation.
         f. Priority of the subsystem with respect to all other subsystems.

II. Examination of Data Processing Systems Currently in Use.
   A. A careful examination should be conducted to determine how each data processing systems relate to the subsystems described in the information architecture.
      1. With respect to interfacing current systems to the future architecture, possible modifications to current systems should be documented.

III. The Data Base.
   A. The data classes supporting the business processes are essential to the architecture definition in the BSP study.
      1. The set of data bases that will support the architecture implementation are derived from the logical grouping of related data classes.
   B. A nonredundant collection of interrelated data items processable by one or more applications is known as a data base.
      1. The following are terms in the definition that need explaining:
         a. Nonredundant means that individual data items appear only once in the data base.
         b. Interrelated means that the files are constructed with an ordered and planned relationship that allows data elements to be tied together, even though they may not necessarily be in the same physical record.
         c. Processalbe by one or more applications means simply that data is shared and used by several different subsystems.
   C. Data base development has some obvious benefits.
      1. The user can obtain better control of data and reduce storage space and processing time, by consolidating files.
   D. Some of the complexities of data management can be overcome by a data base system.
      1. While minimizing storage redundancy, it can provide additional data relationships.
      2. Figure 4.1 illustrates how a subsystem's needs can be supported by a data base system in a current and independent way.
   E. The advantages of a data base concept is revealed by a comparison of the data base environment with the tradi-

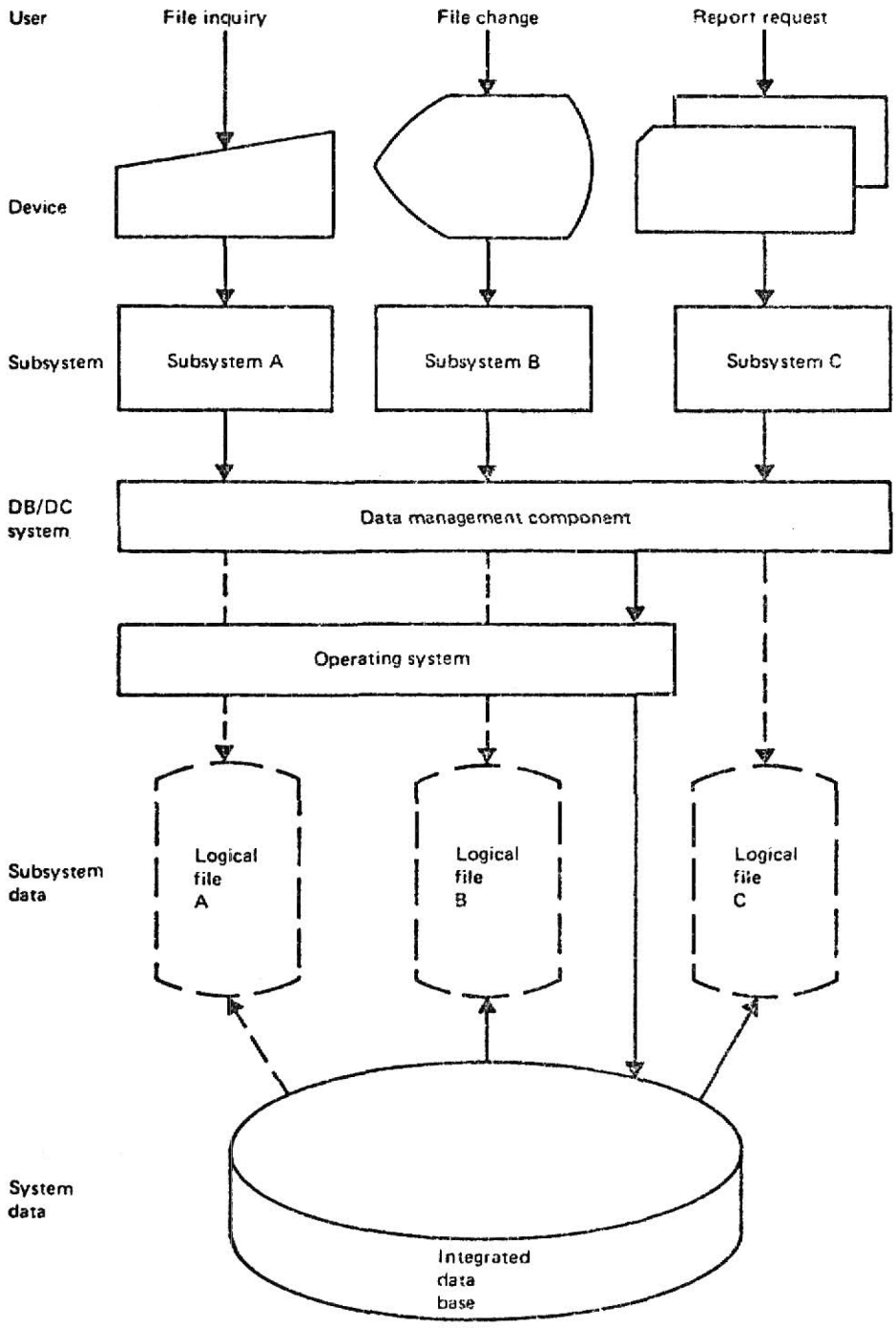


Figure 4.1

Data Base System
[39, p. 93]

tional approach to systems development and maintenance.
1. A system is usually designed, programmed, tested, and then implemented as a total entity in the traditional approach.

F. With a gradual transition from existing systems to on-line, the transaction-driven system is allowed by the data base approach.
1. With just a few transactions implemented at a time, the data base is created gradually.

IV. Distributed Information Systems.
A. A more specific discussion of this requirement will take place later (see p. 112) [39, pp. 92-96].

4.3 Developing and Implementing the High-Priority System

A high-priority system should be developed and implemented as a recommendation by the BSP team. Care should be taken so that the system is not developed "by itself", as development of that system begins. According to IBM, the business processes must be supported by this first development and implementation, and must:

1. Fit properly into and interface with the other (future) systems of the overall architecture described in the BSP study.
2. Provide for proper implementation of the appropriate data base(s) [39, p. 96].

To ensure that these concurrent projects lead toward an integrated whole rather than perpetuate "separatist" or "standalone" applications development, they must be carefully managed (as described in the MIS section of this thesis).

Systems development is a complex process, and requires the following:

1. Technical expertise.
2. Effective Communications.
3. Skillful handling of conflicting objectives of users, management, and data processing [39, p. 71].

The above systems development requirements are outlined below:

I. Technical Risks.
   A. Developing an Information Systems today is more complex than in the past.
      1. The following factors complicate tasks that must be performed on a project:
         a. Data Security.
         b. Data integrity.
         c. Data communications.
         d. Rapid availability of large amounts of data.
         e. Backup and recovery requirements.
   B. Technical risks may be reduced by the following in many areas:
      1. Incorporating appropriate hardware/software products.
      2. Productivity techniques.
      3. Procedures.

II. Communicating Effectively.
   A. The communication and translation of management and user business requirements into achievable data processing solutions is brought on by effective communication (which is indispensable to successful system development).
   B. The business requirements of the system to be developed can only be determined by the users.
      1. It is essential for the users to become involved and continue their participation.
   C. To second guess the needs of users and to create systems that will do the job, is an approach that is sometimes taken by developers.
      1. This approach is unsatisfactory, more often than not.
   D. A mutual understanding of what is to be done and the commitment to respective responsibilities, is the responsibility of users and developers.
      1. Communication and commitment between the two groups must be ensured by the development process.
   E. The use of standardized documentation techniques such as HIPO (Hierarchy Plus Input-process-Output), structured walk-throughs, and the like, have greatly facilitated communications.
      1. The implementation of the system or application is sped up by the reduction of misunderstandings and increased contribution of productivity.

III. Setting Priorities for Conflicting Objectives.
   A. The need is crucial to set priorities for conflicting objectives.
      1. Simple situations can be made complex and cause serious project difficulties by conflicts.
   B. The new system must complete with the demands of trained personnel to maintain old systems, even before a project is under way.
      1. Because everybody has a backlog of applications waiting to be developed, application development resources may be in short supply, and experienced development skills may be hard to find.

C. To be supported by the first system, the project manager, must be qualified both in project management techniques and the business area.
   1. Project management techniques and business have the following resources available to them:
      a. Ample education.
      b. Documentation.
      c. Products.

D. Before the start of the project, the project manager and appropriate team members should be thoroughly prepared in these areas.
   1. To reduce risks and optimize the business value of the first implementation, effective project management must be realized first.

4.4 Summary

With the development of an action plan for the follow-on activities and a presentation for management approval to proceed in the execution of that plan, the BSP study should end.

The keystone of effective support of the business by Information Systems is Management Information Systems. MIS can be defined as the Management of the Information Systems resources for the most efficient and effective support of the business.

The level of detail in the BSP study, has the amount of follow-on effort required in the architecture area dependent upon it. Also, the basic architecture definition should be completed as the beginning of a follow-on project, if the information architecture was not completely defined.

A high-priority system should be developed and implemented as a recommendation by the BSP team. Care should be taken so that the system is not developed by itself, as development of that system begins.

Chapter 5

PLANNING, MEASUREMENT, AND CONTROL OF MANAGEMENT INFORMATION SYSTEMS

Without adequate planning, measurement, and control in the Information Systems functions, the development and implementation of the information architecture cannot be accomplished. This part of the thesis deals with those activities required to adequately review the Management Information Systems (MIS) function so as to recommend immediate changes and to specify MIS activities that are part of the follow-on projects.

All the MIS functions will not be encompassed by the BSP study. The planning and control aspects of the major I/S processes should be included in the MIS analysis, and be at the level of the I/S director's view.

5.1 The MIS Purpose

The management of I/S resources for the most efficient and effective support of the business is the purpose of MIS. Continuous planning, control, measurement, and operation of the information is provided by the management system as outlined below by IBM:

I. MIS Module Objectives.
   A. The MIS Module Objectives are:
      1. Study the facts relating to MIS produced in other modules of the BSP study.
      2. Understand the findings and conclusions on I/S support of the business in relation to MIS.
      3. Further specify I/S objectives.

4. Ensure that the first subsystems selected will be supported by the current or planned MIS functions.
5. Identify those MIS projects that have high priority and should be follow-on MIS projects.

II. Inputs to MIS.

A. Prerequisites to performing the MIS activities in the BSP study, are actions in other study modules:

1. Study Preparation:
   a. I/S objectives and mission.
   b. I/S strategies and plans.
   c. I/S measurements.
   d. I/S organization.
   e. I/S budgets.
   f. I/S trends.
   g. I/S locations and inventory.
2. Determining business requirements:
   a. Description of business objectives.
   b. I/S support problems.
   c. Major MIS problems.
3. Determining architectural priorities:
   a. New technologies and skills required to support the development of the first subsystems [38, p. 60].

5.2 MIS Module Activities Flow

Figure 5.1 illustrates the MIS module activities flow. The required MIS changes are developed through three channels, as noted in Figure 5.1:

1. I/S objectives.
2. Information architecture.
3. Problem Analysis:
   a. I/S problems.
   b. MIS problems.

Serving as input to the MIS portion of the action plan resulting from the BSP study, changes required by each of the three channels (noted above) are then consolidated into a list for developing MIS priorities, as outlined below:

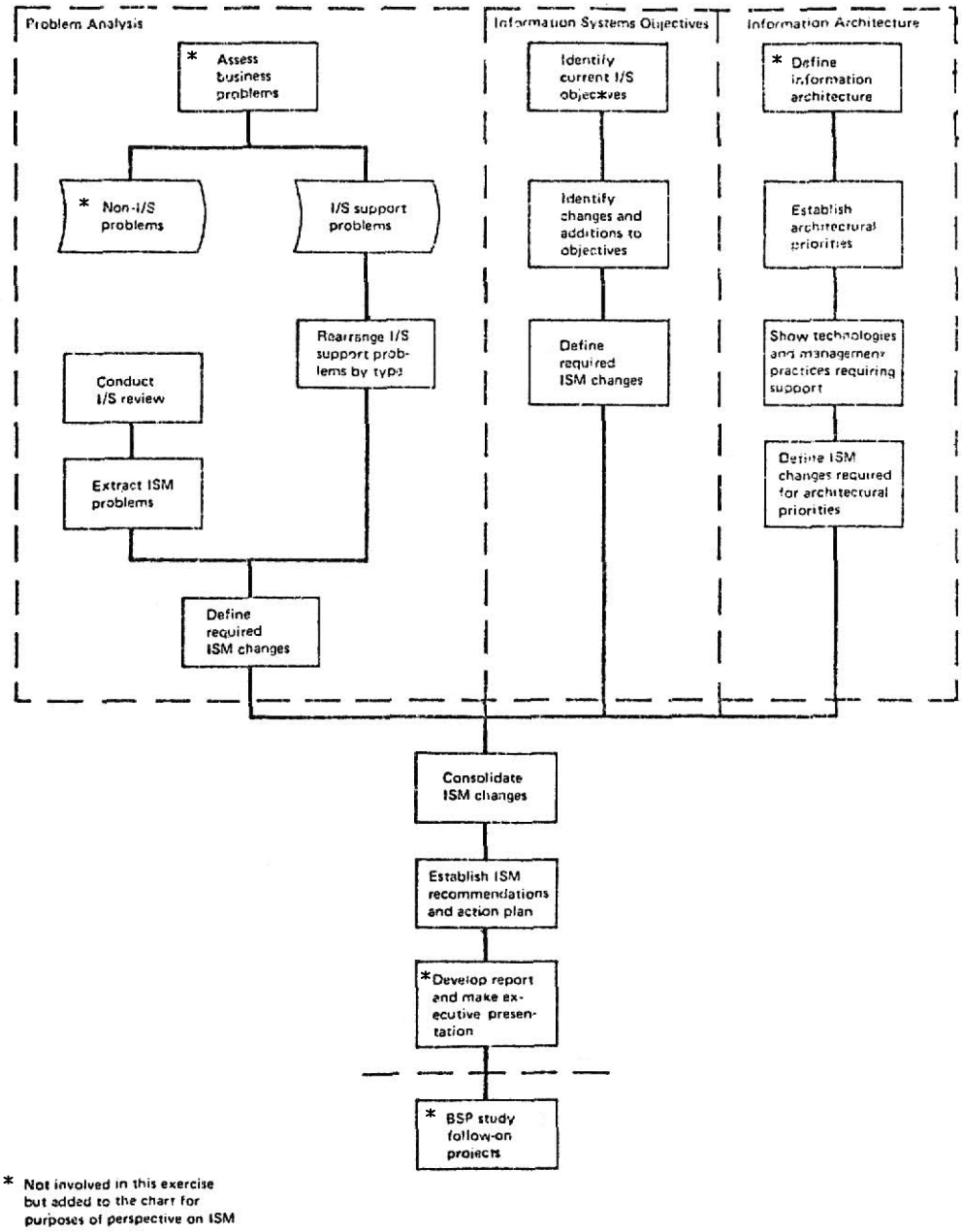


Figure 5.1

Flow of MIS in a BSP Study
[38, p. 61]

I. Compilation of I/S Objectives.
   A. To provide the framework that provides consistency in the development and employment of I/S resources in the support of the business, is the requirement of I/S objectives.
      1. So as to serve as a guide for the development of I/S plans and strategies in the BSP follow-on activities, I/S objectives must be consistent with the objectives and management systems of the business.
   B. During the BSP study preparation phase, the current I/S objectives are then documented, and are discussed in the I/S director's presentation.
   C. The following list can be used as a guide in determining the present I/S objectives to be modified and defined:
      1. I/S personnel.
         a. Organization.
         b. Skill mix.
         c. Development and training.
      2. I/S finance.
         a. Appropriations.
         b. Expense budget.
         c. User budget for I/S [24, pp. 1-11].
      3. User.
         a. Capability.
         b. Responsibility.
            (1) Development.
            (2) Data management.
      4. I/S facilities.
         a. Processing sites.
         b. Equipment.
         c. Software.
         d. Communications network.
      5. Applications.
      6. Data.
   D. Following this approach, is a sample of I/S objectives:
      1. Personnel.
         a. Provide staff assistance for planning and control to all levels of I/S line management.
         b. Centralize major development and control functions with decentralized operations.
         c. Develop I/S personnel who are specialists for each function of the business.
      2. User.
         a. Provide maximum data processing capability and data access to users while maintaining central control.
         b. Establish user responsibility for information requirements and validity of I/S outputs during the external design phase [39, p. 90;11, p. 22].
   E. Implied changes to MIS should result when compiling the I/S objectives.
      1. In establishing MIS project priorities, these changes should be listed and reviewed with the I/S director and then held for later consolidation.

II. Architectural Priority Input.
   A. Figure 5.1 (see p. 102) illustrates that a major input in determining the changes to MIS are architectural priorities.
      1. New technologies that must be provided and managed will be required in the first data bases and Information Systems [61, p. 58].

III. Identifying MIS Changes.
   A. I/S support problems and non-I/S problems.
      1. Problem analysis is the third channel for identifying MIS changes.
         a. The BSP study separate problems into I/S support problems and non-I/S problems.
      2. Check to see that those resulting from inadequate or nonexistent systems have been addressed by the proposed information architecture, after rearranging the I/S support problems by type.
         a. Changes to existing systems may be identified this way.
   B. Categorize MIS problems from I/S review.
      1. A review of the status of Information Systems in the company should be given by the Director of Information Systems, or his representative during the kickoff.
         a. Current problems in Information Systems management are covered in the review
      2. The long-range Information Systems plan should receive major emphasis during problem analysis and it must, of course, be one of the follow-on projects, since it is a major BSP objective.
         a. Data management is of equal importance with I/S planning.

IV. Prioritizing and Consolidating MIS Changes.
   A. All of the implied changes from the three sources should be consolidated.
      1. Criteria should be developed to rank MIS changes, such as:
         a. Impact.
         b. Potential benefits.
         c. Resources involved.
         d. Probability of successful implementation.

V. Action Plan and Recommendation Development.
   A. Do not establish schedules until this list is combined with actions required for other follow-on activities, even if the above activity gives priorities.

5.3 MIS Outputs

Outputs that should result from the BSP study are summarized

in the following list by IBM:

1. Findings and conclusions.
   a. Major MIS problem analysis.
   b. MIS problems deduced from the I/S support problems.
2. I/S objectives.
3. Definition of high-priority MIS projects.
   a. First systems support requirements.
   b. Projects addressing major MIS problems.
   c. Immediate actions recommended.
4. Action plan for follow-on projects [38, p. 63].

5.4 The Management System -- How Effective Is It?

An Information System can and should be managed by the same basic principles as any other business unit. Therefore, the I/S function for instance, may have the established management theory applied to it equally.

The establishment of a management system for the organization, is the starting point for effective management. Therefore, "the management system processes consist essentially of a series of planning and control loops operating at different levels of a hierarchy, each level of the hierarchy being determined by a particular planning horizon" [32, p. 8].

The decision maker or organization component guides this planning and control loop. An organizational structure and working methods that allow work activities to be directed and controlled in the most effective way are needed by the decision maker, along with the need for accurate and meaningful information with which to measure the progress of the activities being managed.

5.4.1 Effectiveness in the I/S Business

By setting the objectives within the overall objectives of the company that the I/S business serves, and by constantly seeking the real business opportunities, is the only way that it can become effective. If people in the I/S organization continually ask for the advice and cooperation of senior management and users, and if senior management and users take an active part in the decisions concerned with the direction and use of the I/S business, the effectiveness concept can become a reality.

Unless I/S personnel submit themselves to the same disciplined working methods as people do elsewhere in the business community, control in the I/S business will not be possible. Only then will agreed service levels be met in terms of quality and timeliness of output from computer operations, committed objectives, schedules, and costs in application system development.

If all staff members try to improve productivity by constantly looking for more cost-effective ways of doing business, and take a businesslike attitude toward their own work, measure their own performance or the performance of the area of their responsibility against established goals or standards, efficiency in the I/S business will be achieved.

5.4.2 The Total Management System

In order to determine when to start the actual implementation, the ISM architecture allows an understanding of the total management system. The key groups of processes required in an I/S must be de-

fined first. Furthermore, they are related to each other; each set of processes directly affects most of the others.

Which of the planning processes are critical in making transitions, is a question which executives often ask. The answer must include the processes to plan the management system itself, in a "top down" planning mode. The processes of the management system are defined and implemented without any clear plan during the first phase. Many of these processes finally become ineffective and inefficient.

In order to allow the I/S business to work, the Management Systems Planning process is concerned with planning this "container" (the plans to manage I/S). This container includes:

1. Organizational structure.
2. Standards.
3. Procedures.
4. Methodology to run the I/S business [32, p. 37].

The other planning process groups dealing with the contents of this container can now be evaluated and assigned to the proper management organization.

5.4.3 Monitoring the Total Management System

The key to successful I/S management, is keeping the management system effective and efficient. The monitoring process assesses the effectiveness of the management system and makes sure that it will be enhanced, if necessary, by using the feedback from all the I/S processes.

Management Systems Monitoring initiates corrective action for variances to the planned management system; and, serves as a self-correcting mechanism for the management system.

The elements of management systems monitoring are:

1. Collect and summarize organization performance data.
2. Compare to the organizational objectives and standards.
3. Diagnose deviation or substandard performance.
4. Initiate effectiveness/efficiency improvements in the organization, standards, procedures and methods [32, p. 38].

5.5 Decision Support For Management Information Systems

Three types of activity are distinguished for Decision Support of Management Information Systems:

1. Supervision.
2. Planning.
3. Goal Setting [4, p. 10].

John Evans Gessford, in his book Modern Information Systems, defines the three types of activity below:

1. Supervisory data is needed to control ongoing operation.
2. Planning data is used to set plans for business operations in the next week, month, quarter, year, or multi-year period -- whichever is appropriate.
3. Strategic data is used in goal setting, or strategic planning [4, p. 10].

5.5.1 Planning for Data Systems

The steering of the organization toward the best use of its resources, is the production of plans that can be used by management. Gessford indicates that "it should not be confused with strategic planning, that is defining what is meant by 'best' in the phrase 'best use of its resources'" [4, p. 458].

The planning process is expedited and improved by the planning systems. Functional areas such as marketing, finance, logistics, and product management, have planning needs that planning systems must concentrate upon.

The planning system, has integrated into it, data systems for planning. The data systems provide and are concerned with data that is useful to planners, but not necessarily data that defines the plan.

Plans and policies that govern the pricing, credit management, direct sales activities, indirect sales activities, and product availability standards are updated periodically by marketing planning. Because of the need for massive amounts of marketing data and the capability to take into account uncertainties, data systems can be of great help in this planning. The use of computing systems satisfies systematic analysis of alternatives.

Gessford describes three types of logistics planning problems:

1. Global allocations.
2. Local planning.
3. Project planning [4, p. 460].

Data systems can play many roles in supporting the analysis of the various problems; and the above three types have many variants within them. Pure data management systems are important to logistics planners, however, computing systems are also commonly involved.

5.5.2 Strategic Planning in MIS

Opportunities and threats that face a business are the responsibility of management. Gessford includes the following:

1. Internal improvements.
2. External markets.
3. Technological developments [4, p. 479].

Gessford lists six sources of strategic information:

1. Personal observation and conversation.
2. News services and internal reports.
3. Intelligance system data.
4. Long-range planning systems.
5. Special reports based on retrieval of data from the database.

6. Computing systems designed to study strategic questions [4, p. 479].

In order to extend this individual manager's ability to communicate with others, several types of teleprocessing systems exist. In addition to the telephone, Gessford lists the following:

1. Videophone.
2. Electronic message systems linking automated offices.
3. Management control room linked to a computer center [4, p. 479].

Topics that are of particular interest to a certain manager can be identified by a document screening system. Without having to look through every book, journal, newspaper, and internal report, the manager can keep abreast of new developments by using the document screening system.

Strategic information can sometimes be conveyed by exception reporting systems. When the result of a plan is based on an incorrect concept of the problem or alternatives available, a deviation from the plan occurs, thus triggering the exception reporting systems.

For intelligence work, data management systems are most useful. The linking of data from diverse sources that are concerned with the same subject, is one of the jobs of a data management system. The documents that relate to a particular topic can be located quickly by creating secondary keys in an index file that contains a record occurrence for each document in an intelligence file.

Through the use of data management and computing systems, the corporate long-range planning can be made less troublesome and time consuming. Upper level staff work can be reduced by data management and computing systems, while lower level planning can be aided through the use of corporate modeling systems.

A wealth of information is usually contained in the corporate database. However, the mass of data usually hides it. Facts of strategic importance, can usually be revealed by special retrievals from, and manipulations of this data. Strategic information can be produced by computing systems in several ways. Gessford lists three ways below:

1. Problem dialogue models.
2. Statistical analysis of data.
3. Designing models to answer "What if?" questions [4, p. 480].

Designing and using models to analyze strategic questions is a general approach of decision analysis. Gessford indicates that it is a three-phase process; "the first phase is similar to the type of investment analyses that accountants have performed for many years" [4, p. 480]. The capacity to perform comprehensive sensitivity analyses is developed by computerizing phase one. Identification of uncertainties that are of crucial importance are also accomplished by phase one. The second and third phases of decision analysis contains the methodology for rationally taking the uncertainties into account.

5.6 Information Systems -- Why Do They Fail?

Organizations have developed a large number of computer-based Information Systems during the past decade. Many of these systems must be classified as failures unfortunately. Some systems continue to operate though no one uses their output; while others have been withdrawn because they have proved unworkable.

Henry C. Lucas, Jr. in his book, Why Information Systems-Fail, presents a descriptive model of Information Systems in the context of

the organization and tests the model with empirical data from six studies [7, p. vii]. Conducted by Lucas, these studies involved over 200 users in 16 organizations.

5.6.1 A Descriptive Model for Information Systems

In the context of the organization which focuses on organizational behavior variables, Lucas presents a descriptive model of Information Systems. The reason why so many systems have failed is the fact that many of these variables have been ignored in the design and operation of Information Systems. To predict the impact of Information Systems on users and the organization, the results of testing the model with empirical data will make it possible to use the descriptive model. When designing the operating Information Systems, the predictive model will suggest ways to solve organizational behavior problems. Also, when planning and managing Information Systems activities, a valid model would be most helpful to a specific organization.

5.6.2 Testing the Propositions of the Descriptive Model

In this part of Lucas's book, he discussed "the specific operational variables" in six studies which he used to provide empirical support for the descriptive model [7, p. 52]. Well over 2000 users of Information Systems in field and laboratory settings, were represented during four years of research.

Certain studies provided evidence only on particular propositions; while not all of the studies furnished data on all parts of the model. Lucas would have preferred "to have each study test all propo-

sitions in the model" [7, p. 52]. As the model and research evolved over time, a number of new variables were added. The nature of the study also made it impossible to include all variables in certain situations. Lucas states an example where all variables were not able to be included: "For example, in the fourth study, the sales force has almost no contact with the information services department, and it would not have been meaningful to measure the sales representatives' attitudes toward the information services department staff" [7, p. 52].

5.6.3 User Attitudes and Perceptions of Information Services Staff and Systems

Lucas now examines six propositions of his model:

1. Proposition 1 -- The data provided some support for the contention that the systems designed and operation policies of the information services department influence the quality of Information Systems.
2. Proposition 2 -- Information Services department design and operation policies are associated with user attitudes.
3. Proposition 3 -- Concerned user contact with the information services staff and received only weak support from the studies.
4. Proposition 4 -- User involvement in the design and operation of Information Systems was positively associated with computer potential, but not attitudes toward the Information Services staff.
5. Proposition 5 -- High quality systems are associated with favorable user attitudes and perceptions of Information Systems and the Information Systems staff.
6. Proposition 6 -- Relates to management support [7, p. 67].

Of major importance, were two findings by Lucas:

1. The various user-oriented policies of the Information Systems department for systems design and operations are associated with favorable user attitudes and perceptions of systems.
2. The technical quality of systems is also positively related to favorable user attitude and perceptions of Information Systems [7, p. 68].

If Information Systems are to succeed, user attitudes and perceptions must be favorable, making the two relationships above important.

5.6.4 Use of Information Systems by the Decision Maker

In this section, Lucas discussed the factors affecting the use of information and the likelihood of taking action, from dealing with the descriptive model. The following results are summarized below:

1. Proposition 7 -- Favorable user attitude and perceptions of Information Systems and the information services staff lead to high levels of use of an Information System.
2. Proposition 8 -- Individuals with differing decision styles have differing levels of use of Information Systems, perform different analyses of data, and take different actions based on information.
3. Proposition 9 -- Different situational and personal factors lead to differing levels of use of an Information System and actions.
4. Proposition 10 -- High levels of system use result from a system with high technical quality.
5. Proposition 11 -- High levels of use of an Information System make it more likely that a user will take action based on the information provided [7, p. 87].

Favorable user attitudes, perceptions, and high technical systems quality are associated with high levels of use of an Information System, thus making these very important findings according to Lucas. A system must be used, to be a success. In addition, Lucas indicates that in order to design successful systems, an understanding of the factors associated with high levels must be obtained first.

5.6.5 The Descriptive Model of Information Systems

In this section, Lucas was concerned with the propositions relating to user performance. a summary of the propositions are shown below:

1. Proposition 12 -- Individuals with differing decision styles having differing levels of performance.
2. Proposition 13 -- Different situational and personal factors lead to differing levels of performance.
3. Prpositions 14 -- Low performance stimulates the use of problem-finding information produced by an Information System.
4. Proposition 15 -- The use of problem-solving Information System leads to high levels of performance if the user takes action consistent with the information.
5. Proposition 16 -- For irrelevent information, low levels of use of an Information System lead to high performance [7, p. 102].

The classification of information into problem-finding and problem-solving categories are supported by the above propositions, thus having very important implications for systems design. Therefore, if a system is to be successful, the relevant information for the problems faced by the user must be provided.

5.6.6 Successful Information Systems

A descriptive model of Information Systems was developed by Lucas, by testing the model with data from six studies, in the context of the organization. Highly consistent with the predictions of the model, is the data from these studies. The results from these studies has helped Lucas understand why so many Information Systems have failed. Lucas indicates that crucial organizational behavior problems have been ignored, and that two much concentration has been on technology.

Information Systems exist within the context of an organization according to the model and findings. Three major groups in the organization must cooperate, in order to design and operate successful Information Systems:

1. Management.
2. Users.
3. Information services department [7, p. 116].

The above groups need to consider the organizational and technical variable that Lucas has discussed. A tremendous potential for users and for the organization. is the development of an Information System. Lucas states that "Our challenge is to understand why Information Systems fail so that we can develop and operate successful systems [7, p. 116]."

5.7 Planning, Developing, and Managing Management Information Systems

Arnold O. Putnam has written a book titled: Management Information Systems: Planning, Developing, Managing where he discusses the success of Management Information Systems covering:

1. The management requirements from the Chief Executive to the Systems Programmer.
2. The time period from predesign though development, installation, and operation, on to future considerations [10, p. 1].

5.7.1 Executive Preparation for MIS

Putnam indicates that over the past four years, five items of major significance have evolved to successfully develop a computer Information System:

1. The importance of a Steering Committee task force in integrating the organization, achieving user involvement and integrating different disciplines.
2. The importance of database files in eliminating both file and program duplication and proliferation.
3. Understanding the significant use of the "main business system."
4. The necessity of data auditing and data improvement.

5. The tremendous need for a Master Plan of implementation, spelling out resources (men and materials) and time-tables. The emphasis in these plans is on aiding more profitable operations [10, pp. 37-38].

The best people available are needed for the task force, because it is very important. In order to gain user participation in the detailed development and implementation of the system, the successful Organizational Development techniques must be used.

The program is successful, when one participates in a program that management deems important: This is based upon the old Hawthorne experiments years ago, that are still valid and important today. Furthermore, top management contributes to a failure syndrome, when they delegate responsibility for EDP systems because they are too technical.

5.7.2 System Design

Putnam indicates that four critical major items have emerged in recent years to successfully develop a computer Information System:

1. The tremendous need for a Master Plan of implementation, spelling out resources (personnal and materials) and time-tables.
2. The importance of "data base files" in eliminating both file and program duplication and proliferation.
3. The importance of the Task Force in integrating the organization and resolving different disciplines.
4. The necessity of data auditing and data improvement [10, p. 70].

5.7.3 System Implementation

The payoff is system implementation (MIS system). If the system cannot be operational, all of the time and investment up to this point will be wasted. Some systems never do replace the existing

one, and may run in parallel for years. A new system may perform less adequately then the old, while other systems are replaced.

"The points made in" Putnam's book "aren't a cure-all, but they can go a long way towards helping when followed" [10, p. 122].

5.8 Risk Analyses, Risk Factors, and Strategies

Steven L. Alter's book: Decision Support Systems: Current Practices and Continuing Challenges, "provides a conceptual introduction to the idea of risk factors and implementation risk analysis" [2, p. 155]. Furthermore, he "presents empirical data about the types of situations in which each of eight risk factors had a significant impact." In addition, Alter observes and discusses 16 implementation strategies that were used. The use of implementation risk analysis as a way to organize and present a great deal of information about implementation situations, is the whole purpose of this part of Alter's book.

5.8.1 Risk Analysis Implementation

Alter suggests that an implementation of risk analysis "be performed in addition to a cost/benefit analysis" [2, p. 181]. It is possible to develop a formal procedure for anticipating and avoiding some of the problems that may arise in implementation, just as it is possible to employ the formal procedure of estimating the costs and benefits resulting from proposed projects. Alter views this "as a two-stage process." The identification of those implementation risk factors that tend to increase the likelihood of implementation diffi-

culties in the situation at hand, is the first stage. By comparing the existing situation with what would be the ideal implementation situation, the risk factors become known. Furthermore, the identification of and choice among potential strategies, either for reducing risk factors themselves or minimizing their manifestations, is what is known as the second stage. Postponement or cancellation of the project should be considered, if the second stage yields no really good strategies for overcoming key risk factors. It is quite likely that other observers studying other systems would find some risk factors and strategies that were omitted by Alter or would choose different conceptualizations for those that were found, even though there was much generality in the risk factors and strategies cited by him earlier. In order to avoid implementation difficulties, implementation risk analysis could constitute a feasible and worthwhile procedure. "The particular risk factors and strategies mentioned" by Alter "should be viewed only as a starting point, which can be expanded or modified on the basis of the implementation experience and special circumstances of any company in which this sort of analysis would be used."

5.8.2 Application of Risk Analysis Implementation

The underlying notion of an "ideal implementation situation" will lead directly to an intriguing dilemma for management, in an application of implementation *risk analysis* [2, p. 181]. Alter's sample of truly innovative systems "were precisely those that would have been judged quite risky by a risk analysis prior to implementation." As evidenced by a higher rate of implementation difficulties

and a lower rate of success than for the systems adhering more closely to the ideal situation, the innovative systems were quite risky. The dilemma seen here by Alter is analogous to the risk as return decision with regard to stock portifolios. Most of the systems actually authorized will be those that start close to the ideal situation: small, user-initiated, efficiency-oriented projects that automate an existing, well-understood function and involve little or no research and little change in the way things are accomplished. In an attempt to produce fundamental improvements in decision making, organizational control, and planning methods, the projects avoided will be those that are initiated by management or by internal entrepreneurs. A model must now be used to anticipate implementation difficulties and in trying to develop strategies that increase the likelihood of success. Therefore, this model may well lend to a sort of conscious mixed strategy. Thus, all system development efforts undertaken cannot necessarily be characterized, even though an ideal implementation situation can.

5.8.3 Risk Analysis Implementation Success

Implementation success cannot be guaranteed by implementation risk analysis. "In many cases, most of the ideas it highlights might have been considered anyway" [2, p. 182]. Also, in the anticipation that stumbling blocks may arise, it serves as an organized disciplined approach. So, it is likely that implementers using this kind of analysis would have been far more attentive to risk factors that came back to haunt them, even though there is no way to prove that the more

tortuous implementations in the sample would have been facilitated by this type of analysis.

5.9 Business Systems Planning Through Data Base Planning

The methodology of Business Systems Planning has been developed by many companies. Many computer vendors have supported their clients by such methods (IBM supports its clients through Business Systems Planning).

5.9.1 Integrating Business Plans With Systems Plans

In order to generate priorities, schedules and resources required for major systems development efforts, business plans and systems plans must be integrated. The lack of a data model of the corporation, is one serious omission, leading ultimately to operating discrepancies.

Dr. Robert H. Holland, in his article "Data Base Planning Entails Return to Basics," indicates that the lack of a data model will ultimately lead to the following:

1. Ill-defined systems projects.
2. Fuzzy thinking about data base planning.
3. Sets of independent data bases which cannot possibly be integrated.
4. Continuous restructuring of data base and application programs.
5. Isolated applications which cannot be easily combined with others within a reasonable development horizon [14, pp. 1-2].

Money is being thrown away by companies that do not superimpose a data model of the company over their systems plan.

A subject data base plan for the corporation must be provided. Due to a lack of data planning, many "war stories" about failures in data base exist in industry.

A data model which must be fully integrated with the system planning process, is required by data planning. In this model, the business systems plan is fed by the business plan, where requirements for the data base plan are developed.

The activities which occur under the process and supporting entities for the activities based on the business functions, are developed by a description of each of the business processes.

"Industry experience has shown that most companies define approximately 25 major systems projects from their BSP effort" [14, p. 2]. The companies normally settle on half of the 25 systems for concurrent project team development, after determining that the resources are not available. This is a mistake according to Holland. Three or four systems development efforts should be underway at any point in time by the majority of companies.

The establishment of entities necessary to support business activities and processes, is accomplished through the creation of a data model. Therefore, once the strategic planning is complete, both systems projects and the data model are passed to the actual systems development process.

5.9.2 Data Base Performance and Stability

Stronger than ever is the need for data base stability. "In achieving stability", Holland wants "to insure that a change in a

subset of business activities does not wildly affect subject data base implementations." Holland also wants "to add new applications and change old applications as business needs arise without having to restructure, reorganize and reload data bases" [15, p. 6]. Finally, an important growth in data base technology will take place during the rest of this decade. The corporation of the 1980's must establish normalized subject data bases as well as an organization for managing data resources, in order to avoid technology lock-out. Companies are going to have to plan, control, and operate in an integrated data base environment.

5.9.3 Developing the Data Base Management Systems Through the View of the User

Understanding the user application well enough to translate it into the access method available from one or more selected data base management system (DBMS) of the company, is the traditional approach to data base design in many corporations. In this process, quite a lot of attention is paid to the DBMS implementation of the user's application, and little to the end user.

Holland focuses on providing a set of rules for successfully developing user views. The following rules may be used by corporations to establish stable data structures:

1. Do not draw complex user views.
2. Use standard forms and methodology for gathering user views.
3. Make sure that concatenated keys are drown properly.
4. Make sure that attributes identified by a concatenated key are dependent upon the whole key.
5. Do not include hidden primary keys in user views.
6. Investigate user views for possible secondary keys before implementations [16, pp. 141-144].

5.9.4 DBMS -- Why has it failed?

Data Base Management Systems have yet to live up to the promises of their promoters, even though they came on the scene more than eight years ago. Holland states that DBMS was supposed to:

1. Remove data redundancy.
2. Ensure data integrity.
3. Present data in a timely fashion.
4. Provide integrated data structures.
5. Offer independence between program and data [17, pp. 1,27,30,45,48].

There have been many failures in the implementation of DBMS, even though a few corporations have succeeded. The degree of emphasis placed on properly structuring the data within Information Systems, is what contributes most to the failure -- or success -- of DBMS.

Because of such pitfalls as:

1. Lack of data integrity,
2. Program dependence on data,
3. Data voids,
4. Data reduncancy [17, p. 27],

in many installations, DBMS provides no better operation and productivity than their predecessor file management systems.

Since file management systems were in vogue (in fashion), corporations have not updated their design techniques and organization methodologies, even though they use state-of-the-art DBMS. Therefore, the modernization and upgrading of a corporation's approach to data analysis, and the use of DBMS, is an essential goal for organizations.

5.9.5 Planning for Tomorrow's Information Systems

In the planning of tomorrow's Information Systems, two primary thrusts exist:

1. Communications and computer networking.
2. Data Base technology [18, p. 1].

Over the last decade, Holland has witnessed a number of significant technological changes in both network and data base development. "Network technology has moved from asynchronous communication to today's state-of-the-art packet switching" [18, p. 1].

The development of approximately 50 data base management systems (DBMS) which utilize hierarchical, network, and the state-of-the-art relational data models, has been seen by data base technology. Over the next decade, corporations can be sure that other new developments in networking and data base will occur.

Finally, the following road map should be used as a planning and design guide for corporations to be successful in systems development efforts over the next decade according to Holland:

1. Define future business plans.
2. Determine a business systems plan to support the business plan.
3. Develop a subject data base plan to support the business systems plan.
4. Implement a systems organization which includes user involvement on a project basis.
5. Utilize a standard methodology to ensure that all systems projects funnel through the same data administration function.
6. Make sure that all data is in the most stable form possible through normalization processes and stability analysis.
7. Evaluate data base and business performance requirements in order to establish the communications network required for operation.
8. Invoke a standard design process that includes dependable communication and feedback mechanisms between end user and systems personnel.
9. Separate the logical design of a system from its physical implementation technology [18, p. 1].

5.10 Summary

Without adequate planning, measurement, and control in the

information systems functions, the development and implementation of the information architecture cannot be accomplished. Also, to recommend immediate changes and to specify MIS activities that are part of the follow-on projects a review of the MIS function must be conducted.

The management of I/S resources for the most efficient and effective support of the business is the purpose of MIS.

MIS changes are developed through three channels:

1. I/S objectives.
2. Information architecture.
3. Problem analysis.

Outputs that result from the BSP study are summarized below:

1. Findings and conclusions.
2. I/S objectives.
3. Definition of high-priority MIS projects.
4. Action plan for follow-on projects.

An Information System can and should be managed by the same basic principles as any other business unit. Furthermore, the establishment of a management system for the organization, is the starting point for effective management.

By setting the objectives within the overall objectives of the company it serves, and by constantly seeking the real business opportunities, is the only way that the I/S business can become effective. Also, unless I/S personnel submit themselves to the same disciplined working methods as people do elsewhere in the business community, control in the I/S business will not be possible.

In order to determine when to start the actual implementation, the MIS architecture allows an understanding of the total management

system. Furthermore, in order to allow the I/S business to work, the management systems planning process is concerned with plans to manage I/S.

The key to successful I/S management, is keeping the management system effective and efficient. Also, Management Systems Monitoring initiates corrective action for variances to the planned management system; and, serves as a self-correcting mechanism for the management system.

Three types of activity are distinquished for Decision Support of Management Information Systems:

1. Supervision.
2. Goal Setting.
3. Planning.

The steering of the organization toward the best use of its resources, is the production plans that can be used by Management. Therefore, the planning process is expedited and improved by the planning system. Also, the planning system, has integrated into it, data systems for planning.

Gessford describes three types of logistics planning problems:

1. Global allocations.
2. Local Planning.
3. Project planning.

Opportunities and threats that face a business are the responsibility of management. Gessford includes the following:

1. Internal improvements.
2. External markets.
3. Technological developments.

Organizations have developed a large number of computer based information systems during the past decade. However, many of these systems have been classified as failures.

In the context of the organization which focuses on organizational behavior variables, Lucas presents a descriptive model of Information Systems. However, certain studies only provided evidence on particular propositions; while not all of the studies furnished data on all parts of the model.

Putnam, on the other hand is concerned with directing the MIS system itself, and directing the overall business operations. In the chapters on Design and Implementation, many of his case examples were from the production and inventory -- control field. Putman's book should lead to the development of a management check list. Looking toward the future, managers should begin to deal with the computer applications in the physical production areas as well.

Nevertheless, Alter provides a conceptual introduction to the idea of risk factors and implementation of risk analysis in his book. He suggests that an implementation risk analysis be performed in addition to a cost/benefit analysis. Furthermore, Alter's sample of truly innovative systems were precisely those that would have been judged quite risky by a risk analysis prior to implementation. Therefore, implementation success cannot be guaranteed by implementation risk analysis.

Finally, the methodology of Business Systems Planning has been developed by many companies. So, in order to generate priorities, schedules and resources required for major systems development efforts, business plans and systems plans must be integrated. Therefore, stronger than ever is the need for database stability. Furthermore, understanding the user application well enough to translate it into the access method made available from one or more selected data

base management systems (DBMS) of the company, is the traditional approach to data base design in many corporations. However, data base management systems have yet to line up to the promises of their promoters, even though they came on the scene more than eight years ago. Even so, in the planning of tomorrow's information systems, two primary trusts exist:

1. Communications and computer network.
2. Data base technology.

Chapter 6

THE DATA DICTIONARY

The primary tool of data administration in managing the data inventory is the data dictionary. As defined by data policy, data administration begins to create the data dictionary by discussing with the creator of data, how the data should be described in terms of data elements, and then developing the standards and procedures to be followed by the other users. The above is then documented into a data dictionary (which provides the guidance on how data should be used, who is allowed to use it, and how much is available) [41, p. 1].

6.1 Use of the Data Dictionary in BSP

In order to generate the Information Systems architecture and the associated matrices (process/data class, process/organization, etc.), large amounts of the data have to be generated (from the BSP methodology) which require manipulation and analysis.

The use of a data-base-oriented, computer assisted tool has the following potential benefits in supporting the above tasks:

1. The storage of large quantities of data and making the manipulation/analysis of complex relationships more - manageable, is made possible through the vast power of the computer. IBM feels that this "could potentially improve the quality of a study and/or reduce the duration of a study by allowing the study team to concentrate on the analysis of problems."

2. The data base approach requires the storage of only one occurrence of each piece of data, even though the gathered BSP data are interrelated. IBM indicates that this "helps to maintain the consistency of analysis data and reduces possible redundancy and errors."
3. The bridge between the end of a BSP study and subsequent data management and other information resource management activities, is known as a data base approach. This, IBM says, is where "the BSP data base can be used to identify implementation systems, support the system design and data modeling activities and generate test plans to help ensure that the systems developed do indeed satisfy the requirements."
4. On-going BSP-like studies are facilitated by the data base approach. According to IBM, "the plan that results from a BSP study represents the best thinking at a certain point in time" [39, p. 158].

The data base is updated with only incremental changes, as the business situations and associated information requirements change. Availability and analysis of information requirements can be made quickly in the changed environment.

Release 3 of the IBM Data Dictionary [47] offers facilities which can perform the tasks that have been listed above. By supporting the activities in the entire spectrum from the BSP study, data base administration, systems design, development and maintenance, the IBM Data Dictionary [42] offers an integrated approach to data resources management.

6.2 An Approach in Using Release 3 of IBM'S Data Dictionary to Support BSP

J. Gene Sakamoto's paper [27] discusses an approach in which Release 3 of IBM's Data Dictionary is used as a tool to support BSP studies. Sakamoto identifies and discusses:

1. Data Dictionary subject categories.
2. Attributes and relationships for the BSP study data.
3. Inquiry and analysis reports.
4. Operational issues [27, p. 3].

Sakamoto believes "that there are potential benefits to be gained by the use of a data base-oriented, computer-assisted tool in supporting" the following tasks of data gathering during the course of the BSP studies that are currently performed manually [5, p. 104]:

1. Organizing.
2. Storing.
3. Manipulating.
4. Retrieving.
5. Analyzing [27, p. 1].

According to Sakamoto, such a tool needs to have minimally:

1. A facility for describing various information-related enterprise phenomena, such as relationships between organizational units, business functions and information being created and used; and storing them in a database in computer-processable form.
2. A facility for adding, deleting and changing such descriptive data in the database.
3. A facility for inquiry and analysis of study data in the database [27, p. 2].

6.3 The Data Dictionary, What is it?

Sakamoto defines the Data Dictionary as

> a central collection of descriptive information about data resources and their relationships.

However, Cheryl Estep's paper [26], DB/DC Data Dictionary: A Business Systems Planning Model, defines the Data Dictionary as

> A central repository for storing data about data and data relationships [26, p. 2].

Such things as formats and characteristics of data, where they are stored and how they are used, are types of information that are maintained in the dictionary. A set of computer-based facilities that

describes this information and enters them in the database where they are modified and reported, are provided by the Dictionary.

Subjects, attributes, and the relationships with other subjects, describe what is known as data resources. Sakamoto illustrates this concept with some examples from the BSP Information Systems Planning Guide [39]. The data creation and usage relationship between the processes and data classes is shown in Figure 6.1 (p. 134). The subjects in the dictionary terminology are the row and column names of the matrix such as "customer", "sales territory", and "order".

The subject categories are where the subjects are grouped into. "DATA CLASS" and "PROCESS" are subjects that belong to a subject category.

By establishing the relationship names between the subject categories, the relationships between the subjects are then describable. In Sakamoto's example, USES and CREATES (USED by and CREATED by) are the relationship names between "PROCESS" and "DATA CLASS" categories.

Sakamoto now describes the relationships between the individual subjects in the categories, having established the relationships between the subject categories.

The information that is needed to describe the properties or characteristics of the subjects are the attributes of the subjects. As an example, Sakamoto can describe the locations of the performance of the various "PROCESSES" and the establishment of the LOCATION attribute.

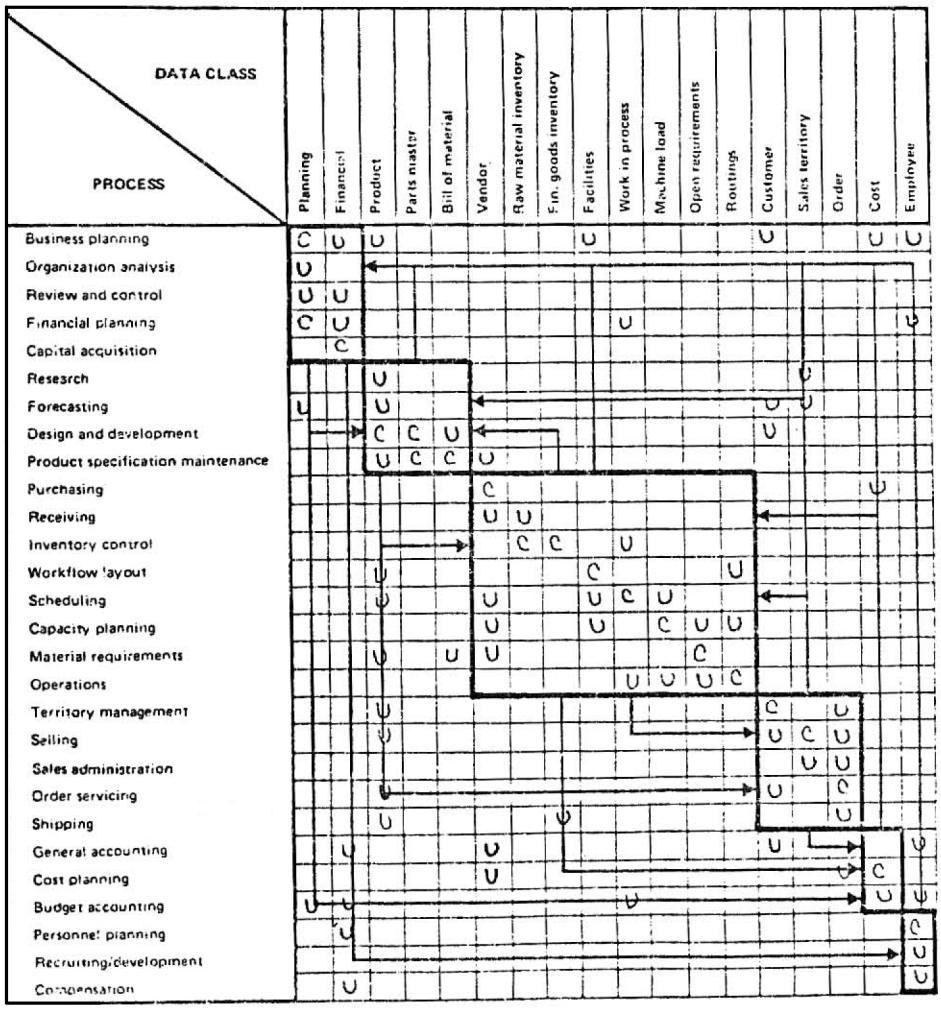


Figure 6.1

Data Flow
[39, p. 73]

To analyze the data class and process relationships in order to determine the information architecture (see Figure 6.2, p. 136), the attribute description is not necessary.

Eleven pre-defined subject categories are included in the Data Dictionary. The units of data within a data base system and the components of the computer programs that use the data are described by the eleven subject categories. The following are some examples:

1. DATABASE.
2. SEGMENT.
3. ELEMENT.
4. PROGRAM.
5. MODULE.
6. TRANSACTION.

Release 3 [47] has made the Dictionary a very attractive tool for supporting the BSP studies by the introduction of the following two major facilities:

1. Program Access Facility.
2. Extensibility Facility [27, p. 6].

The facility that allows an installation to define up to 200 new subject categories plus any associated attributes and relationships, in addition to those supplied by the program product, is the extensibility facility of the Dictionary. The creation of new subject categories to describe the following BSP data, can be accomplished by the use of the Extensibility Facility:

1. Organizational units.
2. Business functions.
3. Data classes being created and used.
4. Current I/S support and informational problems being experienced [27, p. 6].

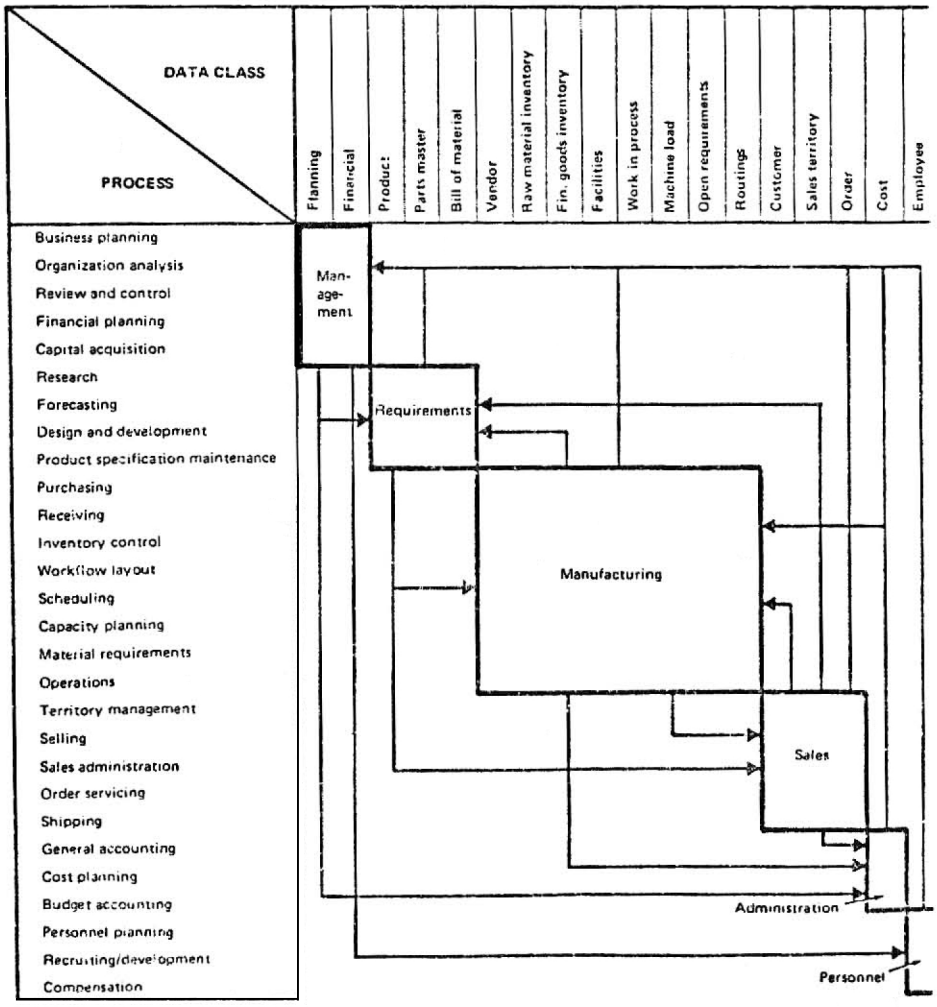


Figure 6.2

Information Architecture
[39, p. 74]

Using the descriptive information stored in the data base, the Program Access Facility (PAF) allows an installation to write various analysis programs. Sakamoto indicates that programs can be written to manipulate data any way one wants and produce reports in desired formats. Producing a report in the Process/Data matrix format such as the one shown in Figure 6.1 (p. 134), can be accomplished by a data flow analysis program, which is an example of a PAF program.

6.4 The Data Dictionary, Why Consider It?

Estep considers the reasons and needs of a Data Dictionary as expressed in the following:

1. To Improve Data Availability.
   a. Online collection of data.
   b. Online retrieval of data.
   c. Concurrent access.
   d. Sharable.
2. To Formalize the Definition Process.
   a. Disipline.
   b. Standards.
   c. Control
3. To improve communication through shared data.
4. To allow for automated analysis [26, p. 14].

A. H. Cassidy's paper, DB/DC Data Dictionary at Canadian Tire: Organization and Usage [25, p. 1], stresses the need to install a dictionary because such a tool is an essential part of the DBA role. The installation would be impossible to control, even Canadian Tire does things (even negatively) without the dictionary.

6.5 BSP Subject Categories, Attributes, and Relationships

The Dictionary subject categories, attributes, and relation-

ships, identify the BSP data. Sakamoto has identified 10 subject categories, 18 relationships, and 7 attributes, based upon the data in the BSP guide [39]. He refers to them as the "BSP Data Model." To best reflect the study teams purpose and emphasis in the study, Sakamoto regards this BSP Data Model as a "starter" model and encourages each team to add, delete or modify certain subject categories.

Appendix O (of the questionnaire) shows the BSP Data Model. The arrows indicate the relationships between the subject categories, and the rectangles indicate the subject categories. Each complement relationship name is shown with its relationship name.

Sakamoto describes each of the subject categories of the BSP data model in the following order (see Appendix O of the questionnaire):

1. Objective - Objective subject category.
2. Orgnzin - Organization subject category.
3. Process - Process subject category.
4. Dataclss - Data class subject category.
5. Problem - Problem subject category.
6. Solution - Solution subject category.
7. Systems - Computer system subject category.
8. Major-sa - Major systems area subject category.
9. Datafile - Data file subject category.
10. Memo - Memo subject category [27, p. 7].

The following subject categories are explained and outlined below by Sakamoto:

I. OBJECTIVE SUBJECT CATEGORY (OBJECTIVE).
   A. It is used to describe the goals and objectives of the business and its organizational units.

II. ORGANIZATION SUBJECT CATEGORY (ORGNZIN).
   A. It is used to describe the various organizational units of the business.
      1. The ACHIEVES relationship to the OBJECTIVE subjects relates the organizational unit to its objectives and goals.
      2. PART_OF and SUBPARTS_ARE used to describe the hierarchical relationships of the organizational units.

3. The PERFORM relationship to the PROCESS subjects relates the organizational units to the business processes.
   a. An Organization/Process matrix (see Appendix A, of the questionnaire) can now be generated by the above outline.
4. The EXPERIENCING relationship to the PROBLEM subject relates the organizational units to the various problems it is experiencing.
5. The CAUSES relationship to the PROBLEM subjects describes the interviewee's perception as to which organizational unit is causing the problem.
6. The RSPNSBLE_FOR relationship to the data (DATACLSS) subjects indicates that the organizational unit is responsible for certain data classes.

III. PROCESS SUBJECT CATEGORY (PROCESS).

A. This category describes the business processes identified by the activities outlined in the "Review of the Business Processes" section of this thesis (see p. 51).
   1. The PERFORMED_BY relationship is the complement of the PERFORMS relationship discussed in the ORGNZIN sections.
   2. The SUPPORTS relationship identifies the business objectives (OBJECTIVE) which are specifically supported by the PROCESS.
   3. The concept of the PART_OF and SUBPARTS_ARE relationships is identical to that for the organizational subjects and describes the hierarchical structure of the processes.
   4. The IMPACTED_BY relationship to the PROBLEM subjects indicates how critically a process is affected by the informational problem.
   5. The SUPPORTED_BY relationship to the SYSTEMS subjects indicates the automated support for the process.
      a. The above examples are expressed in Appendix F (of the questionnaire) of the System/Process matrix.
   6. The INCLUDED_IN relationship to the MAJOR_SA (major systems area) subjects describes a part of the information architecture (see Figure 6.2, p. 136) in which the support for the process is considered.
   7. The USES and CREATES relationships to the DATACLSS (data class) subjects describe the data usage and data creation by the process.

IV. DATA CLASS SUBJECT CATEGORY (DATACLSS).

A. This category describes those data classes identified by the activities outlined in the "Describing Data Classes", section of the thesis (see p. 62).
   1. The PART_OF and SUBPARTS_ARE relationships are used to describe the hierarchical structure of the data class.
   2. The INVOLVED_IN relationship with the PROBLEM subjects indicates that the data class is involved in the informational problem(s) being experienced by the organizational unit(s).

3. The INCLUDED_IN relationship with the MAJOR_SA (major systems area) subjects is similar to the PROCESS's INCLUDED_IN relationship with the MAJOR_SA.
4. The CONTAINED_IN relationship to the DATAFILE (datafile) subjects describes where the data is maintained.

V. PROBLEM SUBJECT CATEGORY (PROBLEM).
   A. This category describes the problems being discovered in the course of the interviews.
      1. The CAUSED_BY relationship indicates which organizational unit(s) may be causing the problem.
      2. The RESOLVED_BY relationship it has with the SOLUTION subjects documents any suggestion or opinion expressed by the interviewees regarding their perception of possible solutions to the problem.
      3. The INVOLVES relationship to the SYSTEMS subject identifies the problem area(s) in the automated support of the business processes.
      4. The DATE attribute indicates the date the problem is identified.

VI. SOLUTION SUBJECT CATEGORY (SOLUTION).
   A. This category describes all the possible solutions for the problems.
      1. The NEEDS relationship to the SYSTEMS subject describes the I/S needs expressed by the interviewees.

VII. COMPUTER SYSTEM SUBJECT CATEGORY (SYSTEMS).
   A. This category is used to describe the computer systems for the automated support of the business processes.
      1. The USES relationship shows the data file usage by the system.
      2. The PART_OF and SUBPARTS_ARE relationships describe the hierarchical structure inherent in most of the computer systems.
      3. The NUMBER attribute simply assigns a number to the system for identification purposes.
         a. This attribute was included to facilitate the generation of the matrix report as shown in Appendix D (of the questionnaire) "Organization/Process Matrix with current systems support."

VIII. MAJOR SYSTEM'S AREA SUBJECT CATEGORY (MAJOR-SA).
   A. This category describes the major systems areas of the information architecture such as the one shown in Figure 6.2 (p. 136).
      1. The INCLUDES relationship to both the PROCESS and DATACLSS subjects indicate the business processes supported and data classes created and used.
      2. The SUB_SYS_ARE relationship to the SYSTEMS subjects describes the existing and/or proposed systems that fall under the major systems areas of the information architecture.
      3. The USES_O_FROM (uses output from) and PRDUCS_O_FOR (produces output for) describe the information flow among the major systems areas.

IX. DATA FILE SUBJECT CATEGORY (DATAFILE).
   A. This category describes the "containers" of data which maybe automated as databases or manually maintained file drawers.
X. MEMO SUBJECT CATEGORY (MEMO).
   A. This category is used as notes or reminders for the BSP study team members.
      1. The MEMO APPLIES_TO all the other subjects [27, p. 15].

6.6 BSP Data Dictionary Facilities

The following Data Dictionary facilities to support Business Systems Planning are required by Estep in her approach:

1. Definition of categories and their attributes.
2. Definition of relationships and their attributes.
3. Interactive display forms for input, update, and retrieval.
4. Batch reports for analysis.
5. "Customized" Program Access Facility programs for analysis, and matrix reports [26, p. 16].

6.7 BSP Data Model Installation

The techniques and procedures that are presented in the BSP Guide [39], helped to define the ten BSP subject categories and associated attributes and relationships discussed in Sakamoto's paper [27]. Sakamoto thinks that each study team should be encouraged to review and evaluate these subject categories in light of its own situation and the areas of emphasis, even though the categories, should adequately describe the BSP data.

Sakamoto now defines the BSP Data Model to the Dictionary, using the Extensibility Facility, after having decided on the model, in terms of the subject categories, their attributes and relation-

ships. It is well to remember that the pre-defined subject categories such as DATABASE and SEGMENT come with the Dictionary.

According to Sakamoto, the above task is often referred to as "the installation of user-defined data definitions in the dictionary." He recommends that a Data Base Administrator (DBS), or a Systems Programmer with a working knowledge of the Dictionary perform the task of installation.

Various characteristics of the BSP data model can be defined as:

1. Maximum length and allowable characters for the subject names.
2. Allowable values of the attributes [27, p. 16].

User written validation routines, make possible a more elaborate validation of input BSP data. However, Sakamoto feels that the Dictionary provides a standard validation facility, which is quite adequate.

A GUIDE report should be generated, following successful installation of the BSP data model in the Dictionary. With all the BSP subject categories, relationships, attributes and their characteristics, the GUIDE report should serve as a "user manual."

6.8 Analysis and Inquiry Reports

Presentation of the BSP data stored in the Dictionary data base should be presented in the form most convenient for the BSP study team members to enable them to retrieve, analyze, and manipulate data.

The SCAN and REPORT commands are provided in the Dictionary [43]. For a specified character string or strings, the SCAN command

searches subject names, relationships or descriptions in a designated subject category.

Selected entries with various levels of detail are produced in a report by the REPORT command. The REPORT command can also produce a glossary report: a group of summary reports on a set of subjects in the data base. A glossary report (Global Keyword Glossary) will be discussed in more detail below.

Sakamoto feels that for specialized inquiry and analysis reports, necessary programs, using the Program Access Facility (PAF) of the Dictionary should be written.

6.9 Developing a Global Keyword Glossary

This is really just an obvious extension of the need to standardize names within an organization. The Global Keyword Glossary can help in achieving this goal. It is only one possible approach, but has proved successful in different situations.

In order to create a glossary suitable to a corporate environment, it is advisable to perform a BSP study first. When this has been done, an existing glossary can be tailored to the environment. Finally, using this glossary, global naming techniques can be utilized to create global names.

The BSP study is undertaken in order to analyze the corporate environment. In the process of conducting this study, the Data Base Administration group should:

1. Identify Processes - determine what is done in the corporate environment, both present and future.

2. Identify Primary Entities - determine which things are involved in the process.

It is difficult to perform the BSP study without some appropriate naming conventions; but hopefully this will be one of the by-products of the study. An existing glossary might be considered to help in describing the environment initially, and then tailor it to the environment as the definition process continues.

When the BSP study has been completed and a tailored keyword glossary has been formulated, standards should than be established.

The above technique uniquely identifies a Dictionary subject, and now must be assigned a global name. A global name is a grouping of global keywords.

Global keywords are short descriptive words that can be grouped together to define unambiguously any subject in the dictionary. These global keywords comprise the Global Keywords Glossary which should include each keyword, its abbreviation and its definition. Abbreviations may become arbitrary after a while, but that is unavoidable. It is recommended that the Global Keyword Glossary be kept outside the Dictionary in a hard copy, so that it can be used as a reference document. The Glossary could also be maintained in the Dictionary as well. Figure 6.3 (p. 145) is a hypothetical Global Keyword Glossary. Some keywords are designated "Class Keywords".

Some important considerations in developing a list of global keywords are:

1. The list of keywords should be as concise as possible. This will limit the search for data by ensuring that a search doesn't

KEYWORD	ABBREVIATION	COMMENT
accumulation	ACCUM	sum of a quantity over period of time
achieved	ACH	measured level of accomplishment
addition	ADD	thing to add
address	ADDR	location as for mail
amount	$	CLASS
attended	ATT	recorded as having attended
authority	AUTH	individual or agency with right
award	AWRD	special recognition
bank	BNK	financial institution
birth_date	BIRTH	date of birth of person
building	BLDG	single physical structure
category	CAT	documented classification
city	CITY	includes towns, etc.
check	CHK	bank check
class	CLS	documented classification
code	CDE	CLASS
comment	COMM	text comment
cost	COST	expense, normally qualified as to inclusiveness
cost_center	CC	as defined in accounting stds manual
county	CTY	political division
Danville_Distribution_Systems	DDS	
date	DTE	CLASS
day	DAY	1-31, month day
deductions	DED	subtractions from salary
city	CITY	political division
department	DEPT	see corporate stds.
description	DESC	descriptive text
detail	DTL	qualifier
disability	DISAB	reduction in physical ability
education	EDUC	formal schooling
employee	EMP	full time employee
employment	EMPNT	pertaining to employee
end	END	
entity	DATA	CLASS
evaluation	EVAL	formal rating
federal	FED	U.S. Government
final	FINAL	last
first	FIRST	
flag	FLAG	on/off indicator
fraction	FRACT	part of whole
history	HIST	archival data
last	LAST	
level	LEV	level in hierarchy
line	LNE	line of text or data
local	LOC	
manager	MGR	
medical	MED	
middle	MID	
miscellaneous	MISC	
model	MOD	qualifier of product
month	MO	1-12, month of year
name	NME	CLASS
number	#	CLASS
overtime	OT	work time

Figure 6.3

Global Keyword Glossary

have to take place for the same data under a variety of different terms.

2. The list should be large enough to resolve any ambiguities. Thus, for example, "time worked" should be either "standard hours" or "overtime hours." "Order" could mean a "request for goods" or a "sequence number." Where ambiguity (duality) exists, establish a new keyword.

6.10 Identifying Useful Reports

Sakamoto thinks that there are three types of reports (outputs) that would be useful for the BSP study team. They are:

1. Descriptive Reports.
   a. These reports involved no analysis of the data. The BSP data in the Dictionary database are simply retrieved according to certain criteria and output according to the predefined formats.
2. Analysis Reports.
   a. For these reports, the retrieved data are subjected to certain algorithm(s) and the results are output.
3. Ad Hoc Query Output.
   a. Unlike the canned reports in 1. and 2., these are produced in response to ad hoc queries on the BSP data in the Dictionary data base [27, p. 18].

Sakamoto feels that the following list of candidate reports are useful for the BSP study team:

1. Descriptive Reports.
   a. Process vs Data class matrix report (PROCESS vs. DATACLSS) (see Appendix C, of the Questionnaire).
   b. Organization vs. Process matrix report (ORGNZIN vs. PROCESS) (see Appendix D, of the questionnaire).

c. System vs. Organization matrix report (SYSTEMS vs. ORGNZIN) (see Appendix E, of the questionnaire).

d. System vs. Process matrix report (see Appendix F, of the questionnaire).

e. System vs. Data file matrix report (SYSTEMS vs. DATA-FILE) (see Appendix G, of the questionnaire).

f. List of problems (PROBLEM) and associated organizations (ORGNZIN), processes (PROCESS), data classes (DATACLSS), systems (SYSTEMS) and solutions (SOLUTION) (see Appendix H, of the questionnaire).

2. Analysis Reports.

a. Problem vs. Process matrix (PROBLEM vs. PROCESS), showing the number of times the problems were stated (see Appendix I, of the questionnaire).

6.11 PAF Programs

Using the Program Access Facility, computer programs must be written for generating the above reports, after having decided on the reports. The PAF programs come with the Dictionary, and may be written in Assembly, COBOL or PL/1.

A great amount of coordinated efforts on the part of the BSP study team and programmers must be undertaken to develop the PAF programs. Sakamoto advocates that this is the most time consuming aspect of his approach.

For a two-month BSP study, a question may be raised on the feasibility of the approach if the program development requires sev-

eral weeks (or even several months). Sakamoto feels that since the Dictionary approach would facilitate on-going BSP-like studies, it is a viable investment. He refers to them as "mini" BSP studies. Sakamoto indicates that a BSP data base can be updated with the follow-on "mini" studies when appropriate, after having established the data base; and that the PAF programs can be run to obtain various reports for analysis and planning purposes.

6.12 The Data Dictionary, Why Use It?

Estep indicates the following reasons of why the Data Dictionary should be used:

1. User Extensibility Feature.
   a. Category definition.
   b. Relationship definition.
   c. Attribute definition.
   d. Validation.
2. Interactive Display Forms.
   a. Online collection.
   b. Online retrieval.
3. Reports.
   a. Subject specific.
   b. Glossary.
   c. Scan.
4. Program Access Facility.
   a. Analysis reports, e.g., attribute.
   b. Matrix generation.
5. This data collection lies into later physical implementation [26, p. 17].

6.13 BSP Study Preparation

The Dictionary must be ready with the BSP data model (BSP subject categories, relationships and attributes) installed, and nec-

essary report programs written, debugged and installed in the Dictionary, prior to the two-week preparation phase of the BSP study.

So that the team members are aware of what to expect from the above tool, the BSP education plan should include an overview discussion of the Dictionary, BSP data model and the purposes of PAF programs.

In order that all of the above information can be used by the rest of the study team, the team secretary should be trained for entering the BSP data into the Dictionary data base, modifying them and requesting for the up-to-date reports from the data base.

Forms for the subject categories may be developed, to facilitate the team secretary in entering the data. During the course of the interview, the team members would fill in these forms.

During this time, the security issue should be addressed. Standards and procedures should be established to handle data, since the data collected will be sensitive.

In summation, Sakamoto has shown a tool to support the Business Systems Planning studies, through the use of the Data Dictionary. He also has identified some of the useful reports that can be implemented as PAF programs; and defined a BSP data model in terms of the Dictionary subject categories, and attributes and relationships. In implementing the above approach, he also discussed some of the operational issues involved.

Sakamoto believes that his approach can contribute greatly to the BSP studies. He feels that a greater value of his approach lies in supporting the activities in the entire spectrum from the BSP study, data base administration, systems design, development, and on

down to the maintenance; and, also to offer an integrated approach to the data resources management.

In his approach, he feels that it "is the logical beginning of an integrated approach to the data resources management."

6.14 Summary

The primary tool of data administration in managing the data inventory is the data dictionary. Release 3 of the IBM Data Dictionary offers facilities to manage the data inventory.

J. Gene Sakamoto believes that there are potential benefits to be gained by the use of a data dictionary in supporting the tasks of data gathering during the course of the BSP studies that are currently performed manually. Therefore, such things as formats and characteristics of data, where they are stored and how they are used, are types of information that are maintained in the dictionary.

Cheryl Estep considers the reasons and needs of the Data Dictionary based on the following:

1. To improve data availability.
2. To formalize the definition process.
3. To allow for automated analysis.
4. To improve communication through shared data.

The Dictionary subject categories, attributes, and relationships, identify the BSP data. Sakamoto has identified 10 subject categories, 18 relationships, and 7 attributes, based upon BSP data.

Estep requires the following Data Dictionary facilities to support BSP: (1) Definition of categories and their attributes; (2)

Definition of relationships and their attributes; (3) Interactive display forms for input, update, and retrieval; (4) Batch reports for analysis; and (5) Customized Program Access Facility programs for analysis, and matrix reports.

Sakamoto thinks that each study team should be encouraged to review and evaluate subject categories in light of its own situation and the areas of emphasis, even though the categories, should adequately describe the BSP data. Furthermore, presentation of the BSP data stored in the Dictionary data base should be presented in the form most convenient for the BSP study team members to enable them to retrieve, analyze, and manipulate data.

In order to create a Global Keyword Glossary suitable to a corporate environment, it is advisable to perform a BSP study first.

Sakamoto thinks that there are three types of reports (outputs) that would be useful for the BSP study team:

1. Descriptive Reports.
2. Analysis Reports.
3. Ad Hoc Query Output.

Using the Program Access Facility, computer programs must be written for generating the above reports, after having decided on the reports.

Estep lists the following reasons as to why the Data Dictionary should be used:

1. User Extensibility feature.
2. Interactive display forms.
3. Reports.
4. Program Access Facility.

The Dictionary must be ready with the BSP data model (BSP subject categories, relationships and attributes) installed, and necessary report programs written, debugged and installed in the Dictionary, prior to the two week preparation phase of the BSP study.

Chapter 7

DISTRIBUTED INFORMATION SYSTEMS

Providing the user with a level of computing resources best suited to his operational requirements, is the general purpose of distributed information systems.

The elements that can be considered for distribution include:

1. *Hardware.*
2. Program execution.
3. Program development.
4. Data [39, p. 94].

From total centralization to total decentralization, the degree of distribution can vary. To address I/S distribution requirements, a good foundation for additional planning is necessary, through a defined information architecture in the BSP study.

The project team must do the following, if the information architecture follow-on project is to add distributed I/S parameters to the architecture:

1. Thoroughly understand the degree of distribution of each element.
2. Understand the argument for and against distribution of the various elements.
3. Be able to put into perspective all the factors that affect distribution and sharing of data processing resources.
4. Appreciate the need for a long-range I/S plan and for development of a facilities plan to support the I/S plan [39, p. 94].

In developing the architecture extensions with respect to distribution, several of the matrices developed in the BSP study can

be very useful. To include physical locations for systems and data requirements, the process and data flow analysis should be extended. Location/Process and Location/Data matrices, and Location/Organization should be prepared. A Process/Data matrix for each location should be prepared with additional parameters on the axis to include:

1. Data use.
2. Security.
3. Auditability.
4. Data occurrence.
5. Activity volumes.
6. Response required.
7. Criticality [39, p. 94].

Appendix N (of the questionnaire) shows this type of matrix for a manufacturing plant site.

In order to determine detailed distributed systems requirements, these additional parameters to the architectural description of the information systems can then be input to the individual subsystem requirement studies. The additional parameters will also give a general feeling for the applicability of distributed systems to the information architecture.

A more detailed specific discussion of the extensions of basic BSP methodology and the development and use of the matrices just cited is shown below. In this discussion, the examination by IBM and other sources of the possibilities for distribution of information systems resources and selecting the most effective alternative to plan for implementation, will be reviewed [40].

7.1 Planning for Distributed Information Systems

The attempt to determine the optimum locations for the re-

sources and activities that make up the total Information System, is the planning for Distributed Information Systems. A convenient way to identify the major activities to be addressed in planning for Distributed Information Systems, is the use of the resource life cycle (a well documented part of the Business Systems Planning methodology).

By identifying the information needs of the enterprise, requirements for Information Systems are determined in an Information Systems life cycle. Through system development activities, systems are acquired and maintained. System management activities determine when a system should be retired, and also provide overall management of the entire Information Systems life cycle; while system operation activities implement the systems.

IBM focuses on four major activities associated with the Information Systems life cycle:

1. Information requirements determination.
2. System development.
3. System operation.
4. System management [40, p. 3].

7.2 Documenting Distribution Requirements

The processes of the enterprise and the data required to support those processes, initiates the information requirements to be determined. Determination of the locations where each process is executed comes first, and then the use locations and source of the data involved. Based upon the similarities in process and data used, the locations executing the processes are grouped accordingly. The characteristics of the processes and data (that could affect decisions to centralize or distribute either the application programs supporting

a process of the data sets created and/or used by a process), are now added to the geographic information.

The foundation for these processes and the data requirement analysis, is provided by the information architecture output of a BSP study. A basis for scoping the analysis is provided by the BSP architecture. The matrix in Appendix N (of the questionnaire), provided a detailed outline of the Process/Data class relationships for each category of user, or "group." For each group the Information System requirements may be summarized in a format such as that used in Figure 7.1.

To indicate the centralized or distributed appropriations of a given processing application or subsystem and its associated data, the requirements now become input for the initial distribution analysis (as discussed later in this section).

7.3 Distribution Decisions

The next step, is the determination of what part those requirements lend themselves to support the distribution of information system resources.

The issues relating to distribution decisions are examined by the following three major components of an Information System:

1. System operation.
2. System development.
3. System management [40, p. 3].

The system operation component is examined in terms of application programs and data, and is considered first. Followed by an examination of the issues related to the distribution of system de-

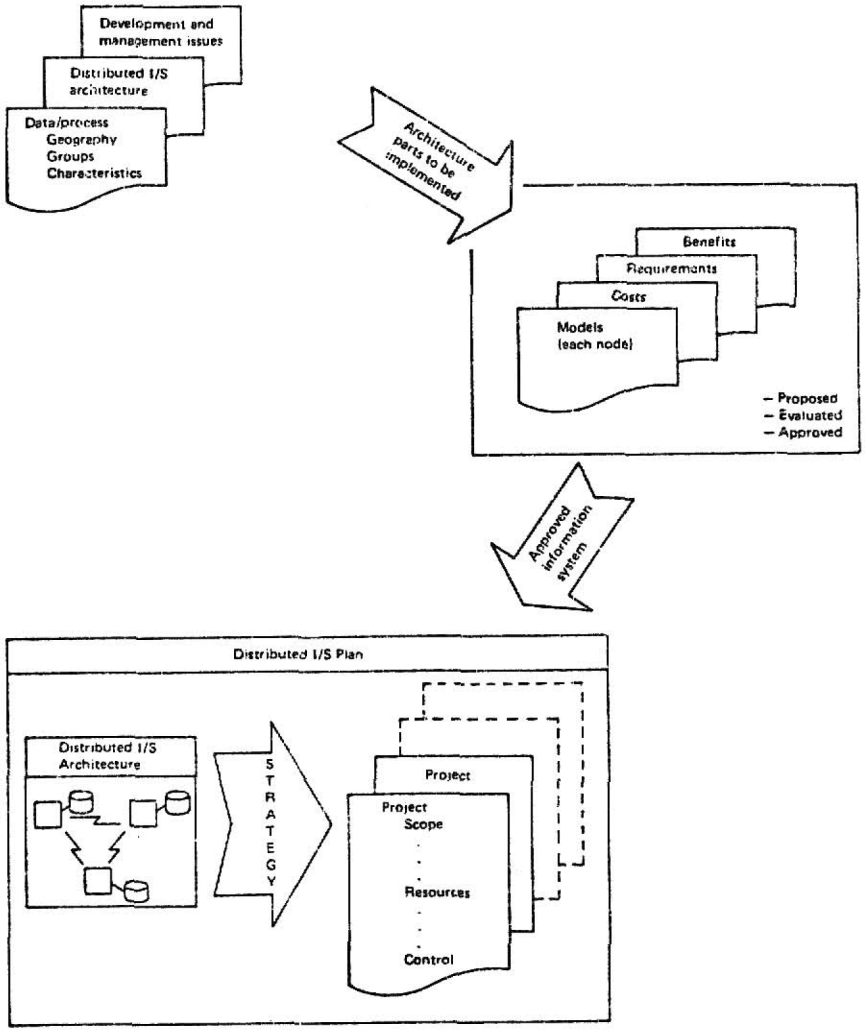


Figure 7.1

Information Requirement
Summary
[40, p. 14]

veloped resources, a preliminary architecture for application programs and their associated data is developed first. Finally, by pointing out factors that should temper the Distributed Information System architecture and plan, the significance of system management issues is introduced.

7.4 Implementation and Creation of the Resource Plan

As shown in Figure 7.2, the development of an architecture for distributing Information System resources, allows the basic information system requirements to be analyzed and applied to it. Preliminary cost estimates are developed to contrast expectations with reality and make adjustments if necessary after a selected part of the architecture has been modeled. The tactical distributed I/S plan is now established by the project plans that are prepared for the selected part of the architecture. Recognizing the need to manage the information resource, the total architecture and strategy for distributed information systems now becomes part of the foundation for the ongoing Information Systems planning activity that should be a normal part of every enterprise.

7.5 Dynamic Aspects of Operational Control

Due to the explosive growth in computer technology, the computer age is also creating a new menance: A vastly expanded potential for computer crime and the inadvertant destruction of data files. The potential for computer crime is now growing even faster than the

HEADQUARTERS	
PROCESS	**DATA**
Planning	Customer
Research	Vendor
Forecasting	Product
General accounting	Bill of material
Cost planning	Cost
Budget accounting	Parts master
Financial planning	Employee
Capital acquisition	Financial
Funds management	Planning
Personnel planning	
Recruiting/development	
Compensation	
Business planning	
Organization analysis	
Review and control	
Risk management	

SALES/SERVICE OFFICE	
PROCESS	**DATA**
Territory management	Customer
Selling	Order
Sales administration	Product
Order servicing	Employee
Personnel planning	Sales territory
Recruiting/development	

MANUFACTURING PLANT	
PROCESS	**DATA**
Design and development	Vendor
Product spec. maintenance	Product
Engineering info. control	Routings
Scheduling	Bill of material
Capacity planning	Cost
Material requirements	Parts master
Operations	Raw material inv.
Purchasing	Finished goods inv.
Receiving	Employee
Inventory control	Financial
Shipping	Work in process
Workflow layout	Facilities
Maintenance	Open requirements
Equipment performance	Machine load
General accounting	
Personnel planning	
Recruiting/development	
Compensation	

WAREHOUSE	
PROCESS	**DATA**
Receiving	Order
Inventory control	Product
Shipping	Finished goods inv.
Personnel planning	Employee
Recruiting/development	

Figure 7.2

Development Of A Distributed Information System Plan [40, p. 30]

stepped-up computer security efforts that many companies have taken in recent years. Some estimates put the take of both reported and unreported crimes as high as $3 billion annually - losses in the 100 or so cases of computer fraud reported annually run in the $100 million range [12, p. 86].

The rapidly increasing move by business to distributed processing - where computing power is scattered throughout an organization - compounds the problem. The number of computer terminals in the U.S. has more than doubled in the past five years to more than 3 million, and most of these remote terminals can get into central computer files. This trend is rapidly spreading computer fraud down to the level of office clerks [12, p. 87].

The quantum leap being made in computer technology is creating a new potential for computer rip-offs that is hard to underestimate. Donn B. Parker, senior systems consultant for SRI International who is considered to be the nation's leading authority on computer fraud, says, "I am now more concerned about the potential for future loss than the present evidence of actual loss" [12, p. 86].

The following are three computer developments that are creating new risks of fraud that are particularly alarming for business:

1. The spread of low-cost personal computers.
2. The soaring number of students and others who are learning how to use computers.
3. The large number of employees who can access computers through the ubiquitous (existing or being everywhere at the same time) remote terminal [12, p. 86].

The pattern of remote-access computers crimes is already emerging, and appears to be the most dangerous. Data base services being marketed to both commercial and personal computer users are threatened by this type of theft.

7.6 Security/Privacy Administration Function

Grayce M. Booth indicates, that as integrated databases make more and more data vital to an organization available on-line, security is becoming more important [3, p. 241]. In addition, in order to exchange data of mutual interest, there is a definite trend toward interconnecting computer systems operated by different companies or organizations.

A topic of increasing public interest is privacy. Current legislation so far deals mostly with personal data managed by the Federal Government, but future legislation may extend this protection to all personal data [3, p. 241].

In the case of large organizations and/or those which manage very large amounts of personal data (e.g., insurance companies), a full-time administrator is necessary, because these trends will make it likely that many on-line systems, and most distributed systems will in the near future require a security and privacy administration function.

The control of access to an Information System and/or to its resources, is the most basic security/privacy -- protection function. The establishment of passwords and/or privilege lists, are the most often used techniques (See Appendix D for further information on Computer Security Safeguards) [28, p. 321.07].

A user must supply a matching password to be allowed access, because passwords are stored by the system. To make use of all of the system's resources, a single password is all that is needed [28, p. 321.08].

A set of functions which a specific user, or class of users, can access, are established by privilege lists. Users are linked to the privilege list and allowed to execute those functions and/or access those resources on their lists, after furnishing a valid individual or group identifier.

According to the policies of the organization and the needs of the system users, most systems use some combination of password(s) and privileges. The security administrator, of course, must also be under control of a higher-level privilege list which prevents change to other areas not under that administrator's control.

In order to determine if access controls are being violated and if attempted violations have been prevented by the system's control mechanisms, the security administrator must also monitor use of the system. So that the security administrator can determine who is trying to access the system and why, all attempted accesses are logged.

Control of data accessibility, is the other basic security/privacy - protection function. The system must have a very high level of integrity to insure security.

One method that is used to protect data from disclosure is encryption. So that data cannot be understood except by another process which can execute an appropriate decryption algorithm, encryption encodes or alters data. This standard method or algorithm for encryption in the U.S. is based upon techniques developed by IBM and formalized by the National Bureau of Standards ((NBS) See Appendix D; pp. 519-568)[3, p. 243;59].

To protect data during transmission over a communications network, encryption is the method most often used. Since a data link

can be tapped relatively easily and inexpensively, data is most vulnerable at this point.

If a storage device is stolen, the data can be encrypted so that it will not be revealed. However, physical protection methods of access control to the disk and tape library locations are used instead of encryption because it is expensive.

If data is misrouted in a complex network, multilevel encryption is sometimes used, so that disclosure will not result. Multilevel encryption will be more common than today, as more and more complex networks -- including public networks come into use.

The type of data encryption that is used, is often affected by public data networks. A header cannot be encrypted, or the intelligent components of the public network cannot decipher the header information, (so a message cannot be routed). This can only happen if a public network requires header information indicating where each message or packet is to be sent.

The management of the encrypting and decrypting keys; is one of the major problems that a security and privacy administrator must cope with. Only the keys used are private, and the security of the encryption system rests on protecting the keys, since the NBS standard makes the algorithm used public (See Appendix D) [3, p. 244;54,55,58,59].

Keys are usually distributed by some method other than data communications in a private-key system. However, the difficulty is to find a scheme of key distribution which is effective, secure, and also cost-effective.

Researchers [13, p. 146-157;59] (See Appendix D) are working on public-key encryption systems, which allow publication of both the

algorithm and encryption key. A complementary decryption key is the only one that is kept private.

To trade off security and privacy against costs correctly, is the key to designing adequate security - and privacy - protection methods. It is pointless to spend a great deal of money and effort protecting data which is of little value.

7.7 Deficiency Of EDP Controls -- Who Is To Blame?

Many companies have been astonishingly remiss in setting up sophisticated antifraud measures, particularly those that employ the computer's own power to protect itself. Security experts blame senior corporate executives, who have been overwhelmed by the computer's complexity, (especially those executives who are directly over the corporation's internal audit staff), for this negligence. Unfortunately, they relied too much on computer professionals to control Electronic Data Processing (EDP) operations. The EDP staffers, in turn, resisted attempts to introduce any controls that might slow data processing, because they concentrated on meeting the ever-increasing work loads. In addition, internal auditors have been considered ineffective in making a strong case for computer controls, because they have failed to keep pace with computer technology. Says Peter S. Browne, a vice president with Systematics General Corp.: "The controls over computer operations are typically weaker than those over any other aspect of the company" [12, p. 89].

Many companies are rapidly working to change that. Preventing computer fraud is only part of the incentive, since the Foreign Cor-

rupt Practices Act provides criminal penalties for even the board of directors should a company fail to set up the proper internal financial controls. However, even with the existence of the Foreign Corrupt Practices Act, many companies have still failed to set up proper internal financial controls, because the company's FCPA staff members have been overwhelmed by the computer's complexity. The result, has been the failure of many companies to put qualified individuals in charge of setting up their internal financial controls, thus putting the company in a very precarious condition.

Companies have now begun to order a wide range of more sophisticated computer security products and services. This includes software to restrict computer access and simplify computer audits, hardware to encrypt or scramble computer data transmissions, and a panoply (an impressive array) of consulting services aimed at tightening information processing procedures and programming computers to detect and report attempted frauds.

Audit software packages have been offered for more than a decade, but the market has tripled to about $15 million annually in the last five years, reflecting a growing desire by internal auditors to try to audit through the computer, not around it. Even so, its a matter of education on the part of corporation's internal audit staff, and executive commitment to ensure proper controls.

An audit software package is of no value if it is not used properly and effectively. Many internal audit departments purchase expensive audit software packages, only to impress top management that the company's assets are secure, and controls are in place. In reality, the internal auditors have no plans to use the package, because,

again they are overwhelmed by the computer's complexity, and their middle management cannot be put in the position of answering complex EDP questions.

Ninety-five percent of the internal audit profession lacks data processing skills. "If auditors do not get up to speed with computer technology, they will be of no value to their firms by the end of the 1980's", warns IAA's Fletcher. "The day of the manual auditor is gone" [12, p. 92].

7.8 Summary Of Distributed Information Systems

Within the computer-user community, the potential advantages of distributed information systems are receiving increasing attention. Recognition of these advantages provides impetus (incentive) for both theoretical and practical work on distributed systems.

Theoreticians are grappling with the:

1. Definition of multilayer protocals for information interchange.
2. Formulation of rules for system-wide deadlock deletion.
3. Definition of methods for access to distributed databases.
4. Other similarly complex technical problems [3, p. 249].

However, in order to enable forward-looking computer users to better handle the realworld problems of their enterprises, the implementation of distributed systems must be accomplished first. As is usual, early implementations are, proceeding in the form of specialized subsets of general capabilities. This way, the computer community as a whole will determine which techniques are feasible and which give the best results; thus, the leading-edge users of distributed systems will gain valuable experience [66]. If it is to become practical for the ma-

jority of computer users to implement distributed systems, these bases of theory and experience are necessary. It will now be possible for many computer users to consider the distribution of functionality within their Information Systems, because of the emergence of wider, more general-purpose support for distributed processing and distributed databases over the next several years.

The distributed system structure, however, will not be used by all applications. A distributed system structure can satisfactorily serve user requirements, because many Information Systems will remain centralized. Because the distributed structure will better meet their user's objectives, other Information Systems will be converted to -- or be created with it.

Computer users will be given an increasingly wide range of alternatives in meeting the needs of their enterprises, because of the existence of generalized support for both centralized and distributed system structures. Distributed system structures will provide a range of alternatives between centralization and decentralization, so it will not be necessary to choose between these two extremes. For at least the next decade, in the evolution of Information Systems, distributed information systems and the advantages they offer will represent an important trend.

Summary Of The Review Of The Literature

The plan that results from a BSP study simply represents the best thinking at a certain point in time, and should not be considered unchangeable. The following list represents the areas that were covered during the course of the review of the literature, in order to implement the best possible plan to develop a BSP study for small, medium, and large corporations:

1. BSP concepts.
2. Major BSP activities.
3. Obtaining the commitment.
4. Study preparation.
5. Beginning the study.
6. Business processes.
7. Data classes.
8. Systems support.
9. Executive perspective.
10. Findings and conclusions.
11. Information architecture.
12. Architecture priorities.
13. Management Information Systems.
14. Recommendations and action plans.
15. Study report and executive presentations.
16. Follow-on activities.
17. Data dictionary.
18. Distributed Information Systems.

The BSP approach offers customers the opportunity to:

1. Create an environment and an initial plan of action that can enable a business to react to future changes in priorities and directions without radical disruptions in systems design.
2. Define an Information System function to continue the planning process [36].

The organization's ability to develop a comprehensive long-range plan based on its own unique requirements, facilitates the success of any future information system investment. Therefore, Business Systems Planning is the ideal method to effectively develop a plan that can provide information that is flexible enough and in the form needed to accommodate change.

PART III

PRESENTATION AND INTERPRETATION OF DATA

PART III

PRESENTATION AND INTERPRETATION OF DATA

The following presentation and interpretation of data refer to the five small, thirteen medium, and ninety-four large U. S. Corporations responding to the Business Systems Planning survey.

The response of the small, medium, and large corporations to the mailed questionnaire was moderately favorable. Two-hundred and twelve letters and questionnaires were mailed to corporations involved in Business Systems Planning (or some form thereof) across the United States. One-hundred and twelve, or 52.8 percent (see Appendix C, p. 509), returned the questionnaire; only one-hundred, or 47.2 percent, did not return them as shown on Table III.1 and Graph III.1.

Questionnaires were sent to fourteen small corporations to survey their past, present, and future BSP programs. Five, or 35.7 percent, returned the questionnaire; nine, or 64.3 percent, did not participate in the survey.

The return of completed questionnaires from the medium corporations was thirteen, or 46.4 percent, out of twenty-eight mailed questionnaires.

Questionnaires were completed by ninety-four, or 55.3 percent, out of one-hundred and seventy large corporations; seventy-six, or 44.7 percent, did not participate in the survey.

Chapter 8 presents and interprets the data of all of the returned questionnaires from the U.S. Corporations. The chapter provides an overview of all the responses pertaining to: the activities

Table III.1

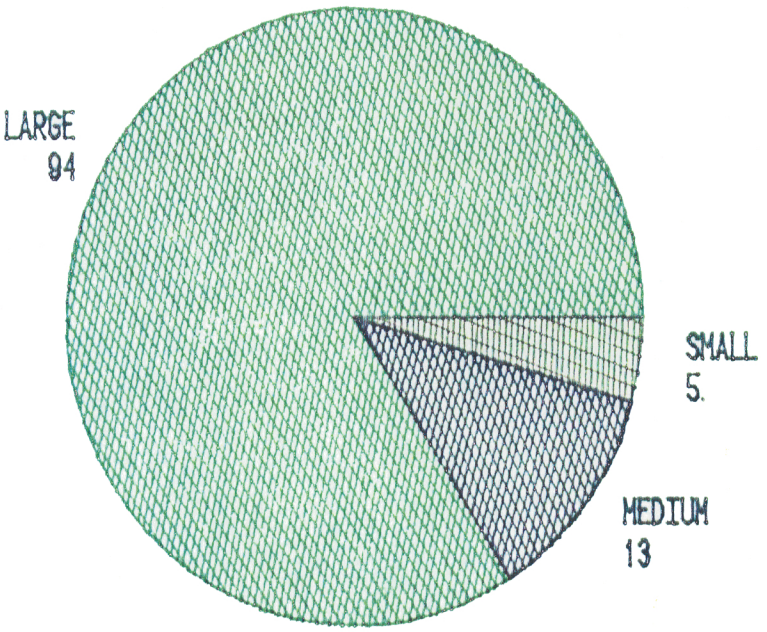
Questionnaire Response by Two-hundred and Twelve Corporations in the United States Where Business Systems Planning Programs Are Being Implemented February, 1982

Corporations by Size According to Annual Sales	Business Systems Planning Questionnaire		
	Number Sent	Number Returned	Percent Returned
Small	14	5	35.7
Medium	28	13	46.4
Large	170	94	55.3
totals	212	112	52.8

GRAPH III.1

QUESTIONNAIRE RESPONSE

SUM OF NR GROUPED BY SIZE



NR: NUMBER RETURNED

in the BSP study; the proper executive commitment before starting a BSP study; and, the activities that take place before the BSP team starts its concentrated study. It also outlines the responses pertaining to the considerations that must be made in the management of the study.

Chapter 9 also presents and interprets the responses of all of the returned questionnaires of the U.S. corporations. The chapter covers the responses pertaining to: the details of the methodology, the writing of the final report, and the making of recommendations to the business executives. In addition, the chapter also deals with the responses pertaining to: those activities required to adequately review the Management Information Systems (MIS) function so as to recommend immediate changes and to specify MIS activities that are part of the BSP follow-on projects.

Chapter 10, again presents and interprets the responses from the U.S. Corporations to the questionnaire on the follow-on activities so that an action plan for them may be developed during the BSP study. Furthermore, the chapter also discusses the returned responses to the questionnaires pertaining to the potential benefits to be gained by the use of the Data Dictionary in Business Systems Planning. In addition, it also analyzes the responses to the major elements and issues that must be considered in planning for a distributed information system, and the responses to providing an approach to compiling a detailed plan for a given system after the BSP study.

In Chapter 11 a financial analysis was conducted of sixty-eight of the one-hundred and twelve U.S. corporations surveyed, to determine how effectively they managed their information resources

based upon the criteria of having a Formal Business Systems Planning program; of having a Partial Business Systems Planning program; of having Other Strategic Planning Methodologies; and, of having No Business Systems Planning program. The analysis followed the study made by A. T. Kearney Management Consultants in asking the question: "How does a company plan, organize, monitor and control the people, equipment, systems, and money which combine to produce effective decision making information?" In addition, the financial analysis used such ratios as the "return on total capital, return on equity, and net profit margin", to determine how profitable a corporation was in managing their information resources based upon the criteria listed above.

Chapter 8

BUSINESS SYSTEMS PLANNING STUDY ACTIVITIES OVERVIEW

The implementation of an information architecture that effectively supports the business goals through planning and development, is shown in the following keys below:

1. Top-down planning with bottom-up implementation.
2. Managing data as a corporate resource.
3. Orientation around business processes.
4. Use of a proven, comprehensive methodology [38, p. 10].

This chapter will provide an overview of the above keys and of all of the responses pertaining to the activities in a BSP study based upon a proven comprehensive methodology.

Furthermore, this chapter deals with the responses pertaining to the commitment of the business to complete all relevant activities and heed the recommendations of the study team (thus having the success of the Business Systems Planning Study heavily dependent upon it).

Finally, the chapter analyzes the responses pertaining to the use of the criteria established to commit the business to complete all relevant activities and heed the recommendations of the study team. Furthermore, potential team members now become identified.

8.1 Major Activities

A BSP study has thirteen major activities that are carried out in varying degrees. However, as one becomes fairly familiar with

Business Systems Planning, he can, as appropriate, do part of a given activity and delay the balance.

8.1.1 Gaining the Commitment

Unless a top executive sponsor and some other executives are committed to being involved, the BSP study should not be started. The commitment to start the BSP study was made by a top executive of the corporation according to seventy, or 62.5 percent of the U. S. corporations that responded to the survey. Thirty-seven, or 33.1 percent of the corporations had no known commitment by a top executive to start a BSP study; and the respondents from five, or 4.4 percent of the corporations felt that it was not applicable to their situation as shown in question 2 of Tables 8.1-8.1.1 and Graph 8.1.

[e.g., However, County Mutual Insurance Company of Bloomington, Illinois, responded with a "Yes" and "No" to this question. Their explanation was that, "It was not sponsored by the Chief Executive Officer, but by one of the top 5 officials. This, however, was effective enough for the scope of our study."]

Broken down by size, three out of five, or 60 percent of the small corporations surveyed had executive support to start the BSP study, while two, or 40 percent had no executive support.

Most of the medium size corporations, or 61.6 percent to be exact, felt that they had executive support. However, four, or 30.8 percent had no support.

The respondents that were answering for all of the large corporations that were surveyed felt that fifty-nine, or 62.8 percent

Table 8.1

Major Activities by One-hundred and Twelve
U.S. Corporations
February, 1982

Questionnaire Response by Number and Percent	Business Systems Planning Questionnaire											
	Questions											
	2	3	4	5	6	7	8	9	10	11	12	13
Small#												
Yes#	3	4	1									
Pct.(%)	60.0	80.0	20.0									
No#	2	1	3									
Pct.(%)	40.0	20.0	60.0									
Other@				2	4	3	4	4	2	3	4	3
Pct.(%)				40.0	80.0	60.0	80.0	80.0	40.0	60.0	80.0	60.0
No Response	0	0	1	3	1	2	1	1	3	2	1	2
Pct.(%)	0.0	0.0	20.0	60.0	20.0	40.0	20.0	20.0	60.0	40.0	20.0	40.0
Medium#												
Yes#	8	10	2									
Pct.(%)	61.6	77.0	15.4									
No#	4	2	9									
Pct.(%)	30.8	15.4	69.2									
Other@				4	10	8	10	10	6	8	10	7
Pct.(%)				30.8	69.9	61.5	69.9	69.9	46.1	61.5	69.9	53.9
No Response	1	1	2	9	3	5	3	3	7	5	3	6
Pct.(%)	7.6	7.6	15.4	69.2	23.1	38.5	23.1	23.1	53.9	38.5	23.1	46.1

\# Corporations by size according to annual sales.
Grand total of responses by small, medium, and large corporations.
"Yes" and "No" responses to questionnaire (see Appendix A).
@ Checked-off responses to one or more of the list of items in the question other than "Yes" or "No."

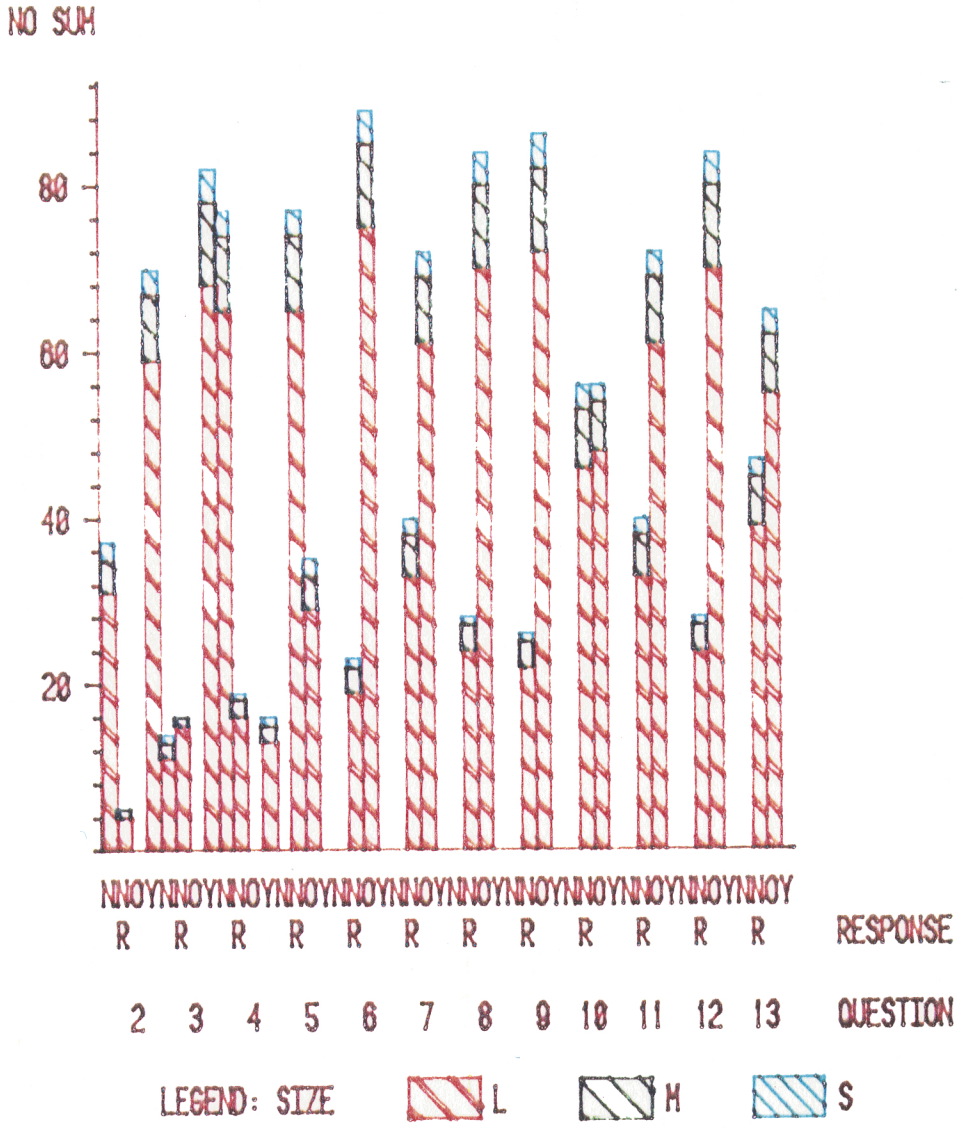
Table 8.1.1

Major Activities by One-hundred and Twelve
U.S. Corporations
February, 1982

Questionnaire Response by Number and Percent	Business Systems Planning Questionnaire											
	Questions											
	2	3	4	5	6	7	8	9	10	11	12	13
Large*												
Yes‡	59	68	13									
Pct.(%)	62.8	72.3	13.9									
No‡	31	11	65									
Pct.(%)	33.0	11.7	69.2									
Other∂				29	75	61	70	72	48	61	70	55
Pct.(%)				30.8	79.8	64.9	74.5	76.6	51.0	64.9	74.5	58.5
No Response	4	15	16	65	19	33	24	22	46	33	24	39
Pct.(%)	4.2	16.0	16.9	69.2	20.2	35.1	25.5	23.4	49.0	35.1	25.5	41.5
Grand Total**												
Yes‡	70	82	16									
Pct.(%)	62.5	73.2	14.3									
No‡	37	14	77									
Pct.(%)	33.1	12.5	68.7									
Other∂				35	89	72	84	86	56	72	84	65
Pct.(%)				31.3	79.4	64.3	75.0	76.8	50.0	64.3	75.0	58.0
No Response	5	16	19	77	23	40	28	26	56	40	28	47
Pct.(%)	4.4	14.3	17.0	68.7	20.6	35.7	25.0	23.2	50.0	35.7	25.0	42.0

* Corporations by size according to annual sales.
** Grand total of responses by small, medium, and large corporations.
‡ "Yes" and "No" responses to questionnaire (see Appendix A).
∂ Checked-off responses to one or more of the list of items in the question other than "Yes" or "No."

GRAPH 8.1
MAJOR ACTIVITIES



N: NO Y: YES
O: OTHER NR: NO RESPONSE

had executive support to start a BSP study, while thirty-one, or 33 percent did not.

An executive or team leader who will work full time in the study and direct team activities is the most important action following commitment. Respondents from 73.2 percent of the U.S. Corporations indicated that a team leader was selected to coordinate the study team's activities. Respondents from several of the corporations, or 12.5 percent indicated that no team leader was selected as shown in question 3 of Tables 8.1-8.1.1 and Graph 8.1 on pp. 178-180.

[e.g., Deere and Company (Motor Vehicles, Parts and Nonelectrical) of Moline, Illinois answered "No" to this question, explaining that the "team was composed of only three third level managers, and not an executive.]

In order to explain the objectives and expected results of a BSP study, there may be a problem in some organizations in obtaining access to executive management. Respondents from 68.7 percent of the U.S. Corporations felt that there wasn't any problem in obtaining access to executive management to explain the objectives and expected results of the BSP study. Sixteen corporations, or 14.3 percent, did have a problem in obtaining access to executive management as shown in question 4 of Tables 8.1-8.1.1 and Graph 8.1 on pp. 178-180.

Of the large corporations that responded, respondents from only sixty-five, or 69.2 percent, felt that they didn't have any problem in obtaining access to executive management.

[e.g., Brown & Root Company, (Engineering/Industrial & Machine Construction) of Houston, Texas, answered "No" to this question, indicating that "No problems in obtaining access" occurred. However,

"problems occurred in expected results matching with what was produced."]

If there was a problem in obtaining access to executive management, one or all of the appropriate actions as shown in question 5 Tables 8.1-8.1.1 and Graph 8.1, pp. 178-180 of the questionnaire (in Appendix A, p. 433) were taken by thirty-five, or 31.3 percent of the respondents. Respondents from 68.7 percent of all corporations, did not take any action at all.

[e.g., The Insurance Company of North America, of Philadelphia, Pennsylvania, took appropriate action on two of the four listed examples, and on one other action as listed below:

1. Conducted an executive briefing session specifically for their executives.
2. Conducted an executive planning session.
3. Other(s) Specify: "Formed a group to support BSP."]

8.1.2 Defining the Study Objectives

The time has now come for the study objectives to be defined. Good objectives should be capable of being started clearly and concisely. In measuring the degree to which they have been met, criteria must now be applied. They will only be applicable to the specific requirements of the organization to be studied. Working within the defined study scope, they will be capable of being satisfied by the BSP study team.

In view of the above comments, respondents from 79.4 percent of the corporations indicated one or more of the study objectives that were defined or satisfied by the study as shown in question 6 (Tables 8.1-8.1.1 and Graph 8.1, pp. 178-180) of the questionnaire (See Appendix A, p. 433).

Respondents from 79.8 percent of the large corporations indicated having defined one or more of the study objectives.

The majority of medium size corporations, 69.9 percent to be exact, defined or satisfied one or more of study objectives. However, all of the small corporations defined or satisfied the study objectives.

[e.g., However, the respondent from J. C. Penny Life Insurance, of Dallas, Texas, indicated having defined all of the study objectives under their own strategic planning methodology called Spectrum (not BSP). He indicated that they "Prioritise and manage strategic projects separate from shorter range operational projects, thereby protecting strategic work."]

8.1.3 BSP Study Obstacles

When doing a BSP study, several factors have become more of an obstacle than others. The respondents from the majority of the corporations surveyed, 64.3 percent, checked off one or more of those factors in question 7, as shown on page 433 of the questionnaire (See Tables 8.1-8.1.1 and Graph 8.1 pp. 178-180).

[e.g., Kathy Chittenden of American Bankers Insurance Group, Miami, Florida indicated in her response to the questionnaire (of the now bankrupt Davidson Timber Company), that "major reorganization and transformation of control; and, multiple independent sub-organizations with autonomous decision making processes and unique lines of product services serving diverse markets," were obstacles in doing a BSP study.]

8.1.4 Supporting the Study Team

The selection of team members is very important, since the study team is responsible for determining the information needs of the entire business and recommending the nature of its data processing operations.

Respondents from 74.5 percent of the large corporations checked one or more of the conditions in question 8, for choosing people for the study team (see Tables 8.1-8.1.1 and Graph 8.1, pp. 178-180).

[e.g., Clark Equipment Company (Motor vehicle parts), Chicago, Illinois, indicated that their team members "had several years' experience within the organization, a sound knowledge of their own area, and an appreciation of the rest of the business."]

Seventy-seven percent of the corporations responded to one or more of the fundamental responsibilities that are assigned to the study team (See question 9 and Tables 8.1-8.1.1 and Graph 8.1, pp. 178-180).

[e.g., The respondent from Monarch Marketing (Product Identification, Materials, Machines and Labels) of Dayton, Ohio, checked the following fundamental responsibilities that were assigned to their study team:

1. The executive sponsor reviewed progress and findings during the study.
2. The team leader saw to it that the study was successfully completed.
3. The team members analyzed the data collected and executive perspectives expressed during the study.]

A BSP study is intensive in nature, and is best performed on a full-time basis, which further compounds the problem of team selection. Part-time studies are often characterized by deadline and

continuity problems, even though they may appear to be easier to support.

A moderate response was received from the corporations that were surveyed, in checking one or more of the assurances that were made in question 10, before they embarked on a part-time study (See Tables 8.1-8.1.1 and Graph 8.1, pp. 178-180).

[e.g., Before, the Florida Power Corp. (Electrical Utilities), of St. Petersburg, Florida, embarked on a part-time study, the following assurances were made:

1. The team was very well managed.
2. Momentum was not lost as a result of inactivity during the study.]

Manpower requirements should fall within the following limits, if the intent and methodology of BSP are reasonably followed, and the study team is full time. Furthermore, these wide variations can be explained by significant variations in organizational types and sizes, as well as study objectives:

1. Number of team members -- 4-7.
2. Number of weeks -- 6-8.

Response from the large corporations to the survey, 64.9 percent to be exact, indicated that their resources did fall within the above limits in answering question 11.

[e.g., The required resources for Johnson and Johnson (Health care/Medical Supplies) of New Brunswick, New Jersey substantiated the favorable response of the large corporations, indicating that they too fell within the above limits.]

The person selected by the executive sponsor to lead the team is responsible for the success of the study. Having knowledge of business matters and broad perspective of the business are require-

ments that a team leader must have. Furthermore, the team leader can save the team valuable time by having first-hand knowledge of how the various departments of the business interact, and where detailed information about the operation of the business can be obtained.

Seventy-five percent of the corporations responding to the survey checked one or more of the activities of the team leader in question 12 of Tables 8.1-8.1.1 and Graph 8.1, pp. 178-180.

[e.g., Northwest Computer Services, Inc. (Banks), Minneapolis, Minnesota, checked the following activities of the team leader:

1. Conducted the study team orientation session.
2. Conducted a kickoff meeting for team members at the outset of the formal activities of the BSP study.
3. Managed the logistics of the study, including day-to-day administration.
4. Maintained the schedule.
5. Presented the study report to management at the completion of the study.]

The chief executive officer now signs the study announcement letter composed by the team leader, and distributes the letter to the executives who control the major functions within the scope of the study.

The team leader did compose a study announcement letter according to 58 percent of the respondents who answered question 13 in Tables 8.1-8.1.1 and Graph 8.1, pp. 178-180.

[e.g., However, according to Amdahl Corporation (Computers, Office Equipment) of Sunnyvale, California, their team leader did not compose a study announcement letter, so the following items were never able to be announced in the above manner:

1. Program objectives.
2. Organizational values.
3. Involvement of functional executives.
4. Executive cooperation and candor.]

8.2 Preparation Plan

Potential team members are now identified using the criteria that was established in section 8.1. The team leader and the executive sponsor normally perform the final selection. Continuity is normally provided for the activities that will follow the BSP study by the information systems representative on the study team. The briefing of each member on the study team must be accomplished in such a way as to magnify the importance of the study and the commitment of the executive sponsor to BSP.

Sixty-nine percent (rounded off) of the respondents prepared for the study by checking one or more of the requirements in question 14 as shown in Tables 8.2-8.2.1 and Graph 8.2.

[e.g., The Kansas State Department of Revenue, Topeka, Kansas prepared for the study by doing the following tasks:

1. Selected the interviewees early.
2. Established a control room.
3. Established a study control book.
4. Sent four study team members to a special BSP class.]

The output shown in question 15 of Appendix A was contained in 62.5 percent of the responding corporations's study control book.

[e.g., However, Abbott Laboratories (Health care/Medical Supplies), of North Chicago, Illinois indicated that they didn't necessarily have a "control book" but that they "published a book explaining the process and findings."]

The team leader prepared a preparation plan in 70.5 percent of the corporations that responded to one or more of the major tasks in question 16 as shown in Tables 8.2-8.2.1 and Graph 8.2.

[e.g., Northwest Pipeline Corporation (Gas Utilities), of Salt

Table 8.2

Preparation Plan by One-hundred and Twelve
U.S. Corporations
February, 1982

Questionnaire Response by Number and Percent	Business Systems Planning Questionnaire Questions											
	14	15	16	17	18	19	20	21	22	23	24	25
Small*												
Yes*						2	3					
Pct.(%)						40.0	60.0					
No*						1						
Pct.(%)						20.0						
Other@	3	3	3	3	3			3	3	2	3	3
Pct.(%)	60.0	60.0	60.0	60.0	60.0			60.0	60.0	40.0	60.0	60.0
No Response	2	2	2	2	2	2	2	2	2	3	2	2
Pct.(%)	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	60.0	40.0	40.0
Medium*												
Yes*						6	8					
Pct.(%)						46.2	61.5					
No*						3	1					
Pct.(%)						23.1	7.7					
Other@	9	8	9	8	9			9	9	6	7	7
Pct.(%)	69.2	61.5	69.2	61.5	69.2			69.2	69.2	46.1	53.8	53.8
No Response	4	5	4	5	4	4	4	4	4	7	6	6
Pct.(%)	30.8	38.5	30.8	38.5	30.8	30.7	30.8	30.8	30.8	53.9	46.2	46.2

* Corporations by size according to annual sales.
** Grand total of responses by small, medium, and large corporations.
* "Yes" and "No" responses to questionnaire (see Appendix A).
@ Checked-off responses to one or more of the list of items in the question other than "Yes" or "No."

Table 8.2.1

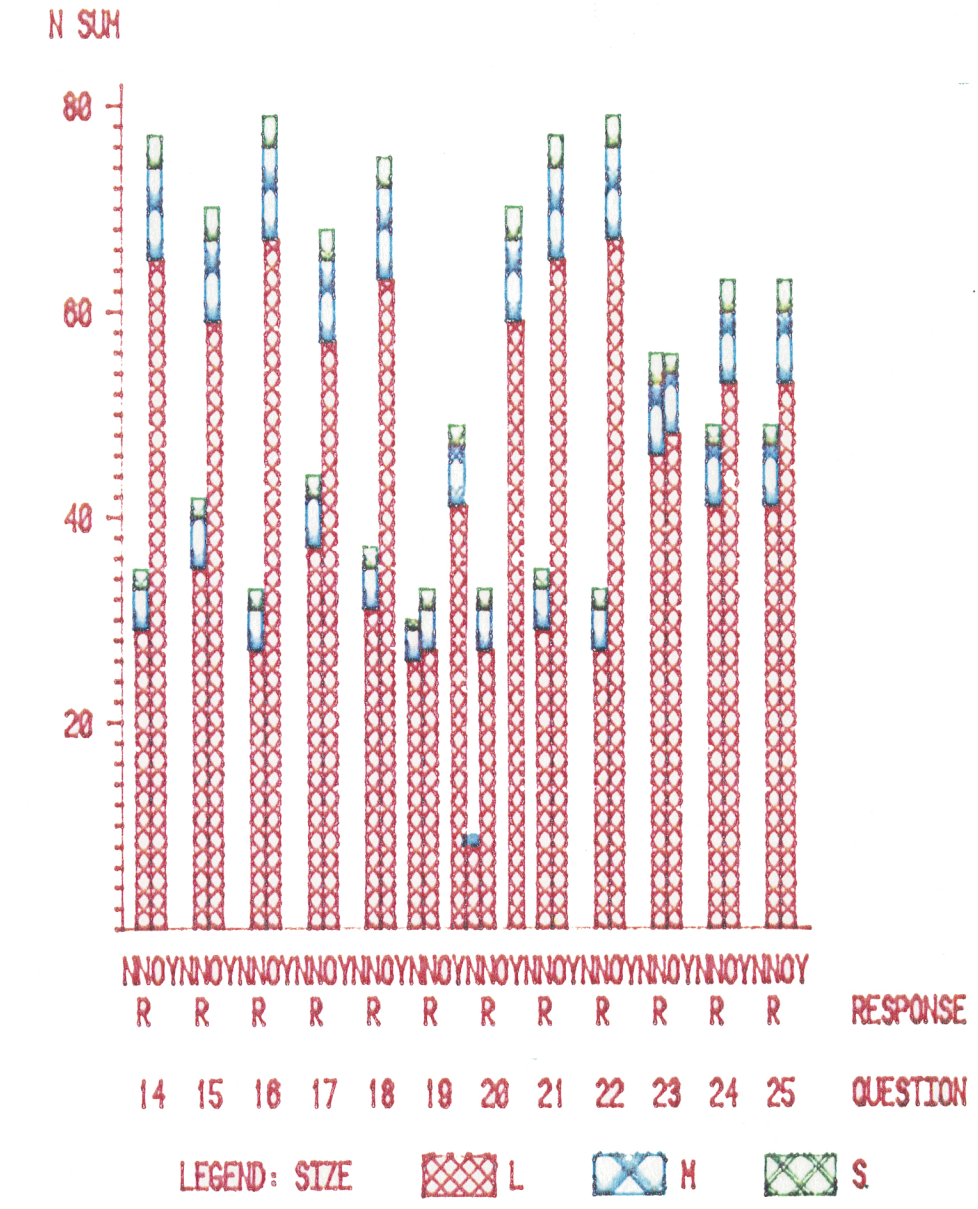
Preparation Plan by One-hundred and Twelve
U.S. Corporations
February, 1982

Questionnaire Response by Number and Percent	Business Systems Planning Questionnaire											
	Questions											
	14	15	16	17	18	19	20	21	22	23	24	25
Large*												
Yes¥						41	59					
Pct.(%)						43.6	62.8					
No¥						26	8					
Pct.(%)						27.7	8.5					
Other@	65	59	67	57	63			65	67	48	53	53
Pct.(%)	69.1	62.8	71.3	60.6	67.0			69.1	71.3	51.0	56.4	56.4
No Response	29	35	27	37	31	27	27	29	27	46	41	41
Pct.(%)	30.9	37.2	28.7	39.4	33.0	28.7	28.7	30.9	28.7	49.0	43.6	43.6
Grand Total**												
Yes¥						49	70					
Pct.(%)						43.7	62.5					
No¥						30	9					
Pct.(%)						26.8	8.0					
Other@	77	70	79	68	75			77	79	56	63	63
Pct.(%)	68.7	62.5	70.5	60.7	66.9			68.7	70.5	50.0	56.3	56.3
No Response	35	42	33	44	37	33	33	35	33	56	49	49
Pct.(%)	31.3	37.5	29.5	39.3	33.1	29.5	29.5	31.3	29.5	50.0	43.7	43.7

* Corporations by size according to annual sales.
** Grand total of responses by small, medium, and large corporations.
¥ "Yes" and "No" responses to questionnaire (see Appendix A).
@ Checked-off responses to one or more of the list of items in the question other than "Yes" or "No."

GRAPH 8.2

PREPARATION PLAN



N: NO Y: YES O: OTHER NR: NO RESPONSE

Lake City, Utah, included the following major tasks in their preparation plan:

1. Briefed the study team.
2. Educated team members.
3. Developed a study work plan.
4. Defined the study report and ancillary output.
5. Created an executive interview list and schedule.
6. Briefed participating executives.
7. Obtained a suitable control room.
8. Reviewed with the executive sponsor.]

8.2.1 Allocation and Preparation Activities

The team leader for 60.7 percent of the responding corporations held a half-to full day orientation session to brief the study team and covered one or more of the topics in question 17, of Tables 8.2-8.2.1 and Graph 8.2.

[e.g., Superior Oil, of Houston, Texas indicated that their orientation session only briefed the study team on the "study preparation plan and schedule."]

8.2.2 Data Accumulation

The study team established a reference library of both business and Information Systems documentation to provide a basis of information for 66.9 percent of the corporations that responded to two types of data, general business and Information Systems, and one or more of the data characteristics in response to question 18 (See Tables 8.2-8.2.1 and Graph 8.2).

[e.g., The following data under General Business or Information Systems pertained to the University of Illinois, Chicago and Urbana, Illinois:

A. General Business:
   1. Business Plan.
   2. Organization charts.
   3. Key decision makers.
   4. Major business measurements and control.
   5. Major problem areas.
   6. Products and markets (i.e. mission: education, public service, and research).
   7. Geographical distribution.
   8. Financial statistics.
   9. Sizing statistics.

B. Information Systems:
   1. I/S plan goals, objectives, strategies, resources, schedules, finances.
   2. Organization charts.
   3. Software environment.
   4. Present and planned systems and data bases.
   5. Sizing statistics.]

8.2.3 BSP Education Plan

Team members should understand the principles of BSP methodology, to enable a smooth, coordinated entry into the BSP study. A review of the nature of the output that can be expected will also be an advantage to the team members, plus some understanding of the method of implementation.

Team education plans for 43.7 percent of the corporations that responded "Yes" to question 19 were established by the team leader (See Tables 8.2-8.2.1 and Graph 8.2).

[e.g., Southern Company Services, Inc. (Electric Utilities) of Atlanta, Georgia also responded "Yes" to question 19, as did many others. However, they indicated that they "do not use BSP", but they do use a planning concept called: "Data Center 5-SR Plan."]

8.2.4 The Study Work Plan

Appropriate planning and assignment of tasks requires an intensive study activity. All known tasks indicating major resource

allocation required to complete the study will be documented by a work plan.

The respondents for 62.5 percent of the corporations questioned (question 20) indicated that their team working under the guidance of the team leader developed a study work plan in keeping with the scope and objectives previously established.

[e.g., The Western Company of North America (Oil Equipment, Services), Fort Worth, Texas, also indicated "Yes" to question 20 (See Tables 8.2-8.2.1 and Graph 8.2).]

8.2.5 The Control File

All material pertaining to the study should be included in a control file. Documents should be stored in a lockable filing cabinet, because of the nature and number of the documents involved.

Many of the respondents, 68.7 percent, established a BSP study control file, and included one or more of the contents in question 21.

[e.g., Federal Express (Small Package Transportation), of Colorado Springs, Colorado, checked the following contents that were included in their control file:

1. Key correspondence.
2. Statements of objectives and scope.
3. Project plan.
4. Schedules.
5. Data gathered during preparation.
6. Documentation of completed analysis.
7. Recommendations.
8. Report and presentation.]

8.2.6 The Study Report

The establishment of an outline should be done as early as

possible. Responsibility for sections of the report should be assigned to the team members. It is the assigned members' duty to coordinate and deliver their section during the study period.

Respondents for the corporations that were surveyed (70.5 percent), checked one or more of the topics in question 22 (Tables 8.2-8.2.1) that were contained in their Study Report (Graph 8.2).

[e.g., Armstrong World Industries, Inc., (Building Materials) of Lancaster, Pennsylvania, checked the following topics that were contained in their study report:

1. Executive summary.
2. Purpose, scope and objectives.
3. Method of study.
4. Findings and conclusions.
5. Recommendations.
6. Appendices.]

8.2.7 Invitation Letter

An invitation letter should be sent at least one week before the interview, to enable the executives to prepare for the interview. The time and place for the interview should also be confirmed. The importance of executive participation in the study should be emphasized and referenced in the study announcement letter previously signed by the chief executive officer. A list of topics for discussion during the interview should be included either within the body of the invitation letter or as an attachment.

Fifty percent of the respondents checked-off (in the questionnaire) one or more of the topics (See question 23; Tables 8.2-8.2.1 and Graph 8.2, pp. 188-190) that should be included in the invitation letter.

[e.g., Associated Grocers (Food Distribution) of Denver, Colorado, checked the following topics that were included in their invitation letter:

1. Objectives and plans.
2. Identified key business areas.
3. Established future I/S support requirements.
4. Determined the value of required I/S support.]

8.2.8 Briefing Session

Prior to the commencement of the executive perspective segment of the BSP study, the selected executives should attend a briefing session. So that the session may be delivered at the appropriate time during the study activities, the executive briefing session should be prepared, presenters selected and exhibits prepared, all during this preparation phase.

Respondents for 56.3 percent of the corporations surveyed (question 24, Tables 8.2-8.2.1 and Graph 8.2, pp. 188-190) checked-off in the questionnaire one or more of the major topics that should be included in the briefing.

[e.g., Ryder Truck Rental, Inc. (Truck Leasing and Transportation Service's) of Miami, Florida, included the following major topics in their briefing:

1. Executive level overview of BSP.
2. Study scope.
3. Objectives of the study.
4. Business reasons for conducting the study.
5. Executive involvement -- why, and what is expected of the executive.]

8.2.9 Executive Sponsor Review Meeting

A successful review meeting with the executive sponsor indi-

cates the completion of the study preparation phase. Furthermore, all issues should have been resolved by this time.

Fifty-six percent (rounded off) of the corporations surveyed responded to one or more of the items to be reviewed with the executive sponsor in question 25 (See Tables 8.2-8.2.1 and Graph 8.2).

[e.g., The General Electric Co. (Powdered Metal Products for Industry), of Detroit, Michigan, checked off the following items that were reviewed with the executive sponsor:

1. Study work plan.
2. Definition of the study output.
3. Approval process.
4. Executive selection and discussion schedule.]

Chapter 9

BUSINESS SYSTEMS PLANNING METHODOLOGY DETAILS OVERVIEW

The details of the methodology, culminating in the writing of the final report and the making of recommendations to the business executives are listed below:

1. Kickoff meeting.
2. Business processes.
3. Data Classes.
4. Business/Systems Relationships.
5. Executive perspective.
6. Business problems.
7. Information architecture.
8. Architectural priorities.
9. Management Information Systems.
10. Recommendations and Action Plans.

This chapter will provide an overview of the above details and recommendations of all of the responses pertaining to specific BSP methodology.

9.1 The Opening Meeting

The first major activity in the formal execution of a BSP study is the opening meeting. The understanding of the business requirements and data processing support (as it exists today as well as business requirements for the future) is part of the aim of the opening meeting and they'll be discussed in sections 9.2-9.6 later in this chapter. All of the above activities must be carried out

conscientiously, since this understanding is vital to the success of the study.

9.1.1 Purpose of the Opening Meeting

Insuring that each team member is conversant with the information that has been gathered and to discuss those facts that are not part of the information supplied, is the main purpose of the opening meeting. The team leader walks through the business facts that have been gathered and makes subjective comments and additions on facts that cannot be readily documented.

In order to accomplish the above, 56 percent of the corporations that responded to question 26 (Tables 9.1-9.1.1 and Graph 9.1) checked off one or more of the presentations that were contained in the first meeting.

[e.g., The Wisconsin Public Service Corporation (Electric/Gas Utilities), Green Bay, Wisconsin, checked off the following presentations that were contained in their first meeting:

1. The executive sponsor reiterated objectives, outputs and study perspectives.
2. The team leader held discussions on such subjects as major problems.]

9.1.2 Executive Sponsor's Opening

The executive sponsor should open the meeting, emphasizing the business reasons for initiating the study, and explaining the significance of the high-priority program to the company.

According to 45.5 percent of the respondents, they answered "Yes" (to question 27) to the question that asked: "Was the kickoff meeting attended by all study team members?"

Table 9.1

The Opening Meeting by One-hundred and Twelve
U.S. Corporations
February, 1982

Questionnaire Response by Number and Percent	Business Systems Planning Questionnaire				
	Questions				
	26	27	28	29	30
Small#					
Yes‡		2		3	
Pct.(%)		40.0		60.0	
No‡		1		0	
Pct.(%)		20.0		0.0	
Other@	2		2		3
Pct.(%)	40.0		40.0		60.0
No Response	3	2	3	2	2
Pct.(%)	60.0	40.0	60.0	40.0	40.0
Medium#					
Yes‡		6		7	
Pct.(%)		46.1		53.9	
No‡		1		1	
Pct.(%)		7.8		7.8	
Other@	6		6		8
Pct.(%)	46.1		46.1		61.7
No Response	7	6	7	5	5
Pct.(%)	53.9	46.1	53.9	38.3	38.3

Corporations by size according to annual sales.
Grand total of responses by small, medium, and large corporations.
‡ "Yes" and "No" responses to questionnaire (see Appendix A).
@ Checked-off responses to one or more of the list of items in the question other than "Yes" or "No."

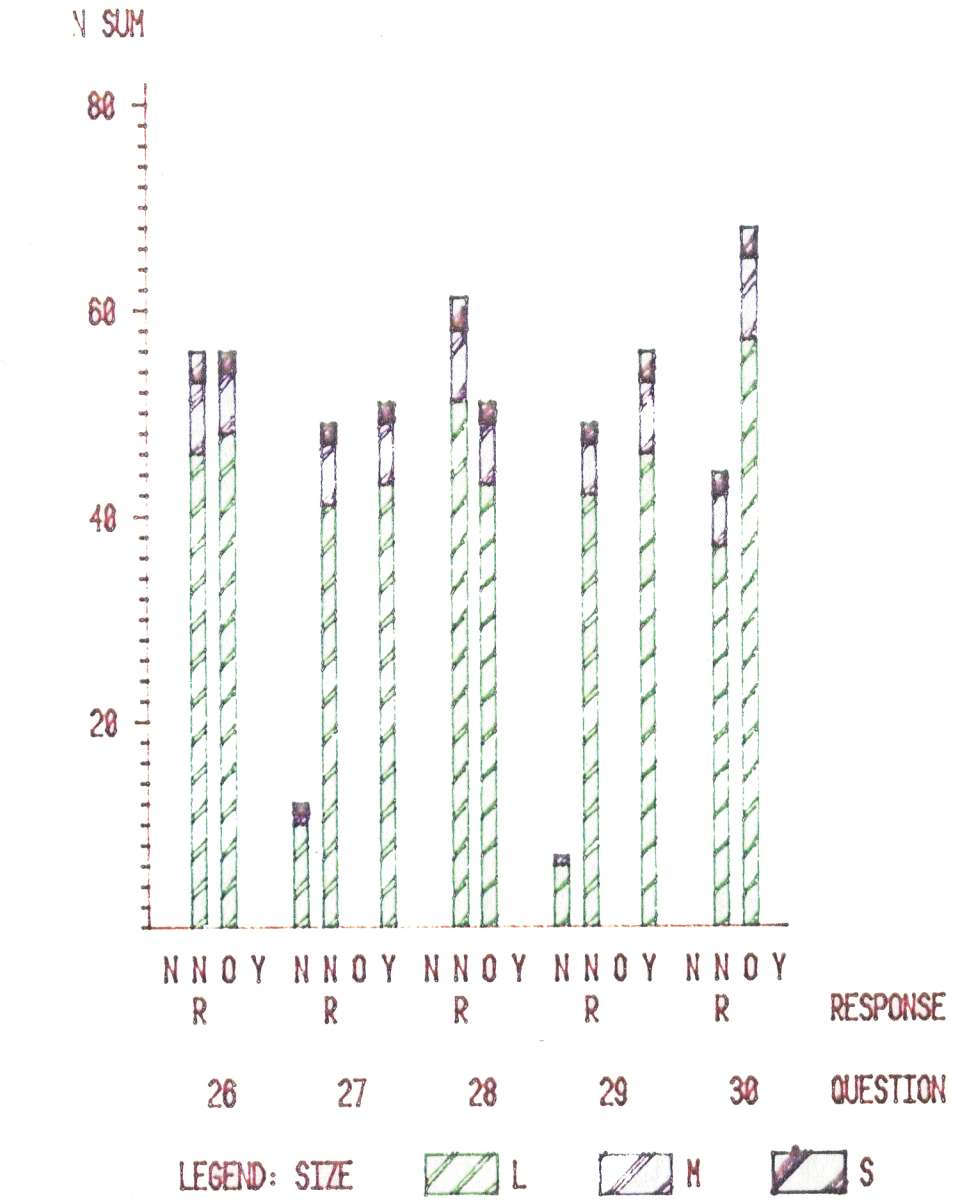
Table 9.1.1

The Opening Meeting by One-hundred and Twelve
U.S. Corporations
February, 1982

Questionnaire Response by Number and Percent	Business Systems Planning Questionnaire				
	Questions				
	26	27	28	29	30
Large*					
Yes‡		43		46	
Pct.(%)		45.8		49.0	
No‡		10		6	
Pct.(%)		10.6		6.4	
Other∂	48		43		57
Pct.(%)	51.0		45.7		60.6
No Response	46	41	51	42	37
Pct.(%)	49.0	43.6	54.3	44.6	39.4
Grand Total**					
Yes‡		51		56	
Pct.(%)		45.5		50.0	
No‡		12		7	
Pct.(%)		10.7		6.2	
Other∂	56		51		68
Pct.(%)	50.0		45.6		60.7
No Response	56	49	61	49	44
Pct.(%)	50.0	43.8	54.4	43.8	39.3

* Corporations by size according to annual sales.
** Grand total of responses by small, medium, and large corporations.
‡ "Yes" and "No" responses to questionnaire (see Appendix A).
∂ Checked-off responses to one or more of the list of items in the question other than "Yes" or "No."

GRAPH 9.1
THE OPENING MEETING



N: NO Y: YES O: OTHER NR: NO RESPONSE

[e.g., A T & T Long Lines (Telephones), of Bedminster, New Jersey also answered "Yes" to the above question, but did not offer to explain why.]

9.1.3 Work Plan Review

The work plan should be reviewed by the study team leader. The study work plan should also be used as a point of departure for discussing and finalizing one or more of the topics that were checked off by 45.6 percent of the respondents in question 28 (Tables 9.1-9.1.1 and Graph 9.1).

[e.g., The Lockheed Missile and Space Co., (Aircraft/Missiles), of Sunnyvale, California, indicated that the study work plan was used as a point of departure for discussing and finalizing the following topics:

1. Major events, outputs, and schedules.
2. Individual assignments.
3. Project control.]

9.1.4 Business Related Information

The business related information gathered during the study preparation phase should be prepared in form by the team leader according to 50 percent of corporations who answered "Yes" to this question (question 29; Tables 9.1-9.1.1 and Graph 9.1, pp. 199-201).

[e.g., The Southern New England Telephone Co., of New Haven, Connecticut also answered "Yes" to the above question, but declined to explain why.]

9.1.5 Study Preparation Summary

While the team members are developing their conclusions and recommendations, a copy of the presentation should be made available to them, as it will help them later in the study -- especially during the interviews.

One or more of the topics in the outline for the presentation of the I/S function was checked off by 60.7 percent of the corporations responding (See question 30 in Tables 9.1-9.1.1 and Graph 9.1).

[e.g., J. C. Penney Life Insurance Co., Dallas, Texas, indicated that the following were included in their outline for the presentation of the I/S function:

1. History and background of data processing.
2. Relationship with users.
3. Project approval process.
4. Key problems and challenges.
5. Quality reviews -- moving window concept for refunding and replanning projects.

In addition, J. C. Penney indicated that: "They gave a presentation to officers and managers of the company on SPECTRUM and its philosophy, instead of BSP."]

9.2 Business Processes

The identification of the business processes is one of the most overwhelming and important activities during the BSP study. A list of all the processes, a description of each, and the identification of those that are a key to the success of the business, is the major output from identifying the business processes.

Fifty-six percent (rounded off) of the corporations indicated "Yes" to the question (see question 31, Tables 9.2-9.2.1 and Graph

Table 9.2

Business Processes by One-hundred and Twelve
U.S. Corporations
February, 1982

Questionnaire Response by Number and Percent	Business Systems Planning Questionnaire Questions 31	32	33	34	35	36	37	38	39	40
Small#										
Yes¥	3					3	3		3	
Pct.(%)	60.0					60.0	60.0		60.0	
No¥										
Pct.(%)										
Other@		3	3	2	2			2		3
Pct.(%)		60.0	60.0	40.0	40.0			40.0		60.0
No Response	2	2	2	3	3	2	2	3	2	2
Pct.(%)	40.0	40.0	40.0	60.0	60.0	40.0	40.0	60.0	40.0	40.0
Medium#										
Yes¥	7					8	7		7	
Pct.(%)	53.9					61.6	53.9		53.9	
No¥	1						1		1	
Pct.(%)	7.7						7.7		7.7	
Other@		7	7	5	6			6		9
Pct.(%)		53.8	53.8	38.4	46.2			46.1		69.2
No Response	5	6	6	8	7	5	5	7	5	4
Pct.(%)	38.4	46.2	46.2	61.6	53.8	38.4	38.4	53.9	38.4	30.8

\# Corporations by size according to annual sales.
Grand total of responses by small, medium, and large corporations.
¥ "Yes" and "No" responses to questionnaire (see Appendix A).
@ Checked-off responses to one or more of the list of items in the question other than "Yes" or "No."

Table 9.2.1

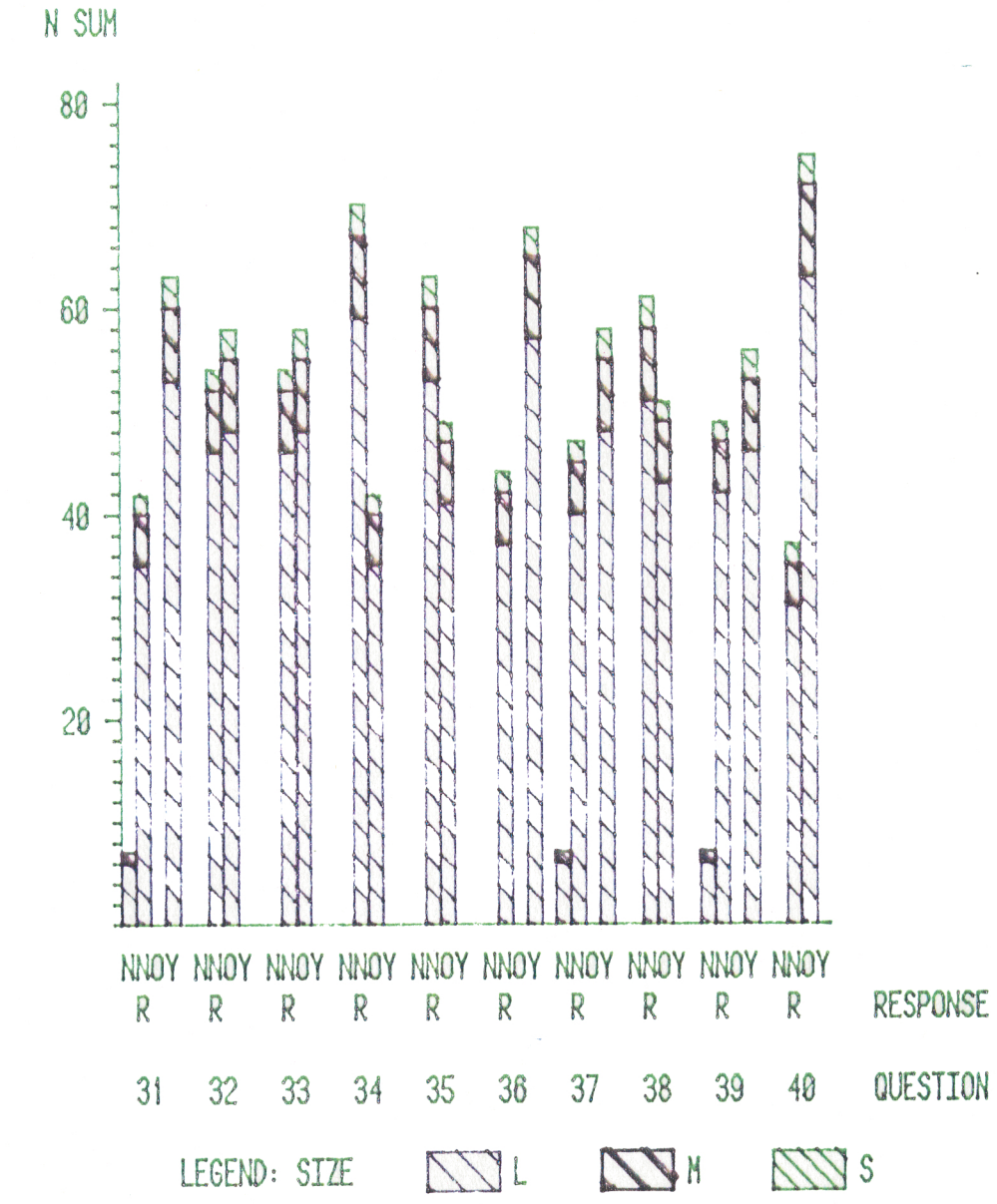
Business Processes by One-hundred and Twelve
U.S. Corporations
February, 1982

Questionnaire Response by Number and Percent	Business Systems Planning Questionnaire									
	Questions									
	31	32	33	34	35	36	37	38	39	40
Large*										
Yes†	53					57	48		46	
Pct.(%)	56.4					60.7	51.0		49.0	
No†	6						6		6	
Pct.(%)	6.4						6.4		6.4	
Other@		48	48	35	41			43		63
Pct.(%)		51.0	51.0	37.2	43.6			45.7		67.0
No Response	35	46	46	59	53	37	40	51	42	31
Pct.(%)	37.2	49.0	49.0	62.8	56.4	39.3	42.6	54.3	44.6	33.0
Grand Total**										
Yes†	63					68	58		56	
Pct.(%)	56.2					60.7	51.8		50.0	
No†	7						7		7	
Pct.(%)	6.2						6.2		6.2	
Other@		58	58	42	49			51		75
Pct.(%)		51.8	51.8	37.5	43.8			45.6		66.9
No Response	42	54	54	70	63	44	47	61	49	37
Pct.(%)	37.6	48.2	48.2	62.5	56.2	39.3	42.0	54.4	43.8	33.1

* Corporations by size according to annual sales.
** Grand total of responses by small, medium, and large corporations.
† "Yes" and "No" responses to questionnaire (see Appendix A).
@ Checked-off responses to one or more of the list of items in the question other than "Yes" or "No."

GRAPH 9.2

BUSINESS PROCESSES



N: NO Y: YES O: OTHER NR: NO RESPONSE

9.2) of whether they had defined their business process.

[e.g., However, A T & T Long Lines, Morristown, New Jersey, indicated "No" to the above question. They explained that the corporation as a whole has not defined the business processes, but that their "department only" had.]

9.2.1 Business Process Definition

Business Processes are defined as "groups of logically related decisions and activities required to manage the resources of the business" for purposes of the BSP study. Without regard to the organization responsible for them, they are studied and identified.

After the business processes were defined, 51.8 percent of the respondents checked off one or more of the results in question 32 (Tables 9.2-9.2.1 and Graph 9.2).

[e.g., The respondent for the Department of Revenue for the State of Kansas, checked off the following results after the business processes were defined:

1. Separated the strategic planning and management control processes from operational control process.
2. Defined required information architecture, determining its scope, to make it modular, and setting priorities for its development.
3. Set parameters for the resulting systems development projects.]

9.2.2 Predefinition of Business Processes

Prior to defining the processes, 51.8 percent of the corporations responding, checked one or more of the prerequisites that they met, as listed in question 33 (See Tables 9.2-9.2.1 and Graph 9.2).

[e.g., Abbott Laboratories, of North Chicago, checked the following prerequisites, prior to defining the processes:

1. All members were present and participated throughout the exercise, and there was general agreement on the expected outputs before the exercise began.
2. The team had a clear understanding of the concept of resources and their life cycle.]

9.2.3 Resource Management

Managing the resources to most efficiently and effectively support the goals of the total business, is the job of the manager. In order to logically identify and group the processes, a four-stage life cycle of the product/service and of each of the supporting resources was used by 37.5 percent of the corporations responding to the survey. The responding corporations used one to four of the stages of the life cycle in response to question 34 (Tables 9.2-9.2.1 and Graph 9.2).

[e.g., Federal Express Corporation, only checked two of the life cycle stages:

1. Requirements, planning, measurement and control.
2. Acquisition or implementation.]

9.2.4 Overview of Process Identification

It should not be too difficult to identify the processes involved, since preparatory work was completed in collecting information on planning and samples of the organization plans. The processes will be grouped into strategic planning and management control. Furthermore, a seven-year plan or development plan, is usually referred to as the "long range plan." In addition, an operating plan, management plan, resource plan, and contract, may be referred as "management

control." The budget may serve as a major tool for management planning and control in some companies.

Processes of strategic planning and control were defined in 43.8 percent of the corporations who checked-off one or more of the planning and control processes in question 35 (See Tables 9.2-9.2.1 and Graph 9.2).

[e.g., The American Medical Association, Chicago, Illinois, checked all of the planning and control processes in the question.]

9.2.4.1 Products/Service Identification

Sixty-one percent (rounded off) of the respondents answered "Yes" to the question (question 36; Tables 9.2-9.2.1 and Graph 9.2): "Was the product/service of the organization identified?"

[e.g., Amdahl Corporation answered "Yes" to the above question, and stated that the product/service of the organization was identified through the development of "Databases."]

To start with the requirements stage and work through the succeeding stages, is the general approach that was used by 51.8 percent of the respondents (who answered "Yes") in identifying the processes in question 37 (Tables 9.2-9.2.1 and Graph 9.2).

[e.g., However, Northwest Computer Services, of Minneapolis, Minnesota, answered "No" to this question, in that they, "did not have full agreement on some products; and further study was required."]

A general flowchart of the product/service processes was made by 45.6 percent of the corporations that responded to the survey. Furthermore, those responding to question 38 (Tables 9.2-9.2.1, and

Graph 9.2) checked off one or more of the purposes that the flowchart helped to serve.

[e.g., Southern Co. Services, Inc. (Electric Utilities), Atlanta, Georgia, indicated that the general flowchart helped to serve the following purposes, even though they did not use BSP, but a methodology called "The Data Center Plan."

1. It helped to provide that all the processes had been identified.
2. It helped to determine that the team really understood the business processes associated with the product/service.
3. It served as a model for the subsequent definition of the information architecture.
4. It helped identify the processes involved in managing the supporting resources.]

Furthermore, the respondent for Southern Co. Services, Inc., also indicated that they used "data flow diagrams, data dictionaries, and process descriptions" in the development of the general flowchart.

Team members were taking notes in 50 percent of the corporations that responded "Yes", on the decisions and activities associated with each of the processes as they were defined by the group, in question 39 (See Tables 9.2-9.2.1 and Graph 9.2, pp. 204-206).

[e.g., Brown & Root, Inc., also indicated "Yes" in response to the above question. Furthermore, they indicated that the processes were identified with the aid of a "Chairman of 8 functional committees -- Accounting, Personnel, Project General Management, Project Cost, Scheduling, Estimating, and Materials."]

9.2.4.2 Resource Processes Support

That which a business consumes or uses in meeting its goals, is described as a resource. The resources are described in question

40 (See Tables 9.2.-9.2.1 and Graph 9.2, pp. 204-206), in which 66.9 percent of the corporations responding consumed one or more of them in meeting the goals.

[e.g., Country Mutual Life Insurance, checked the following resources, which were used by them in meeting their goals:

1. Money.
2. Facilities.
3. Personnel.
4. Data (since insurance policies are made of data).]

Forty-two percent of respondents answered "Yes" to the question (question 41; Tables 9.2.2 and 9.2.2.1 and Graph 9.2.1, pp. 212-214): "Were the processes in the life cycle of each of the resources identified?"

[e.g., Northwest Computer Services, Inc., answered "No" to the above question, because processes were "already fairly well understood by their membership."]

9.2.4.3 Process Grouping

The following three sources are what identifies the process:

1. Strategic planning and management control.
2. Major product/service.
3. Supporting resources.

The processes were grouped along one or more of the lines as stated in question 42 (See Tables 9.2.2-9.2.2.1 and Graph 9.2.1, pp. 212-214), as indicated by 35.7 percent of the respondents.

[e.g., Amdahl Corporation checked off the processes if they were grouped along the following lines:

1. Reduced inconsistencies in source level.
2. Shared information.]

Table 9.2.2

Business Processes by One-hundred and Twelve
U.S. Corporations
February, 1982

Questionnaire Response by Number and Percent	Business Systems Planning Questionnaire Questions									
	41	42	43	44	45	46	47	48	49	50
Small#										
Yes‡	2		2	2	2		1	1	1	1
Pct.(%)	40.0		40.0	40.0	40.0		20.0	20.0	20.0	20.0
No‡	1		1	1	1		1	2	2	1
Pct.(%)	20.0		20.0	20.0	20.0		20.0	40.0	40.0	20.0
Other@		2				3				
Pct.(%)		40.0				60.0				
No Response	2	3	2	2	2	2	3	2	2	3
Pct.(%)	40.0	60.0	40.0	40.0	40.0	40.0	60.0	40.0	40.0	60.0
Medium#										
Yes‡	6		6	5	5		3	3	4	3
Pct.(%)	46.2		46.2	38.4	38.4		23.1	23.1	30.8	23.1
No‡	2		2	2	2		4	4	4	4
Pct.(%)	15.4		15.4	15.4	15.4		30.8	30.8	30.8	30.8
Other@		5				8				
Pct.(%)		38.4				61.6				
No Response	5	8	5	6	6	5	6	6	5	6
Pct.(%)	38.4	61.6	38.4	46.2	46.2	38.4	46.1	46.1	38.4	46.1

\# Corporations by size according to annual sales.
Grand total of responses by small, medium, and large corporations.
‡ "Yes" and "No" responses to questionnaire (see Appendix A).
@ Checked-off responses to one or more of the list of items in the question other than "Yes" or "No."

Table 9.2.2.1

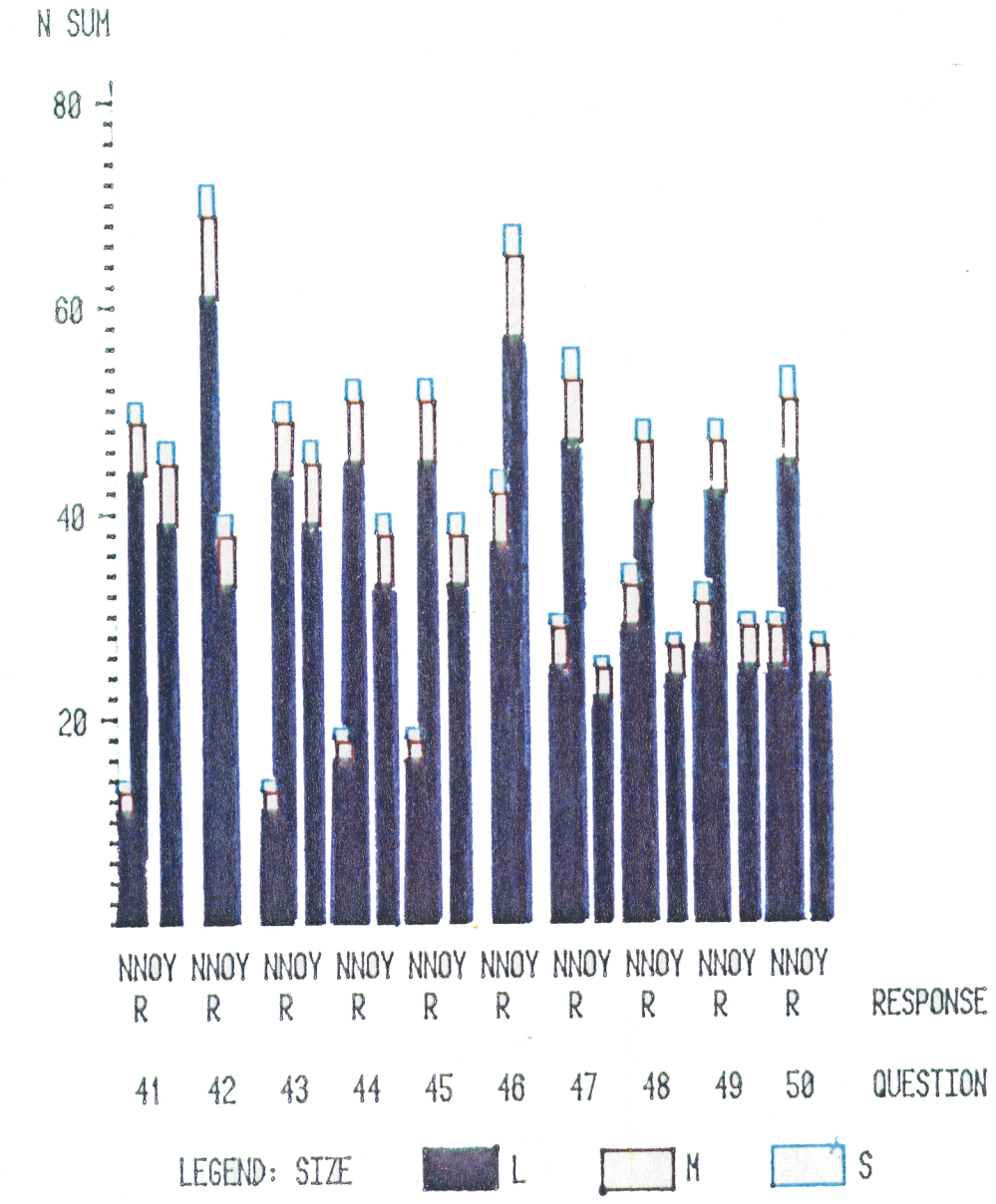
Business Processes by One-hundred and Twelve
U.S. Corporations
February, 1982

Questionnaire Response by Number and Percent	Business Systems Planning Questionnaire									
	Questions									
	41	42	43	44	45	46	47	48	49	50
Large#										
Yes¥	39		39	33	33		22	24	25	24
Pct.(%)	41.5		41.5	35.1	35.1		23.4	25.5	26.6	25.5
No¥	11		11	16	16		25	29	27	25
Pct.(%)	11.7		11.7	17.0	17.0		26.6	30.9	28.7	26.6
Other@		33				57				
Pct.(%)		35.0				60.6				
No Response	44	61	44	45	45	37	47	41	42	45
Pct.(%)	46.8	65.0	46.8	47.9	47.9	39.4	50.0	43.6	44.6	47.9
Grand Total##										
Yes¥	47		47	40	40		26	28	30	28
Pct.(%)	42.0		42.0	35.7	35.7		23.2	25.0	26.8	25.0
No¥	14		14	19	19		30	35	33	30
Pct.(%)	12.5		12.5	17.0	17.0		26.8	31.3	29.5	26.8
Other@		40				68				
Pct.(%)		35.7				60.7				
No Response	51	72	51	53	53	44	56	49	49	54
Pct.(%)	45.5	64.3	45.5	47.3	47.3	39.3	50.0	43.7	43.7	48.2

\# Corporations by size according to annual sales.
\#\# Grand total of responses by small, medium, and large corporations.
¥ "Yes" and "No" responses to questionnaire (see Appendix A).
@ Checked-off responses to one or more of the list of items in the question other than "Yes" or "No."

GRAPH 9.2.1

BUSINESS PROCESSES



N: NO Y:YES O: OTHER NR: NO RESPONSE

Each process group and its processes were listed on a chart and displayed for the whole team to view, as 42 percent of the respondents answered "Yes" to this question (See question 43; Tables 9.2.2-9.2.2.1 and Graph 9.2.1, pp. 212-214).

[e.g., The Upjohn Corporation (Chemicals/Drugs/Health care, Medical Supplies/Personal Care/Agricultural), of Kalamazoo, Michigan, answered "No", as to whether each process group and its processes were listed on a chart for the whole team to view. Instead, they indicated that they "used the IBM Data Dictionary."]

The business process can be related to the organizational structure of the business to help the study team identify any additional people that should be interviewed and to further clarify their understanding of the business processes. Did the study team complete a matrix before completing the process descriptions? The response to this question (question 44, Tables 9.2.2-9.2.2.1 and Graph 9.2.1, pp. 212-214) by 35.7 percent of corporations that answered, was a definite "Yes."

[e.g., However, Ryder Truck Rental, Inc., of Miami, Florida, gave a definite "No" to above question, indicating only that they "did the matrix after completing the process descriptions."]

The identification of the processes to the business success will later size up the importance of the problems identified, and the identification of items to be stressed in the executive interviews, so that it will aid in selecting the area of the business to be studied in more detail (architecture priority). Question 45 (See Tables 9.2.2-9.2.2.1 and Graph 9.2.1) asked whether "the processes key to

business success were identified?" Thirty-six percent (rounded off) of the respondents indicated an answer of "Yes" to this question.

[e.g., However, Superior Oil answered "No" to the above question, indicating that the identification was neither "explicitly discussed or developed."]

9.2.5 Business Process Output

The output expected from defining the business processes consisted of one or more of the topics checked off in question 46 (Tables 9.2.2-9.2.2.1 and Graph 9.2.1, pp. 212-214) by 60.7 percent of the corporations responding to the survey.

[e.g., Southern Co. Services, Inc., checked the following output that originated from their definition of the business processes:

1. A typed description of each of the processes.
2. Product/services flowchart (Data Flow Diagram which is under study by the corporation).]

9.2.6 Business, Product, Service Diversity

Were the various divisions or parts of the company of the product/services too diversified to have common-processes? If so, were they grouped before process identification was begun (question 47; Tables 9.2.2-9.2.2.1 and Graph 9.2.1, pp. 212-214)? Only 23.2 percent of the respondents answered "Yes" to the above questions.

[e.g., Southern N.E. Telephone Co., answered "No" to the above questions, indicating that their "studies were limited to certain departments within the business."]

9.2.6.1 External Assistance

There may be voids, even though the team members were selected with the aim of having their combined knowledge cover the entire business unit. Outside assistance was needed by 25 percent of those corporations who answered "Yes" to question 48 (See Tables 9.2.2-9.2.2.1 and Graph 9.2.1).

[e.g., However, the Western Company of North America answered the question "No", indicating that only "One employee on the team had any previous BSP experience. However, an IBM Systems Engineer was part of the team."]

9.2.6.2 Optional Methods for Identifying Business Processes

Twenty-seven percent (rounded off) of corporations surveyed used predefined checklists of processes in answering "Yes" to question 49 (See Tables 9.2.2-9.2.2.1 and Graph 9.2.1, pp. 212-214).

[e.g., However, the University of Illinois, answered "No" to this question, stating that they "developed their own lists."]

9.2.6.3 Business Process Model

A simple model of the business could be used as an alternate approach to identifying the business processes. The model that was used, was expanded to fit the business in identifying business processes, by only 25 percent of the corporations that responded "Yes" to question 50 (Tables 9.2.2-9.2.2.1 and Graph 9.2.1).

[e.g., Nevertheless, the State of Kansas Department of Revenue responded with a "No" to the above question. The respondent for the State explained that the "processes were 'brainstormed', then dis-

cussed and defined. A list of taxes and fees the agency administers was used to insure completeness. The budget cycle provided a checklist for administrative functions."]

Therefore, a model was not used that could be expanded to fit the business in identifying business process.

9.3 Data Class Definition

The data classes were defined and grouped into logically related categories, according to 51.8 percent of the corporations that responded "Yes" to question 51 (Tables 9.3-9.3.1 and Graph 9.3, pp. 219-221).

[e.g., However, Amdahl Corporation answered "No" to the above question, indicating that "data entities" instead of "data classes" better "suited their purpose, in defining and grouping them into logically related categories.]

Since the data classes were probably defined, and grouped into logically related categories, were they identified in the two approaches below?

1. Business entity.
2. Business Process.

According to 54.5 percent of respondents, one or both of the approaches were used, in answering question 52 (See Tables 9.3-9.3.1 and Graph 9.3).

[e.g., However, the Upjohn Corporation, "used a different approach" than the above, the "entity affinity analysis" or the "entity relationship analysis" to be exact.]

Table 9.3

Data Class Definition by One-hundred and Twelve
U.S. Corporations
February, 1982

Questionnaire Response by Number and Percent	Business Systems Planning Questionnaire				
	Questions				
	51	52	53	54	55
Small*					
Yes¥	3		2	1	2
Pct.(%)	60.0		40.0	20.0	40.0
No¥			1	1	1
Pct.(%)			20.0	20.0	20.0
Other∂		3			
Pct.(%)		60.0			
No Response	2	2	2	3	2
Pct.(%)	40.0	40.0	40.0	60.0	40.0
Medium*					
Yes¥	7		4	3	5
Pct.(%)	53.9		30.7	23.1	38.4
No¥	1		3	3	2
Pct.(%)	7.7		23.1	23.1	15.4
Other∂		7			
Pct.(%)		53.9			
No Response	5	6	6	7	6
Pct.(%)	38.4	46.1	46.2	53.8	46.2

* Corporations by size according to annual sales.
** Grand total of responses by small, medium, and large corporations.
¥ "Yes" and "No" responses to questionnaire (see Appendix A).
∂ Checked-off responses to one or more of the list of items in the question other than "Yes" or "No."

Table 9.3.1

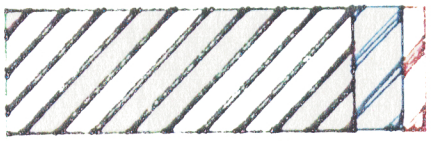
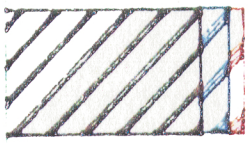
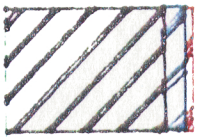
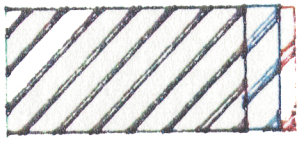
Data Class Definition by One-hundred and Twelve
U.S. Corporations
February, 1982

Questionnaire Response by Number and Percent	Business Systems Planning Questionnaire				
	Questions				
	51	52	53	54	55
Large#					
Yes*	48		27	22	33
Pct.(%)	51.1		28.7	23.4	35.1
No*	6		22	24	11
Pct.(%)	6.4		23.4	25.5	11.7
Other@		51			
Pct.(%)		54.2			
No Response	40	43	45	48	50
Pct.(%)	42.5	45.8	47.9	51.1	53.2
Grand Total##					
Yes*	58		33	26	40
Pct.(%)	51.8		29.5	23.2	35.7
No*	7		26	28	14
Pct.(%)	6.3		23.2	25.0	12.5
Other@		61			
Pct.(%)		54.5			
No Response	47	51	53	58	58
Pct.(%)	41.9	45.5	47.3	51.8	51.8

\# Corporations by size according to annual sales.
Grand total of responses by small, medium, and large corporations.
* "Yes" and "No" responses to questionnaire (see Appendix A).
@ Checked-off responses to one or more of the list of items in the question other than "Yes" or "No."

GRAPH 9.3

DATA CLASS DEFINITION

QUESTION	RESPONSE		FREQ	N SUM
51	Y		3	58.00000
52	Y		3	0.00000
53	Y		3	33.00000
54	Y		3	26.00000
55	Y		3	40.00000



LEGEND: SIZE  L  M  S

Y: YES

9.3.1 The Business Approach

Things that an organization is concerned about and therefore keeps information about, are called "business entities". A matrix, therefore, should be developed by the study team to identify the data classes related to those entities, similar to the example in "Appendix B" of the questionnaire.

Thirty percent (rounded off) of the corporations that responded, answered "Yes" (question 53; Tables 9.3-9.3.1 and Graph 9.3, pp. 219-221) to having developed a matrix to help identify the data classes in relation to entities.

[e.g., General Electric Corporation, of Detroit, Michigan, answered the question "Yes" in their development of a matrix to identify the data classes. However, they indicated that "this intermediate matrix wasn't directly included in the final report."]

9.3.2 The Process Approach

Specifically, the data that is created and/or used by each process, is the second approach to identifying data classes, which uses the previously defined business processes. Therefore, it appears that only 23.2 percent of the respondents used the business process approach. In addition, the same percentage of respondents answered "Yes" (question 54; Tables 9.3-9.3.1 and Graph 9.3, pp. 219-221) to having a series of input-process-output diagrams constructed, one for each of the 20 to 60 processes identified in the business process definition.

[e.g., The Insurance Company of North America, Philadelphia, Pennsylvania, answered the above question "No", because "to the best

of their knowledge, all business plans were in summary form with attached charts; diagrams were prepared at a later date."]

9.3.3 Cross-referencing and Regrouping

It is possible to compile a manageable list of 30 to 60 data classes, by cross-analyzing "Appendix B" (of the questionnaire) and the "input-process-output diagrams" and regrouping on the basis of commonalties or inconsistencies in level. Do to the fact that the above was done, the study team placed the data classes on a matrix opposite the business processes, according to 35.7 percent of the corporations that answered "Yes" to question 55 (See Tables 9.3-9.3.1 and Graph 9.3).

[e.g., Deere and Company, answered the above question "No", and explained further by stating that: "Details were not required; and the study was to define planning at a much higher level."]

9.4 Business Systems Analysis

In order to develop recommendations for future action, the purpose of analyzing Business/Systems relationships is to show how data processing currently supports the business. Also, in order to identify voids and redundancies, help clarify responsibilities, and further the understanding of the business processes, the currently existing organizations, business processes, information systems (applications), and data files are analyzed.

Therefore, the main analysis tool is the matrix, and various matrices are developed using combinations of the four elements above.

Thirty-three percent (rounded off) of the responding corporations used the matrix as their main analysis tool to prepare the study team for discussions with executives, and determine requirements for information support, by answering "Yes" to question 56 (See Tables (9.4-9.4.1 and Graph 9.4, pp. 225-227).

[e.g., The Kansas Department of Revenue did not use the matrix as their main analysis tool, thus indicating an answer of "No." Their explanation was that the "data classes were defined after the interviews."]

The matrices cannot indicate the extent of support needed or the value of their support to each of the processes, even though they provide an overview of the current and planned data processing support of the business. Therefore, in 29.5 percent of the corporations that used the matrix as their main analysis tool, the same percentage indicated ("Yes") that the matrices provided an overview of the current and planned data processing support of the business (See question 57; Tables 9.4-9.4.1 and Graph 9.4, pp. 225-227).

[e.g., Davidson Timber (the bankrupt corporation), did not use the matrix as its main analysis tool, and therefore could not provide an overview of the current and planned data processing support of the business. Instead, they only used a "Decision matrix on an ongoing advanced level, because it was not completed for DP decision making."]

9.4.1 Data Processing Support

The study team may opt to annotate the organization/process matrix in order to obtain a businesswide picture of existing and

Table 9.4

Business Systems Analysis by One-hundred and Twelve
U.S. Corporations
February, 1982

Questionnaire Response by Number and Percent	Business Systems Planning Questionnaire				
	Questions				
	56	57	58	59	60
Small#					
Yes*	2	2		1	1
Pct.(%)	40.0	40.0		20.0	20.0
No*	1	1		1	1
Pct.(%)	20.0	20.0		20.0	20.0
Other@			2		
Pct.(%)			40.0		
No Response	2	2	3	3	3
Pct.(%)	40.0	40.0	60.0	60.0	60.0
Medium#					
Yes*	4	4		3	3
Pct.(%)	30.7	30.7		23.1	23.1
No*	3	2		2	3
Pct.(%)	23.1	15.4		15.4	23.1
Other@			5		
Pct.(%)			39.5		
No Response	6	7	8	8	7
Pct.(%)	46.2	53.9	61.5	61.5	53.9

\# Corporations by size according to annual sales.
Grand total of responses by small, medium, and large corporations.
* "Yes" and "No" responses to questionnaire (see Appendix A).
@ Checked-off responses to one or more of the list of items in the question other than "Yes" or "No."

Table 9.4.1

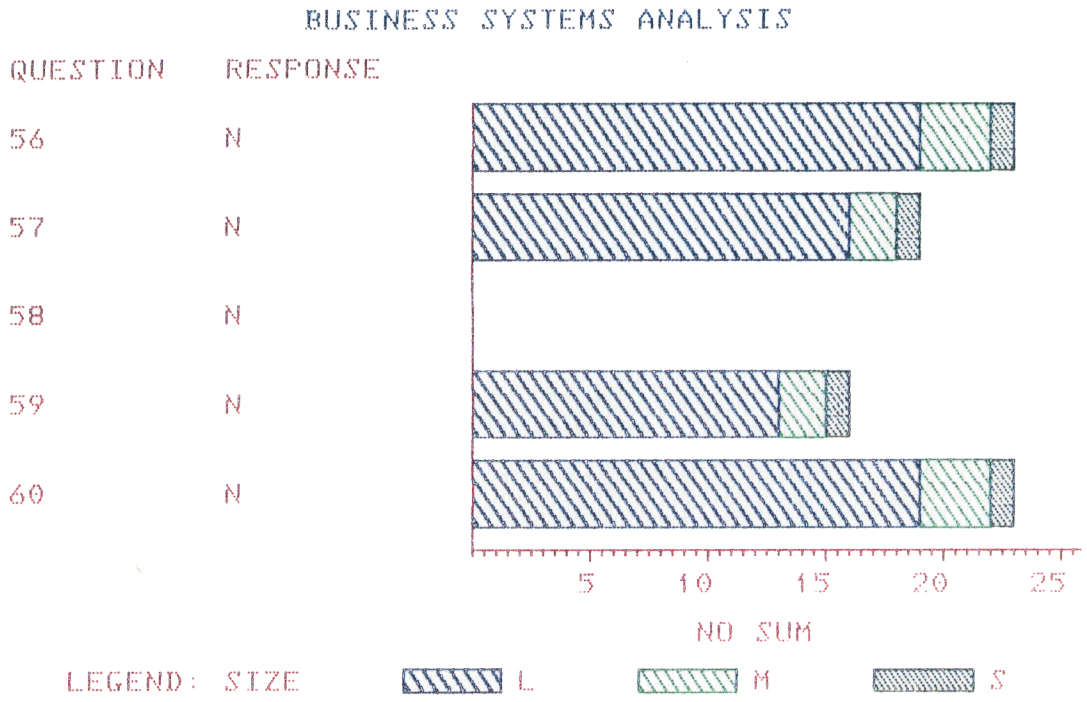
Business Systems Analysis by One-hundred and Twelve
U.S. Corporations
February, 1982

Questionnaire Response by Number and Percent	Business Systems Planning Questionnaire				
	Questions				
	56	57	58	59	60
Large#					
Yes*	31	27		24	24
Pct.(%)	33.0	28.7		25.5	25.5
No*	19	16		13	19
Pct.(%)	20.2	17.0		13.8	20.2
Other@			35		
Pct.(%)			37.2		
No Response	44	52	59	57	51
Pct.(%)	46.8	55.3	62.8	60.7	54.3
Grand Total##					
Yes*	37	33		28	28
Pct.(%)	33.1	29.5		25.0	25.0
No*	23	19		16	23
Pct.(%)	20.5	17.0		14.3	20.8
Other@			42		
Pct.(%)			37.5		
No Response	52	61	70	68	61
Pct.(%)	46.4	54.5	62.5	60.7	54.2

\# Corporations by size according to annual sales.
Grand total of responses by small, medium, and large corporations.
* "Yes" and "No" responses to questionnaire (see Appendix A).
@ Checked-off responses to one or more of the list of items in the question other than "Yes" or "No."

GRAPH 9.4

BUSINESS SYSTEMS ANALYSIS



N: NO

planned data processing support (See Appendix D, of questionnaire). In order to determine which organizations are receiving application support, notations are used on the matrix.

Therefore, the above helped the study teams of 37.5 percent of the responding corporations to identify one or more of the characteristics in question 58 (Tables 9.4-9.4.1 and Graph 9.4).

[e.g., General Electric Corporation was able to identify the following in question 58:

1. Processes receiving no current systems support.
2. Processes receiving systems support in some organizational unit.
3. Possible redundant systems.
4. Various -- Appendix D (of the questionnaire) is a key matrix to prepare, because it helps focus discussions.]

The team assigns a number to each of the current systems, then posts this number to the appropriate intersections on the organization/process matrix, in order to create the notations. Therefore, prior to creating the notations, only twenty-eight, or 25 percent of the respondents, indicated that their study teams created a system/organization matrix (Appendix E, of the Questionnaire) or a system/organization matrix (Appendix F, of the questionnaire), by answering "Yes", to question 59 (Tables 9.4-9.4.1 and Graph 9.4)

[e.g., Baker, Knapp & Tubbs, Inc. (Mfg. Furniture), of Grand Rapids, Michigan, answered "Yes" to question 59, but offered no explanation as to why they did.]

9.4.2 Current Data Usage

To determine which systems utilize certain portions of the data, the study team needs to understand what data is currently automated and where. So, in only 25 percent (a very poor response) of the

returned questionnaires, did the respondents answer "Yes" to question 60, in that the study team did develop the system/data file matrix (Appendix G, in the questionnaire) to provide this understanding (See Graph 9.4).

[e.g., However, First Wisconsin National Bank, of Milwaukee, Wisconsin, did not develop a system/data file matrix; nor did they give an explanation as to why they did not.]

9.5 Interviewing and Interview Analysis

Determining the executive perspective is part of the top-down approach. Its purpose is to validate the work done by the team, determine the objectives, problems, and information needs and their value, and gain executive rapport and involvement. Nearly half, or 48.2 percent of the respondents checked one or more of the major output that resulted from the interviews in question 61 (See Tables 9.5-9.5.1 and Graph 9.5).

[e.g., The Arkla Gas Co., of Shreveport, Louisiana, indicated that their only major output consisted of notes from the interview.]

Because the executive interviews are the primary source of information for determining the business problem and management's need for support in overcoming their problem and/or supporting new opportunities, interviewing and interview analysis consume more time during the study than any other activity. Therefore, the interviews are not intended to gather data on the specific details and exact form of the information required by the interviewees.

Table 9.5

Interviewing and Interview Analysis by One-hundred and Twelve
U.S. Corporations
February, 1982

Questionnaire Response by Number and Percent	Business Systems Planning Questionnaire								
	Questions								
	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9
Small*									
Yes*				2	2				2
Pct.(%)				40.0	40.0				40.0
No*									
Pct.(%)									
Other@	3	2	2			2	2	2	
Pct.(%)	60.0	40.0	40.0			40.0	40.0	40.0	
No Response	2	3	3	3	3	3	3	3	3
Pct.(%)	40.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0
Medium*									
Yes*				7	6				7
Pct.(%)				53.9	46.2				53.9
No*				1	1				
Pct.(%)				7.7	7.7				
Other@	6	7	7			6	7	5	
Pct.(%)	46.1	53.9	53.9			46.1	53.9	38.4	
No Response	7	6	6	5	6	7	6	8	6
Pct.(%)	53.9	46.1	46.1	38.4	46.1	53.9	46.1	61.6	46.1

* Corporations by size according to annual sales.
** Grand total of responses by small, medium, and large corporations.
\# "Yes" and "No" responses to questionnaire (see Appendix A).
@ Checked-off responses to one or more of the list of items in the question other than "Yes" or "No."

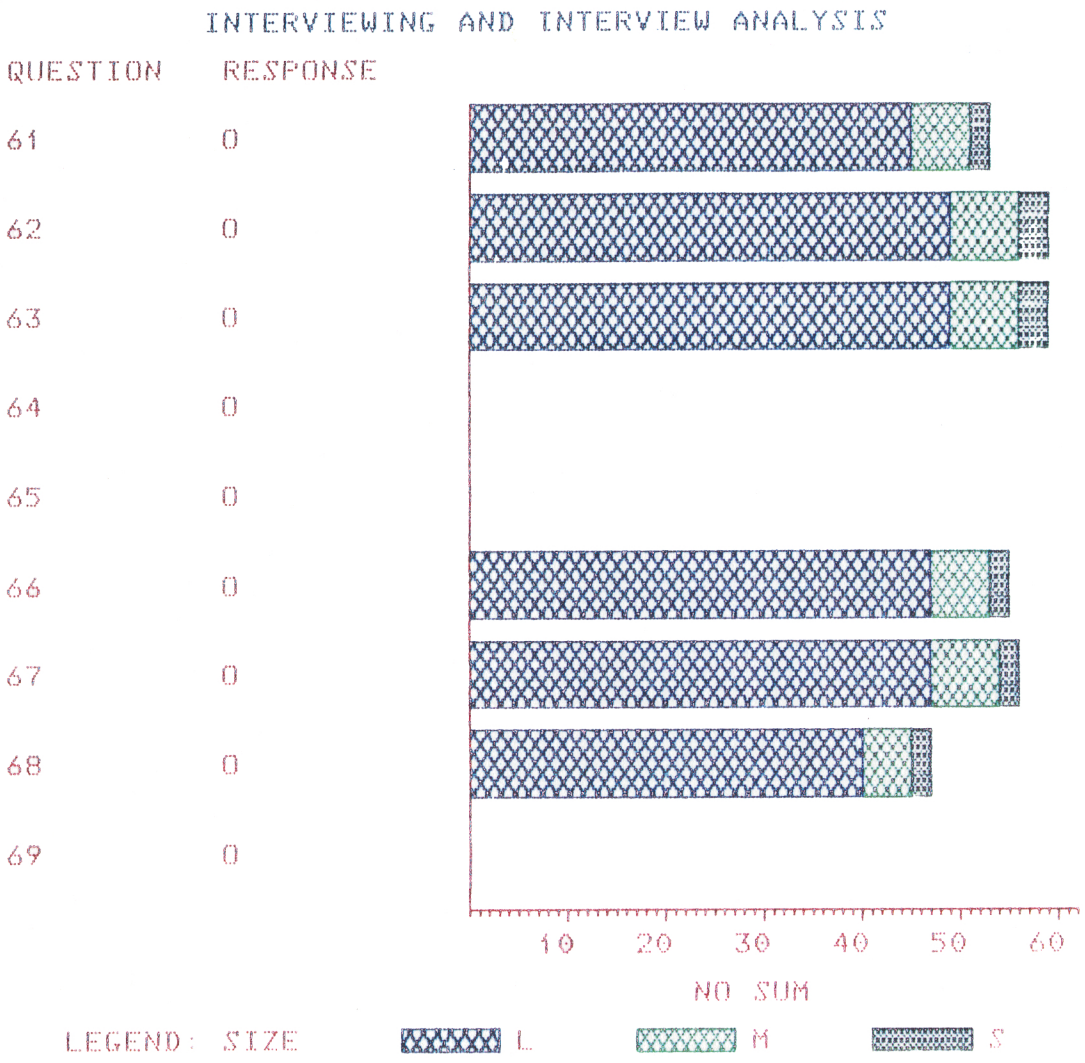
Table 3.5.1

Interviewing and Interview Analysis by One-hundred and Twelve
U.S. Corporations
February, 1982

Questionnaire Response by Number and Percent	Business Systems Planning Questionnaire Questions								
	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9
Large#									
Yes*				47	39				49
Pct.(%)				50.0	41.5				52.2
No*				4	6				2
Pct.(%)				4.3	6.4				2.1
Other@	45	49	49			47	47	40	
Pct.(%)	47.8	52.2	52.2			50.0	50.0	42.5	
No Response	49	45	45	43	49	47	47	54	43
Pct.(%)	52.2	47.8	47.8	45.7	52.1	50.0	50.0	57.5	45.7
Grand Total##									
Yes*				56	47				58
Pct.(%)				50.0	42.0				51.8
No*				5	7				2
Pct.(%)				4.5	6.3				1.7
Other@	54	58	58			56	56	47	
Pct.(%)	48.2	51.8	51.8			50.0	50.0	42.0	
No Response	58	54	54	51	58	56	56	65	52
Pct.(%)	51.8	48.2	48.2	45.5	51.7	50.0	50.0	58.0	46.5

\# Corporations by size according to annual sales.
Grand total of responses by small, medium, and large corporations.
* "Yes" and "No" responses to questionnaire (see Appendix A).
@ Checked-off responses to one or more of the list of items in the question other than "Yes" or "No."

GRAPH 9.5



0: OTHER

The study teams, or slightly over half (51.8 percent) of the corporations that responded to question 62, checked off one or more of the objectives of the interview that they were able to meet (See Tables 9.5-9.5.1 and Graph 9.5).

[e.g., The respondent for Crown Zellerbach Corporation, San Francisco, California, checked off the following objectives of the interview that their study team was able to meet:

1. Validated the data gathered, analyzed, and documented in matrices and charts.
2. Determined the information that was needed by individual executives as well as their problems and priorities.
3. Determined management values and quantified benefits that were derived by modifying or adding applications.]

In order to conduct the interview, certain tasks must be accomplished if it is to be successful. A little more than half of the respondents, fifty-eight, or 51.8 percent to be exact, checked-off one or more of the tasks that were accomplished as shown in question 63 (See Tables 9.5-9.5.1 and Graph 9.5).

[e.g., General Electric Corporation checked-off the following tasks that were accomplished in order to conduct the interview:

1. Confirmed the list of executives to be interviewed that was developed during the study preparation.
2. Reviewed the interview schedule to be certain it was practical, and confirmed it with the interviewees.
3. Organized wall charts in the control room.
4. Reviewed the questions that applied to all interviewees, and developed individualized questions for certain executives, as appropriate.
5. Determined the role of the study team members for each interview and the characteristics of individual interviewees.
6. Conducted the interview itself.
7. Prepared a summary of each interview to be approved by the interviewee.
8. Varied team members by interviewee, so as to maximize familiarity with functions.]

9.5.1 Executive Identification

The executives that are to be interviewed, should be identified by the team during the BSP study preparation phase, as indicated by fifty-six, or exactly half (50%) of the corporations that responded "Yes" to question 64 (See Tables 9.5-9.5.1 and Graph 9.5).

[e.g., Southern Co. Services, Inc., of Atlanta, Georgia, indicated that during the "Data Center Plan (a concept similiar to BSP)" study preparation, the team did identify (Yes) the "personnel (executives)" that were to be interviewed.]

9.5.2 Interview Schedule Confirmation

In answering question 65, forty-seven, or 42 percent of the corporations surveyed, indicated that the study team did confirm (by answering "Yes") the interview schedule, after the list of executives to be interviewed had been updated and confirmed (See Tables 9.5-9.5.1 and Graph 9.5).

[e.g., Abbott Laboratories, also indicated that their study team confirmed the interview schedule, but failed to state why.]

9.5.3 Interview Questions

The study team prepares a list of general questions that apply to all interviewees before the interviews are conducted. As needed, the team may also prepare specific questions for certain executives. While conducting the executive interview, fifty-six, or 50 percent of the responding corporations checked one or more of the "questions" in question 66 (See Tables 9.5-9.5.1 and Graph 9.5).

[e.g., Amdahl Corporation checked the following questions that were asked while conducting the executive interview:

1. Briefly, what is your area of responsibility?
2. What kind of decisions are you expected to make?
3. What major changes are anticipated in your area in the next year? Three Years?
4. Do you have any additional thoughts or comments?
5. What information entities do you utilize (e.g. customers, employees)?]

9.5.4 Role Assignment for Team Members

The assignment of roles for team members to play during interviews, is one of the tasks that must be performed when preparing for the interview. When making these assignments, there are several factors to consider.

There are usually no more than four active team members present at any particular interview, regardless of the number of people on the study team.

The same role in each interview, should not be played by a given team member. Furthermore, one or more of the roles that were played by the team members, were checked off by fifty-six, or 50 percent of the responding corporations in question 67.

[e.g., Davidson Timber (bankrupt) checked off the following roles that were played by the team members while conducting the executive interview:

1. An individual to present the study objectives and approach to the interviewee.
2. The interviewer himself.
3. Someone to take notes during the interview and have them organized, typed, and presented to the interviewee afterwards for approval.
4. Someone to tape the executive interview.]

9.5.5 Holding the Interview

The place where interruptions are least likely and where the matrices and charts can be displayed on the walls for reference, is the study control room. It should be convenient for the interviewees, if the control room is close to executive offices.

The sequence of activities that are shown in question 68 (of the questionnaire), where checked-off (one or more checked-off) by forty-seven, or 42 percent of the responding corporations. The corporations indicated that these activities transpired after the interviewee arrived and had been introduced to the interview team (See Tables 9.5-9.5.1 and Graph 9.5).

[e.g., Armstrong World Industries, Inc., checked off the following sequence of activities:

1. The interviewee was seated so that he could see the wall charts during the interview.
2. All the General questions and specific questions previously formulated were asked.]

9.5.6 Interview Documentation

The documentation of the interview should be kept current by the study team. Fifty-eight, or 51.8 percent of respondents who answered "Yes" to question 69 (in questionnaire), had all of their documentation (notes) pulled together, summarized, and typed (See Tables 9.5-9.5.1 and Graph 9.5).

[e.g., Associated Grocers of Colorado, Inc., answered the above question "Yes," but did not bother to explain why.]

9.6 Business Problems

During the fact gathering-step, some of the business problems were supplied as input. The knowledge of the team expanded and complemented the business problems, where they were then validated, explained, and added to the executive interview. In order to give guidance to the setting of project priorities, and to show clearly that better information will help to solve the problems, the problems must now be analyzed and related to the business processes.

One of the last activities in assessing the business problems by fifty-one, or 45.6 percent of the responding corporations that answered question 70 "Yes", was to divide them into those which are information systems support problems and those which are non I/S problems (See Tables 9.6-9.6.1 and Graph 9.6).

[e.g., Armstrong World Industries, Inc., in answering the above question, indicated that their business problems were not ("No") divided between those which were Information Systems support problems and those which were non I/S problems until much "later" on in the study.]

9.6.1 Interview Data Summarization

Forty-four, or less than half of the respondents (39.3%) checked-off one or more of the items in question 71 (of the questionnaire) which were selected out of each set of interview notes (See Tables 9.6-9.6.1 and Graph 9.6).

[e.g., General Electric Corporation checked off all of the following items in question 71, and included one of their own:

Table 9.6

Business Problems by One-hundred and Twelve
U.S. Corporations
February, 1982

Questionnaire Response by Number and Percent	Business Systems Planning Questionnaire			
	Questions			
	70	71	72	73
Small*				
Yes**	2		1	1
Pct.(%)	40.0		20.0	20.0
No**				
Pct.(%)				
Other@		2		
Pct.(%)		40.0		
No Response	3	3	4	4
Pct.(%)	60.0	60.0	80.0	80.0
Medium*				
Yes**	6		4	2
Pct.(%)	46.1		30.8	15.3
No**	1		2	6
Pct.(%)	7.7		15.3	46.1
Other@		5		
Pct.(%)		38.4		
No Response	6	8	7	5
Pct.(%)	46.2	61.6	53.9	38.6

* Corporations by size according to annual sales.
** Grand total of responses by small, medium, and large corporations.
* "Yes" and "No" responses to questionnaire (see Appendix A).
@ Checked-off responses to one or more of the list of items in the question other than "Yes" or "No."

Table 9.6.1

Business Problems by One-hundred and Twelve
U.S. Corporations
February, 1982

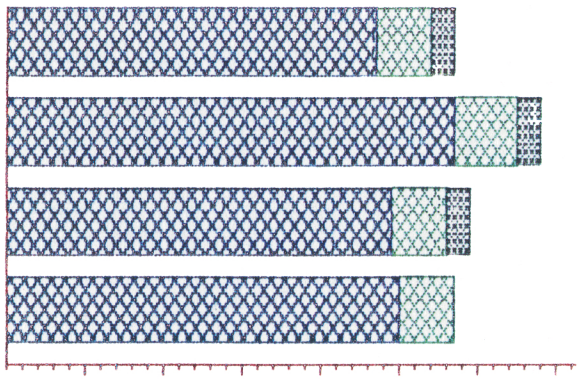
Questionnaire Response by Number and Percent	Business Systems Planning Questionnaire			
	Questions			
	70	71	72	73
Large#				
Yes‡	43		28	18
Pct.(%)	45.8		29.8	19.2
No‡	4		17	29
Pct.(%)	4.2		18.0	30.8
Other@		37		
Pct.(%)		39.3		
No Response	47	57	49	47
Pct.(%)	50.0	60.7	52.2	50.0
Grand Total##				
Yes‡	51		33	21
Pct.(%)	45.6		29.5	18.8
No‡	5		19	35
Pct.(%)	4.4		17.0	31.2
Other@		44		
Pct.(%)		39.3		
No Response	56	68	60	56
Pct.(%)	50.0	60.7	53.5	50.0

\# Corporations by size according to annual sales.
Grand total of responses by small, medium, and large corporations.
‡ "Yes" and "No" responses to questionnaire (see Appendix A).
@ Checked-off responses to one or more of the list of items in the question other than "Yes" or "No."

GRAPH 9.6

BUSINESS PROBLEMS

QUESTION	RESPONSE
70	NR
71	NR
72	NR
73	NR



LEGEND: SIZE L M S

NR: NO RESPONSE

1. Problems.
2. Solutions.
3. Value Statements.
4. Impacted processes.
5. Processes causing the problems.
6. "Benefits quantified."]

9.6.2 Interview Data Classification

Using the interview notes and worksheets, the teams from thirty-three, or 29.5 percent of the responding corporations examined each line entry and established whether it was in the category of following:

1. I/S problems/solutions and values.
2. I/S needs and values.
3. Non-I/S problems (See question 72).

[e.g., Lockheed Missile and Space Co., of Sunnyvale, California, explained that they "didn't" go "this deep" in examining each line entry (answered "No"). The examination was "generally done at" a "higher level."]

9.6.3 Data to Processes Relation

"Yes", the study teams from twenty-one, or 18.8 percent (a very poor response) grouped the interview data entries by the use of matrices as shown in Appendix "I" of the questionnaire (See question 73, Tables 9.6-9.6.1, and Graph 9.6).

[e.g., However, Davidson Timber (now bankrupt) did not group the interview data by the use of matrices, but instead "formulated the project after the initial study" using a "decision matrix" and "interview" data.]

9.7 Identifying Information Architecture

The examination of the present to a synthesis of the future was represented by the definition of the information architecture by forty, or 35.7 percent of the corporations surveyed, in answering "Yes" to question 74 (See Tables 9.7-9.7.1 and Graph 9.7).

[e.g., However, the respondent for Armstrong World Industries, indicated that "only" a partial information architecture had been defined.]

The team should continue its analysis by determining how the data will be managed to support the processes, after having acquired an understanding of the business processes and the data required to support them. Also, in having identified the data classes, they can now be logically grouped into data bases. In order to formulate useful management information to support the business processes, Information Systems must become the vehicles used to insert data into and extract it from data bases.

Using a diagram that shows the relationship of data to systems and the processes supported by each, forty, or 35.7 percent of the respondents for the corporations, indicated that an information architecture was defined, in order to identify the Information Systems and subsystems that are to be developed (See question 75 (of the questionnaire), Tables 9.7-9.7.1 and Graph 9.7)).

[e.g., The respondent for Deere and Company indicated that a diagram was <u>not</u> used to show the relationship of data to systems and the processes supported by each. He explained further, that the above was "too low a level of detail for this study."]

Table 9.7

Identifying Information Architecture by One-hundred and Twelve
U.S. Corporations
February, 1982

Questionnaire Response by Number and Percent	Business Systems Planning Questionnaire Questions 74	75	76	77	78	79	80
Small#							
Yes‡	1	1	2	2	1	1	2
Pct.(%)	20.0	20.0	40.0	40.0	20.0	20.0	40.0
No‡	1				1	1	
Pct.(%)	20.0				20.0	20.0	
Other@							
Pct.(%)							
No Response	3	4	3	3	3	3	3
Pct.(%)	60.0	80.0	60.0	60.0	60.0	60.0	60.0
Medium#							
Yes‡	5	5	3	3	4	4	3
Pct.(%)	38.5	38.5	23.0	23.0	30.8	30.8	23.0
No‡	3	2	2	2	1	2	2
Pct.(%)	23.0	15.4	15.4	15.4	7.7	15.4	15.4
Other@							
Pct.(%)							
No Response	5	6	8	8	8	7	8
Pct.(%)	38.5	46.1	61.6	61.5	61.5	53.8	61.5

\# Corporations by size according to annual sales.
‡‡ Grand total of responses by small, medium, and large corporations.
‡ "Yes" and "No" responses to questionnaire (see Appendix A).
@ Checked-off responses to one or more of the list of items in the question other than "Yes" or "No."

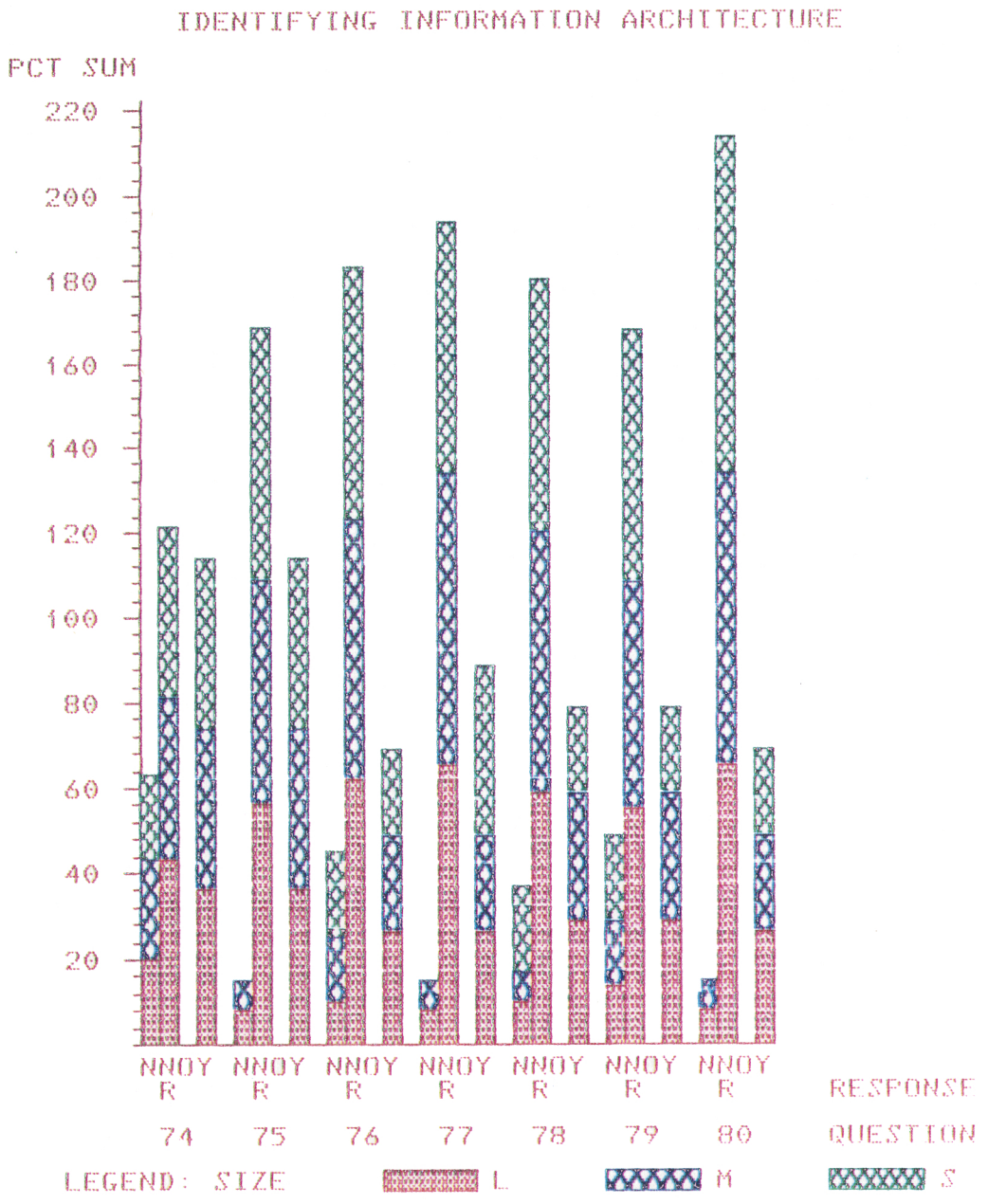
Table 9.7.1

Identifying Information Architecture by One-hundred and Twelve
U.S. Corporations
February, 1982

Questionnaire Response by Number and Percent	Business Systems Planning Questionnaire Questions 74	75	76	77	78	79	80
Large#							
Yes‡	34	34	25	25	28	28	25
Pct.(%)	36.2	36.2	26.6	26.5	29.8	29.8	26.6
No‡	19	7	10	7	10	13	7
Pct.(%)	20.2	7.5	10.6	7.4	10.6	13.9	7.4
Other@							
Pct.(%)							
No Response	41	53	59	62	56	53	62
Pct.(%)	43.6	56.3	62.8	66.0	59.6	56.3	66.0
Grand Total##							
Yes‡	40	40	30	30	33	33	30
Pct.(%)	35.7	35.7	26.8	26.8	29.5	29.5	26.8
No‡	23	9	12	9	12	16	9
Pct.(%)	20.6	8.0	10.7	8.0	10.7	14.3	8.0
Other@							
Pct.(%)							
No Response	49	63	70	73	67	63	73
Pct.(%)	43.7	56.2	62.5	65.2	59.8	56.2	65.2

\# Corporations by size according to annual sales.
Grand total of responses by small, medium, and large corporations.
‡ "Yes" and "No" responses to questionnaire (see Appendix A).
@ Checked-off responses to one or more of the list of items in the question other than "Yes" or "No."

GRAPH 9.7



N: NO Y: YES O: OTHER NR: NO RESPONSE

9.7.1 Architecture Diagram Development

In developing the information architecture, thirty, or 26.8 percent of the study teams for the responding corporations, began with the "process/data class matrix" (where the process axis is in life cycle sequence based upon the Key resource), in answering question 76 (See Tables 9.7-9.7.1, Graph 9.7, and Appendix "J", in the questionnaire).

[e.g., The respondent for Lockheed Missile and Space Co. indicated that their study team "didn't have time" to work with the "process/data class matrix."]

Again, as in question 76, thirty, or 26.8 percent answered "Yes" to question 77 (See Tables 9.7-9.7.1 and Graph 9.7), where their study teams arranged the data axis by taking all the data classes created by the first process and grouping them to the left, or origin matrix. Furthermore, their study teams also grouped all the data classes created by the second process next to those created by the first process and continued this grouping until all the data classes were covered.

[e.g., Lockheed Missile and Space Co., again, indicated an answer of "No" to question 77, in that the above function was performed "at a much higher level."]

9.7.2 Data Flow Determination

The data creation and use can be indicated by boxes and arrows, and the C's and U's may be eliminated and names applied to the major systems areas representing the completed information architecture. Therefore, the teams for only thirty-three, or 29.5 percent of the responding corporations, prepared a final rearrangement of axes

and use of two-way arrows, allowing preparations of a simplified graphic architecture (See Appendix L, of the questionnaire, question 78, Tables 9.7-9.7.1 and Graph 9.7).

[e.g., The respondent for Country Mutual Insurance Co., answered the question "No", and explained that his company never went very "far" in rearranging the axes and use of two-way arrows to create Appendix "L" (in the questionnaire).]

9.7.3 Identifying Subsystems

Only thirty-three, or 29.5 percent of the respondents' study teams bothered to identify all the subsystems (See question 79, Tables 9.7-9.7.1, and Graph 9.7).

[e.g., However, the respondent for First Wisconsin National Bank, Milwaukee, Wisconsin, answered question 79 "No." He explained that all of the subsystems could not be identified by the study team, "because no interviewing occurred, and only a major system architecture was defined."]

9.7.4 Prerequisite Analysis

Of the thirty-three, or 29.5 percent of corporations that answered "Yes" to question 79, only thirty or 26.8 percent actually made a prerequisite analysis to determine which subsystems were in place before others could be created, after the subsystems were identified by the study team (See question 80, Tables 9.7-9.7.1 and Graph 9.7).

[e.g., Wisconsin Public Service Corp., of Green Bay, Wisconsin, answered the question with a "No." The respondent indicated that

they in fact "didn't go into subsystems in the study, but just to information groupings."]

9.8 Architectural Priority Establishment

The eventual establishment of a controlled environment in which the information architecture can be developed, implemented, and operated efficiently and effectively is the purpose of MIS. Thirty-seven, or 33.0 percent of the surveyed corporations placed a check mark next to one or more of the information systems functions examined during the BSP study and listed in question 81 (See Tables 9.8-9.8.1 and Graph 9.8).

[e.g., The Public Service Co. of New Hampshire, Manchester, New Hampshire, placed a check mark next to the following:

1. Changes that properly managed and implemented the high-priority information architecture projects.
2. Major activities that became projects in the follow-on to the BSP study.]

A portion of the information architecture to be implemented first should be selected by the team and recommended to management. In order to begin the implementation as early as practical, the identification and recommendation of such follow-on projects must be done immediately. Therefore, the foundation for the implementation of Information Systems is established on a "pay as you go" basis.

One or more of the tasks that were listed in question 82 were checked-off by forty-four, or 39.3 percent of the responding corporations in selecting their first subsystems (See Tables 9.8-9.8.1 and Graph 9.8).

Table 9.8

Architectural Priority Establishment by One-hundred and Twelve
U.S. Corporations
February, 1982

Questionnaire Response by Number and Percent	Business Systems Planning Questionnaire					
	Questions					
	B1	B2	B3	B4	B5	B6
Small#						
Yes‡				1	1	2
Pct.(%)				20.0	20.0	40.0
No‡				1	1	1
Pct.(%)				20.0	20.0	20.0
Other@	2	2	2			
Pct.(%)	40.0	40.0	40.0			
No Response	3	3	3	3	3	2
Pct.(%)	60.0	60.0	60.0	60.0	60.0	40.0
Medium#						
Yes‡				3	2	3
Pct.(%)				23.0	15.4	23.1
No‡				2	2	1
Pct.(%)				15.4	15.4	7.7
Other@	4	5	5			
Pct.(%)	30.7	38.4	38.4			
No Response	9	8	8	8	9	9
Pct.(%)	69.3	61.6	61.6	61.6	69.2	69.2

\# Corporations by size according to annual sales.
Grand total of responses by small, medium, and large corporations.
‡ "Yes" and "No" responses to questionnaire (see Appendix A).
@ Checked-off responses to one or more of the list of items in the question other than "Yes" or "No."

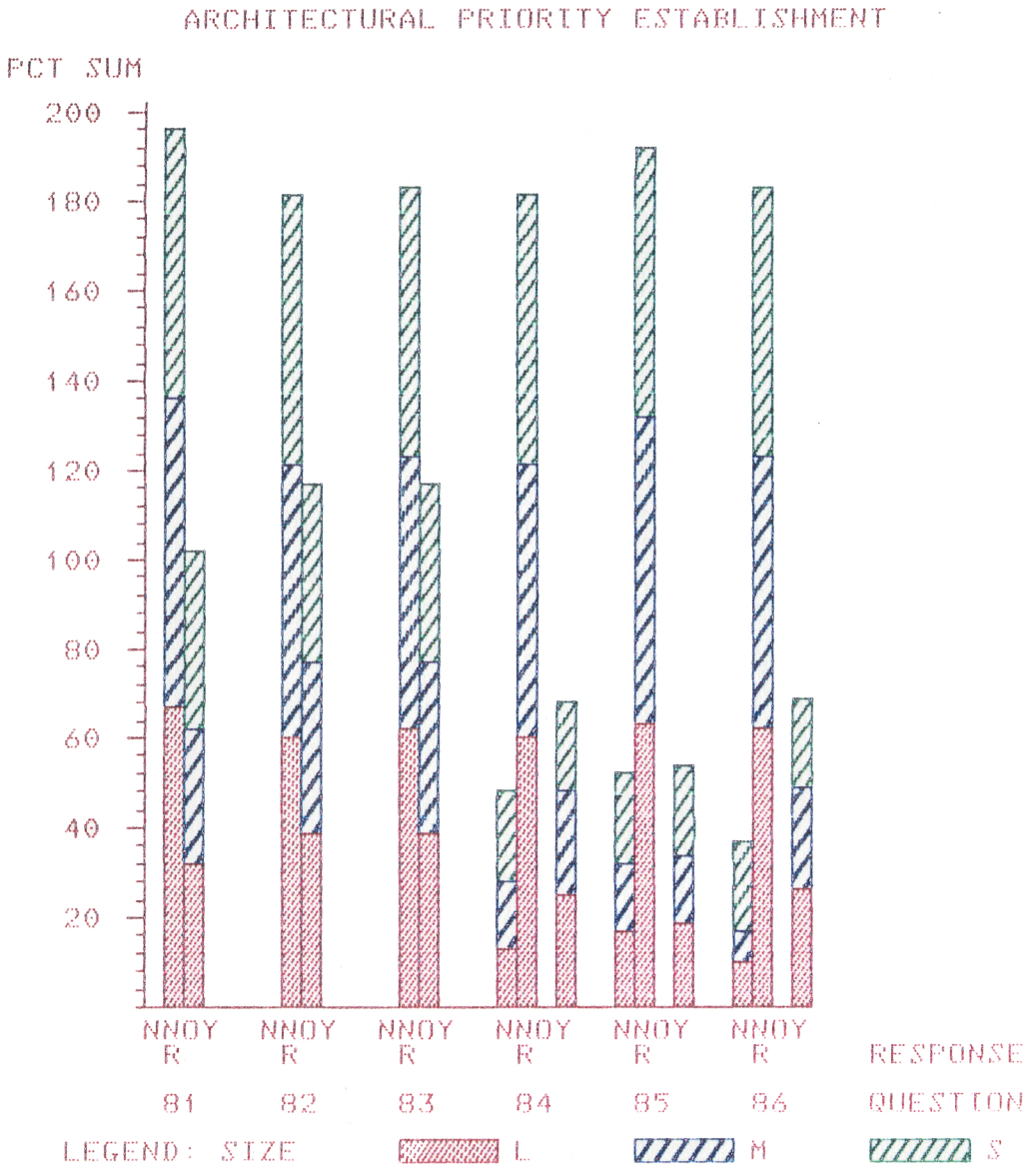
Table 9.8.1

Architectural Priority Establishment by One-hundred and Twelve
U.S. Corporations
February, 1982

Questionnaire Response by Number and Percent	Business Systems Planning Questionnaire					
	Questions					
	81	82	83	84	85	86
Large#						
Yes*				24	18	25
Pct.(%)				25.5	19.1	26.6
No*				13	16	10
Pct.(%)				13.9	17.0	10.6
Other@	31	37	37			
Pct.(%)	32.9	39.3	39.3			
No Response	63	57	57	57	60	59
Pct.(%)	67.1	60.7	60.7	60.6	63.9	62.8
Grand Total##						
Yes*				28	21	30
Pct.(%)				25.0	18.8	26.8
No*				16	19	12
Pct.(%)				14.3	17.0	10.7
Other@	37	44	44			
Pct.(%)	33.0	39.3	39.3			
No Response	75	68	68	68	72	70
Pct.(%)	67.0	60.7	60.7	60.7	64.2	62.5

\# Corporations by size according to annual sales.
Grand total of responses by small, medium, and large corporations.
* "Yes" and "No" responses to questionnaire (see Appendix A).
@ Checked-off responses to one or more of the list of items in the question other than "Yes" or "No."

GRAPH 9.8



N: NO Y: YES O: OTHER NR: NO RESPONSE

[e.g., Ryder Truck Rental, Inc., checked off the following tasks that were performed in the selection of their first subsystems:

1. Determined the selection criteria and the documentation technique to be used.
2. Listed subsystems in priority sequence.
3. Listed dependencies or projects that were a prerequisite to the first subsystems.
4. Documented or described the recommended subsystems.]

9.8.1 Selection Criteria Establishment

I/S projects should be able to be evaluated by management in the same way other business projects are evaluated, since data is now being treated as a business source. The team should use whatever justification technique presently exists within the organization for evaluating new projects.

Therefore, forty-four, or 39.3 percent of the respondents checked one or more of the major criteria in question 83, in determining whether their logical priorities were grouped by the study teams in four categories (See Tables 9.8-9.8.1 and Graph 9.8).

[e.g., Southern Company Services, Inc., listed only three of four categories, along with the major criteria for determining logical priorities:

1. Potential benefits:
   a. Tangibles.
   b. Intangibles.
2. Success:
   a. Probability of implementation.
   b. Prerequisites.
   c. Length of implementation.
   d. Risk.
   e. Resources available.
3. Demand:
   a. Value of existing systems.
   b. Relationship with other systems.
   c. Political overtones.
   d. Need.

Furthermore, the respondent for Southern Company Services, stated that the above categories are "considerations by a program review committee in establishing priorities for the development of systems."]

9.8.2 Criteria and List Systems Applications

The study teams for twenty-eight, or 25 percent of the corporations that were surveyed, analyzed (for the categories in question 83) the major systems comprising the architecture as potential first-subsystems candidates and ranked them on a scale of 1 to 10 (See question 84, Tables 9.8-9.8.1, and Graph 9.8).

[e.g., The Wisconsin Public Service Corporation indicated that they too answered the question "Yes." Furthermore, the respondent indicated that their "groupings are within the architecture."]

9.8.3 Identification of System Prerequisites

The team should prepare a matrix to identify system prerequisites during the architecture development activity. Therefore, in the corporations where the first system was identified, only twenty-one, or 18.8 percent (a very poor response), of the study teams reviewed the matrix that identified the system prerequisites (See question 85, and Tables 9.8-9.8.1, and Graph 9.8).

[e.g., However, Country Mutual Insurance Co., bears out the poor response to the question, in that they also answered "No", indicating that "prerequisites" did not exist in their "matrix."]

9.8.4 Subsystems Recommendation

Finally, the study teams for thirty, or 26.8 percent of the corporations documented their recommended first subsystem (See question 86, and Tables 9.8-9.8.1 and Graph 9.8).

[e.g., Nevertheless, the Public Service Co. of New Hampshire did not; and indicated that their "study team recommended that feasibility studies be performed" instead.]

9.9 Review of Management Information Systems (MIS)

The team must establish priorities for the development of the systems and data bases, since a total information architecture cannot be developed and implemented at one time. Therefore, the study teams for forty-seven, or 42 percent established priorities for the development of the systems and data bases (See question 87, Tables 9.9-9.9.1, and Graph 9.9).

[e.g., The study team for Southern Co. Service, Inc., "recommended" priorities for the development of the systems and data bases. Their respondent stated that the "Program Review Committee establishes priorities."]

All MIS functions cannot be encompassed by the BSP study. For thirty-three, or 29.5 percent, of the corporations responding to question 88, the Information Systems management analysis was made at the level of their Information Systems top management, and included only the planning and control aspects of the major I/S processes (See Tables 9.9-9.9.1 and Graph 9.9).

Table 9.9

Review of Management Information Systems by One-hundred and Twelve U.S. Corporations
February, 1982

Questionnaire Response by Number and Percent	Business Systems Planning Questionnaire Questions 87	88	89	90	91	92	93	94	95	96	97	98
Small#												
Yes*	2	1	3					1		1	1	
Pct.(%)	40.0	20.0	60.0					20.0		20.0	20.0	
No*	1							1	1	1		
Pct.(%)	20.0							20.0	20.0	20.0		
Other@				2	2	1	1					1
Pct.(%)				40.0	40.0	20.0	20.0					20.0
No Response	2	4	2	3	3	4	4	3	4	3	4	4
Pct.(%)	40.0	80.0	40.0	60.0	60.0	80.0	80.0	60.0	80.0	60.0	80.0	80.0
Medium#												
Yes*	6	4	5					3	2	3	3	
Pct.(%)	46.2	30.8	38.5					23.1	15.4	23.1	23.1	
No*	1	2	1					2	3	2	2	
Pct.(%)	7.7	15.4	7.7					15.4	23.1	15.4	15.4	
Other@				4	4	3	3					5
Pct.(%)				30.8	30.8	23.0	23.0					38.5
No Response	6	7	7	9	9	10	10	8	8	8	8	8
Pct.(%)	46.1	53.8	53.8	69.2	69.2	77.0	77.0	61.5	61.5	61.5	61.5	61.5

\# Corporations by size according to annual sales.
\#\# Grand total of responses by small, medium, and large corporations.
* "Yes" and "No" responses to questionnaire (see Appendix A).
@ Checked-off responses to one or more of the list of items in the question other than "Yes" or "No."

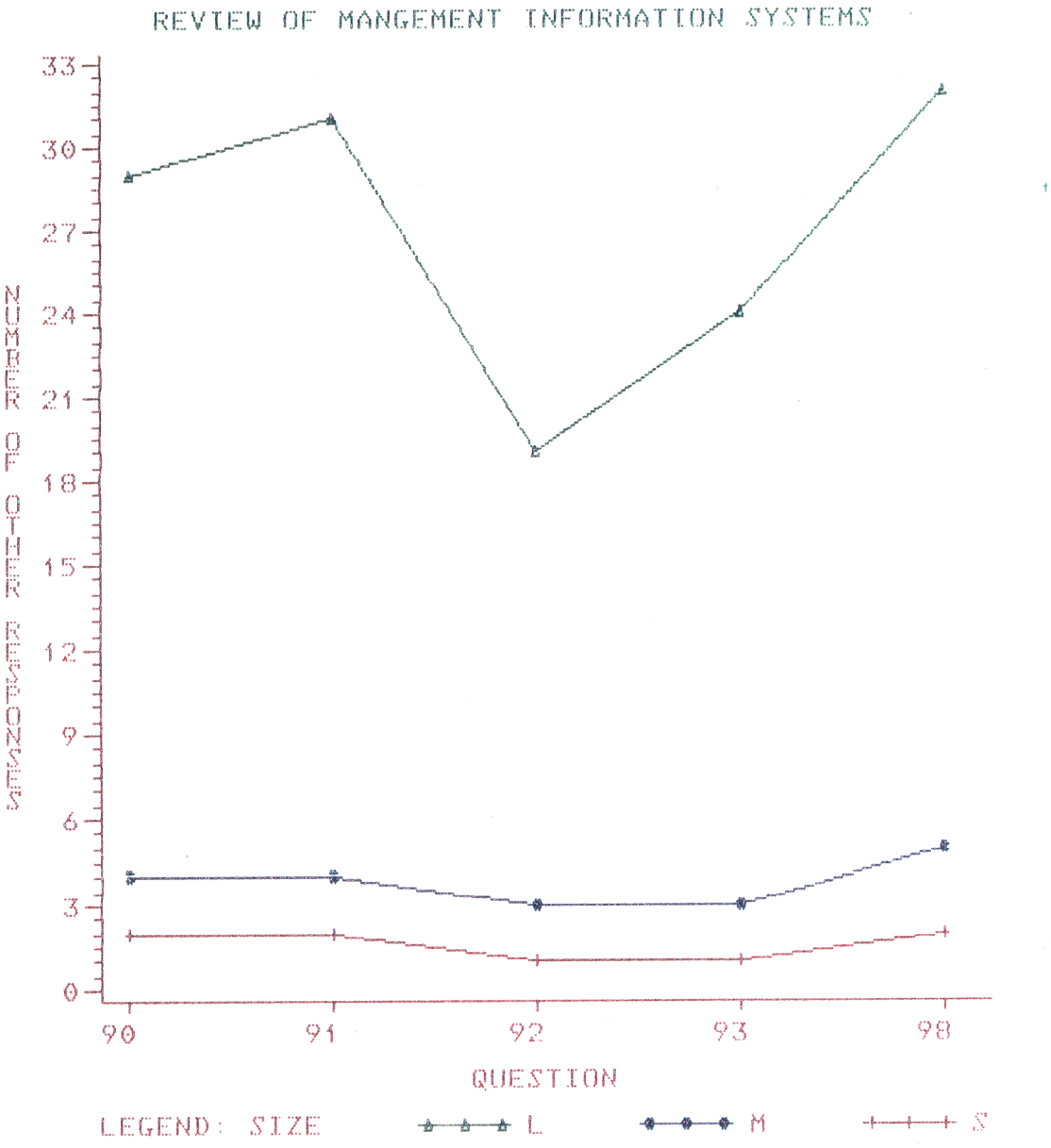
Table 9.9.1

Review of Management Information Systems by One-hundred and Twelve
U.S. Corporations
February, 1982

Questionnaire Response by Number and Percent	Business Systems Planning Questionnaire											
	Questions											
	87	88	89	90	91	92	93	94	95	96	97	98
Large#												
Yes*	39	28	39					22	12	20	20	
Pct.(%)	41.6	29.8	41.5					23.4	12.8	21.3	21.2	
No*	10	12	6					13	22	13	12	
Pct.(%)	10.6	12.8	6.4					13.9	23.4	13.9	12.8	
Other@				29	31	19	24					32
Pct.(%)				30.9	33.0	20.2	25.5					34.0
No Response	45	54	49	65	63	75	70	59	60	61	62	62
Pct.(%)	47.8	57.4	52.1	69.1	67.0	79.8	74.5	62.7	63.8	64.8	66.0	66.0
Grand Total##												
Yes*	47	33	47					26	14	24	24	
Pct.(%)	42.0	29.5	42.0					23.2	12.5	21.4	21.4	
No*	12	14	7					16	26	16	14	
Pct.(%)	10.7	12.5	7.5					14.3	23.2	14.3	12.5	
Other@				35	37	23	28					38
Pct.(%)				31.3	33.0	20.6	25.0					34.0
No Response	53	65	58	77	75	89	84	70	72	72	74	74
Pct.(%)	47.3	58.0	51.5	68.7	67.0	79.4	75.0	62.5	64.3	64.3	66.1	66.0

\# Corporations by size according to annual sales.
\#\# Grand total of responses by small, medium, and large corporations.
* "Yes" and "No" responses to questionnaire (see Appendix A).
@ Checked-off responses to one or more of the list of items in the question other than "Yes" or "No."

GRAPH 9.9



0: OTHER

[e.g., The respondent for the Kansas Department of Revenue answered "Yes" and "No" to the question 88. He indicated that "Yes", it did include only the planning and control aspects of the major I/S processes. But "No", the Information Systems management analysis was not made at the level of their Information Systems top management. In addition, the respondent also indicated that "operational aspects were also considered."]

9.9.1 Purpose of Management Information Systems

It was the purpose of forty-seven, or 42 percent of the responding corporations' "Management Information System" to manage the I/S resources in the most efficient and effective way, for the support of the business (as part of the BSP study), in answering question 89 (See Tables 9.9-9.9.1 and Graph 9.9).

[e.g., However, Amdahl Corporation answered "No" to the above question; explaining, that they "only" managed their "Data Base" System in the most efficient and effective way.]

9.9.1.1 MIS Module Objectives

One or more of the objectives (question 90) of the MIS (Management Information Systems) module, were checked by thirty-five, or 31.3 percent of respondents, as it pertained to their Business Systems Planning study (See Tables 9.9-9.9.1 and Graph 9.9).

[e.g., The Wisconsin Public Service Corporation checked the following objectives of their MIS as a "supplement" to an "expansion" process:

1. Understood the findings and conclusions on I/S support of the business in relation to MIS.
2. Further specified I/S objectives.
3. Identified those MIS projects that had high priority and were follow-on.]

9.9.1.2 Inputs to MIS

Thirty-seven, or 33 percent of the responding corporations checked one or more of the actions (in question 91) in other study "actions" in other "study" modules as being prerequisites to performing MIS activities in the BSP study (See Tables 9.9-9.9.1 and Graph 9.9).

[e.g., General Electric Company, checked off all the actions in Part A (From Study Preparation), Part B (From Determining Business Requirements), and Part C (From Determining Architectural Priorities). However, "Description of business objectives" was not checked-off in Part B. Furthermore, the respondent stated that the actions "had all been studied just prior to deciding that a BSP was needed."]

9.9.2 Flow of MIS in a BSP Study

Required MIS changes are usually developed through three channels:

1. I/S objectives.
2. Information architecture.
3. Problem analysis.

Only twenty-three, or 20.6 percent of the returned questionnaires had one to three of the above activities checked-off (in question 92), as required by their MIS module (See Tables 9.9-9.9.1 and Graph 9.9).

[e.g., Insurance Co. of North America, (INA), Philadelphia,

Pennsylvania, checked only one of three channels that develop required MIS changes:

1. I/S objectives.]

9.9.2.1 Generating I/S Objectives

In order to provide consistency in the development and employment of I/S resources in support of the business, the I/S objectives are required to provide the framework first. So, as to serve as a guide for the development of I/S follow-on activities, the I/S objectives must be consistent with the objectives and management systems of the business.

Furthermore, in the BSP study preparation phase, the current I/S objectives are documented, and discussed in the I/S director's presentation.

Therefore, a list was used as a guide by twenty-eight, or 25 percent of the respondents to determine whether the present I/S objectives are to be "modified, added, or defined", by placing an M (modified), A (added), or D (defined) in the spaces provided (question 93) for in the following:

1. I/S Personnel.
2. I/S Finance.
3. User.
4. I/S Facilities.
5. Applications
6. Data (See Tables 9.9-9.9.1 and Graph 9.9).

In addition, by defining the long-term view of each of the above categories in Information Systems, the objectives can be specified.

[e.g., The Wisconsin Public Service Corporation placed an "M" next to the following I/S objectives:

1. I/S Personnel.
   a. Organization.
2. Finance.
   a. User budget for I/S.
3. Data.
   a. "A very heavy emphasis on the use of data."

In addition, the respondent placed an "A" next to the following:

1. User ("a very heavy user environment").
   a. Capability.
   b. Responsibility.
      (1) Development.
      (2) Data Management.]

9.9.2.2 MIS Support of Architectural Priorities

Does your corporation ensure that MIS (ISM) supports architectural priorities? Twenty-six, or 23.2 percent answered question 94 "Yes" (See Tables 9.9-9.9.1 and Graph 9.9).

[e.g., Public Service Company of New Hampshire, however, answered the question with a definite "No." The respondent indicated that "there is no check (ensure) outside of MIS."]

9.9.2.3 I/S Support Problems and Non-I/S Problems

Problem analysis is another channel for identifying MIS changes. I/S support problems and non-I/S problems have been identified in the BSP study and now are separated. Therefore, only a very few companies (fourteen, or 12.5 percent) even bothered to rearrange their I/S support problems by type (See question 95 and Tables 9.9-9.9.1 and Graph 9.9).

[e.g., The Wisconsin Public Service Corporation, along with twenty-six, or 23.2 percent, of the other corporations, answered the above question "No." The respondent indicated that instead of rear-

ranging the I/S support problems by type, they "put together a general section."]

9.9.2.4 Current Problems in Management Information Systems

Were MIS problems extracted from the I/S review? Twenty-four, or 21.4 percent, answered this question (question 96) "Yes."

[e.g., General Electric's respondent answered the question "No"; as did sixteen (or 14.2 percent) other corporations. He stated that: "We knew we had problems, and what they were. Again this issue was what to do application wise, and I/S action would be developed based on that."]

9.9.2.5 Consolidating MIS Changes

The consolidation of all of the implied MIS changes was conducted by twenty-four, or 21.4 percent of the respondents in answering question 97 (See Tables 9.9-9.9.1 and Graph 9.9).

[e.g., However, Northwest Computer Services, Inc., indicated an answer of "No" to the above question (so did fourteen, or 12.5 percent of the respondents as well). The respondent explained further, that by "keeping them separate, an analysis of resources required for implementation could be facilitated."]

9.9.3 MIS Output Summarization

One or more of the items in the list, in question 98, were checked-off by thirty-eight, or 34 percent of the responding corporations. The list summarized the outputs that resulted from the MIS portion of the BSP study (See Tables 9.9-9.9.1 and Graph 9.9).

[e.g., The Public Service Co. of New Hampshire, checked-off the following outputs that resulted from the MIS portion of their BSP study:

1. Findings and Conclusions:
   a. Major MIS problem analysis.
   b. MIS problems deduced from the I/S support.
2. Definition of High-Priority MIS Projects:
   a. First systems support requirements.
   b. Immediate actions recommended.]

9.10 Planning the Recommended Follow-on Projects

Thirty-three, or 29.5 percent of the responding corporations developed recommendations and an action plan to assist management in its decisions regarding the recommended follow-up-projects (See question 99 and Tables 9.10-9.10.1 and Graph 9.10).

[e.g., The respondent for the University of Illinois along with fourteen, or 12.5 percent of the other respondents, answered the question "No", but did not indicate why they did not develop recommendations and action plans.]

A list of specific BSP study recommendations (in question 100) was checked-off by sixty-one, or 54.5 percent of the respondents for the corporations (See Tables 9.10-9.10.1 and Graph 9.10).

[e.g., First Wisconsin National Bank of Milwaukee, checked-off the following BSP study recommendations that centered in any of their areas:

1. Information Architecture:
   a. "Outlining major systems needing attention."
2. Information Systems Management:
   a. Data management to control the data resource of the organization.
   b. Information Systems planning process to ensure that the information architecture remains responsive to changing conditions.]

Table 9.10

Planning the Recommended Follow-on Projects by One-hundred and Twelve U.S. Corporations
February, 1982

Questionnaire Response by Number and Percent	Business Systems Planning Questionnaire Questions 99	100	101
Small#			
Yes¥ Pct.(%)	1 20.0		
No¥ Pct.(%)			
Other@ Pct.(%)		3 60.0	2 40.0
No Response Pct.(%)	4 80.0	2 40.0	3 60.0
Medium#			
Yes¥ Pct.(%)	4 30.8		
No¥ Pct.(%)	2 15.4		
Other@ Pct.(%)		7 53.8	4 30.8
No Response Pct.(%)	7 53.8	6 46.2	9 69.2

\# Corporations by size according to annual sales.
Grand total of responses by small, medium, and large corporations.
¥ "Yes" and "No" responses to questionnaire (see Appendix A).
@ Checked-off responses to one or more of the list of items in the question other than "Yes" or "No."

Table 9.10.1

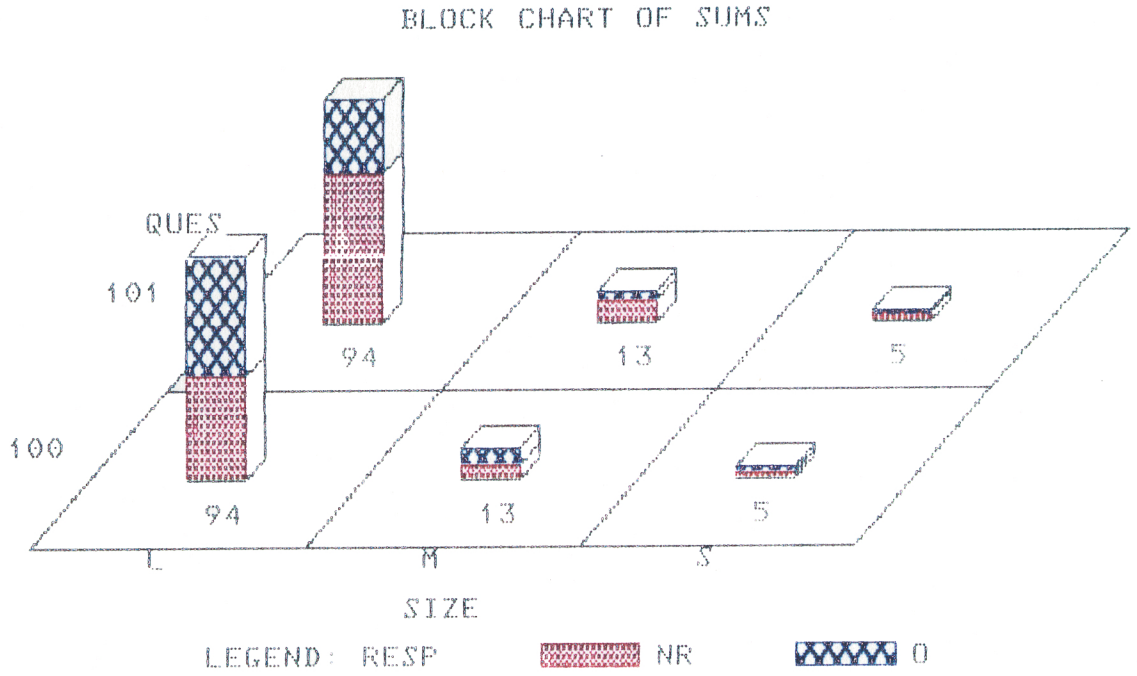
Planning the Recommended Follow-on Projects by One-hundred and Twelve U.S. Corporations
February, 1982

Questionnaire Response by Number and Percent	Business Systems Planning Questionnaire Questions 99	100	101
Large*			
Yes*	28		
Pct.(%)	29.8		
No*	12		
Pct.(%)	12.8		
Other@		51	32
Pct.(%)		54.2	34.0
No Response	54	43	62
Pct.(%)	57.5	45.8	66.0
Grand Total**			
Yes*	33		
Pct.(%)	29.5		
No*	14		
Pct.(%)	12.5		
Other@		61	38
Pct.(%)		54.5	34.0
No Response	65	51	74
Pct.(%)	58.0	45.5	66.0

* Corporations by size according to annual sales.
** Grand total of responses by small, medium, and large corporations.
* "Yes" and "No" responses to questionnaire (see Appendix A).
@ Checked-off responses to one or more of the list of items in the question other than "Yes" or "No."

GRAPH 9.10

PLANNING THE RECOMMENDED FOLLOW-ON PROJECTS



O: OTHER NR: NO RESPONSE

L: LARGE M: MEDIUM S: SMALL

3. Architecture Priorities-Development of the First System to be Implemented.

The action plan mentioned in question 101 contained one or more of the items that were checked-off by thirty-eight, or 34 percent, of the respondents (See Tables 9.10-9.10.1 and Graph 9.10).

[e.g., Southern Company Services, Inc., checked-off the following in their action plan "for specific Information Systems":

1. Scope of the project.
2. Deliverables.
3. Schedule.
4. Potential benefits.
5. People and skills
6. Training.
7. Communications.
8. Logistics.
9. Controls.]

9.11 Final Report and Executive Presentation

The whole concept of obtaining executive management commitment and involvement for implementing recommendations from the BSP study, is generation of the final report and executive presentation. Based upon the results of the study, the report may have to be modified slightly now, even though the format was agreed upon before the study. During the BSP study, various parts of the report should have been written and finalized at this time.

Fifty-one, or 45.5 percent of the respondents to question 102, checked-off one or more of the requirements that should have been included in their final report (See Tables 9.11-9.11-1 and Graph 9.11).

[e.g., The Wisconsin Public Service corporation's respondent checked-off the following items in their final report:

Table 9.11

Final Report and Executive Presentation by One-hundred and Twelve
U.S. Corporations
February, 1982

Questionnaire Response by Number and Percent	Business Systems Planning Questionnaire					
	Questions					
	102	103	104	105	106	107
Small#						
Yes* Pct.(%)			2 40.0	2 40.0	2 40.0	
No* Pct.(%)			1 20.0	1 20.0	1 20.0	
Other@ Pct.(%)	2 40.0	3 60.0				2 40.0
No Response Pct.(%)	3 60.0	2 40.0	2 40.0	2 40.0	2 40.0	3 60.0
Medium#						
Yes* Pct.(%)			3 23.0	3 23.1	3 23.1	
No* Pct.(%)			2 15.4	3 23.1	3 23.1	
Other@ Pct.(%)	6 46.6	5 38.5				6 46.2
No Response Pct.(%)	7 53.4	8 61.5	8 61.6	7 53.8	7 53.8	7 53.8

\# Corporations by size according to annual sales.
Grand total of responses by small, medium, and large corporations.
* "Yes" and "No" responses to questionnaire (see Appendix A).
@ Checked-off responses to one or more of the list of items in the question other than "Yes" or "No."

Table 9.11.1

Final Report and Executive Presentation by One-hundred and Twelve U.S. Corporations
February, 1982

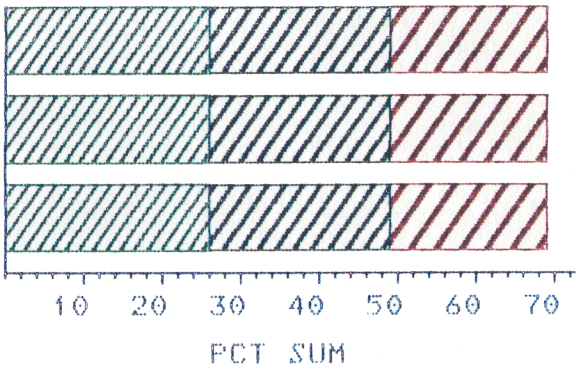
Questionnaire Response by Number and Percent	Business Systems Planning Questionnaire Questions 102	103	104	105	106	107
Large‡						
Yes¥			25	25	25	
Pct.(%)			26.6	26.6	26.6	
No¥			16	20	19	
Pct.(%)			17.0	21.3	20.2	
Other¤	43	39				41
Pct.(%)	45.8	41.5				43.6
No Response	51	55	53	49	50	53
Pct.(%)	54.2	58.5	56.4	52.2	53.2	56.4
Grand Total‡‡						
Yes¥			30	30	30	
Pct.(%)			26.8	26.8	26.8	
No¥			19	24	23	
Pct.(%)			17.0	21.7	20.6	
Other¤	51	47				49
Pct.(%)	45.5	42.0				43.8
No Response	61	65	63	58	59	63
Pct.(%)	54.5	58.0	56.2	51.3	52.6	56.2

‡ Corporations by size according to annual sales.
‡‡ Grand total of responses by small, medium, and large corporations.
¥ "Yes" and "No" responses to questionnaire (see Appendix A).
¤ Checked-off responses to one or more of the list of items in the question other than "Yes" or "No."

GRAPH 9.11

FINAL REPORT AND EXECUTIVE PRESENTATION

QUESTION	RESPONSE
104	Y
105	Y
106	Y



LEGEND: SIZE L M S

Y: YES

1. Executive Summary.
2. Supporting details in the appendices, such as descriptions of the business processes.
3. "Information Architecture and Information Systems structure."]

One or more of the activities that were performed in preparing for the study report and executive presentation, were checked-off by forty-seven, or 42 percent of the corporations that were surveyed in response to question 103 (See Tables 9.11-9.11.1 and Graph 9.11).

[e.g., The respondent for Abbott Laboratories checked-off all of the activities in question 103. However, sixty-five, or 58 percent, did not bother to answer the question.]

9.11.1 Preliminary Report Outline

During the initial steps of preparing for the study and developing a work plan for conducting the study, thirty, or 26.8 percent of the respondents, prepared a preliminary report outline (See question 104, and Tables 9.11-9.11-1 and Graph 9.11).

[e.g., The respondent for Associated Grocers of Colorado, Inc., answered question 104 with a "No"; and explained further that the preliminary report outline did "not come during the initial steps, but came after most of the study was complete."]

9.11.2 Primary Report Writing Responsibility

Was the primary writing responsibility for each of the sections of the report assigned during the study preparation? Thirty, or 26.8 percent of the above answered the question (question 105) with a "Yes" (See Tables 9.11-9.11.1 and Graph 9.11).

[e.g., However, Deere and Company, and twenty-four, or 21.4 percent of the corporations answered the question "No." The respondent for the corporation indicated that the primary writing responsibilities were not assigned specifically, but were a "group effort."]

9.11.3 Report Presentation

The type and size of the audience and the accepted ways of making a presentation in the particular business environment, are the principal factors that must be considered in determining how the report should be presented. Most helpful in establishing the proper direction, is the consultation with the executive sponsor early in the study to obtain his advice on this subject.

The study teams for thirty, or 26.8 percent of corporations that responded to question 106, consulted with an executive sponsor early in the study to obtain his advise on how to present the report (See Tables 9.11-9.11-1 and Graph 9.11).

[e.g., Southern Company Services, Inc., responded "No" to the above question. The respondent for the corporation indicated that their study team consulted with the Department Manager (executive sponsor) responsible for their Data Processing Plan (did not use BSP).]

9.11.4 The Executive Presentation

The material that is contained in the final draft of the report can help develop the executive presentation. To inform management of the study's findings, make recommendations, and secure ap-

proval of the action plan, are the principal aims of this presentation.

The presentation should preferably be no longer than an hour, and be concise. It should end with recommendations for the follow-on activities, and be logical and factual. The presentation, for forty-nine, or 43.8 percent of the respondents, checked-off on one or more of the subjects listed in question 107 (See Graph 9.11 and Tables 9.11-9.11.1).

[e.g., The respondent for the University of Illinois checked-off all of the subjects in question 107, except for the "Conclusions and Recommendations" area. However, sixty-three, or 56.2 percent of the respondents, didn't bother to check any off.]

Chapter 10

BUSINESS SYSTEMS PLANNING: FOLLOW-ON PROJECTS, DATA DICTIONARY, AND DISTRIBUTED INFORMATION SYSTEMS

The BSP study at this point should end with the development of an action plan for the follow-on activities and a presentation for management approval to proceed in the execution of that plan. This chapter will give an overview of the follow-on activities and present and interpret the responses from the U. S. Corporations on such subjects as: (1) The potential benefits to be gained by the use of the Data Dictionary in Business Systems Planning; and, (2) the responses to the major elements and issues that must be considered in planning for a Distributed Information System.

10.1 Follow-on Project Orientation

This section will put the follow-on activities in perspective and emphasize their importance. It also explains how to maximize output from the BSP study. The understanding of the follow-on projects to allow for scheduling them in the action plan and to help prepare for them, will be discussed later in this chapter.

The first and most obvious question now is: How long did it take your corporation to conduct the BSP study? Therefore, the second and most obvious question is: Is there a permanent on-going BSP study group?

In analyzing the responses from the one-hundred and twelve corporations that responded, fifty-nine, or 52.6 percent responded to both questions in question 108 (of the questionnaire). Furthermore, see Tables 10.1-10.1.1 and Graph 10.1 for further information.

[e.g., The University of Illinois took "2 months" to complete the study in their "Phase I," and "one year" for final completion in "Phase II." Furthermore the respondent indicated that there wasn't a permanent on-going BSP study group. He explained further, that "there was an on-going BSP study for 3 years, but in the form of a Phase III project team for application analysis."]

After the BSP study ended, twenty-eight, or 25 percent of the respondents were able to conduct one or more of the follow-on activities in their response to question 109 (See Tables 10.1-10.1.1 and Graph 10.1).

[e.g., Western Company of North America checked all of the following follow-on activities:

1. Related the follow-on activities to the BSP study.
2. Showed how to capitalize on the results.
3. Further explained the major follow-on projects.]

10.1.1 Continuation of BSP Study Through Follow-on Activities

If project implementation is to be successful, there must be a great need for communications among the project teams. Since the functions performed during the follow-on activities are a part of the MIS responsibilities, the Information Systems Director should take overall responsibility for the projects. There is a need for continuity of team members, because the follow-on activities build upon the results of and the information gathered in the BSP study.

Table 10.1

Follow-on Project Orientation on Systems by One-hundred and Twelve U.S. Corporations
February, 1982

Questionnaire Response by Number and Percent	Business Systems Planning Questionnaire Questions												
	108	109	110	111	112	113	114	115	116	117	118	119	121
Small*													
Yes#			2							1	1	1	
Pct.(%)			40.0							20.0	20.0	20.0	
No#										1	1	1	
Pct.(%)										20.0	20.0	20.0	
Other@	3	1		2	2	1	2	2	1				4
Pct.(%)	60.0	20.0		40.0	40.0	20.0	40.0	40.0	20.0				80.0
No Response	2	4	3	3	3	4	3	3	4	3	3	3	1
Pct.(%)	40.0	80.0	60.0	60.0	60.0	80.0	60.0	60.0	80.0	60.0	60.0	60.0	20.0
Medium*													
Yes#			5							3	3	3	
Pct.(%)			38.5							23.1	23.1	23.1	
No#			1							3	2	3	
Pct.(%)			7.7							23.1	15.4	23.1	
Other@	7	3		5	4	5	5	4	5				11
Pct.(%)	53.9	23.0		38.5	30.8	38.5	38.5	30.8	38.5				84.7
No Response	6	10	7	8	9	8	8	9	8	7	8	7	2
Pct.(%)	46.1	77.0	58.8	61.5	69.2	61.5	61.5	69.2	61.5	58.8	61.5	58.8	15.3

* Corporations by size according to annual sales.
** Grand total of responses by small, medium, and large corporations.
\# "Yes" and "No" responses to questionnaire (see Appendix A).
@ Checked-off responses to one or more of the list of items in the question other than "Yes" or "No."

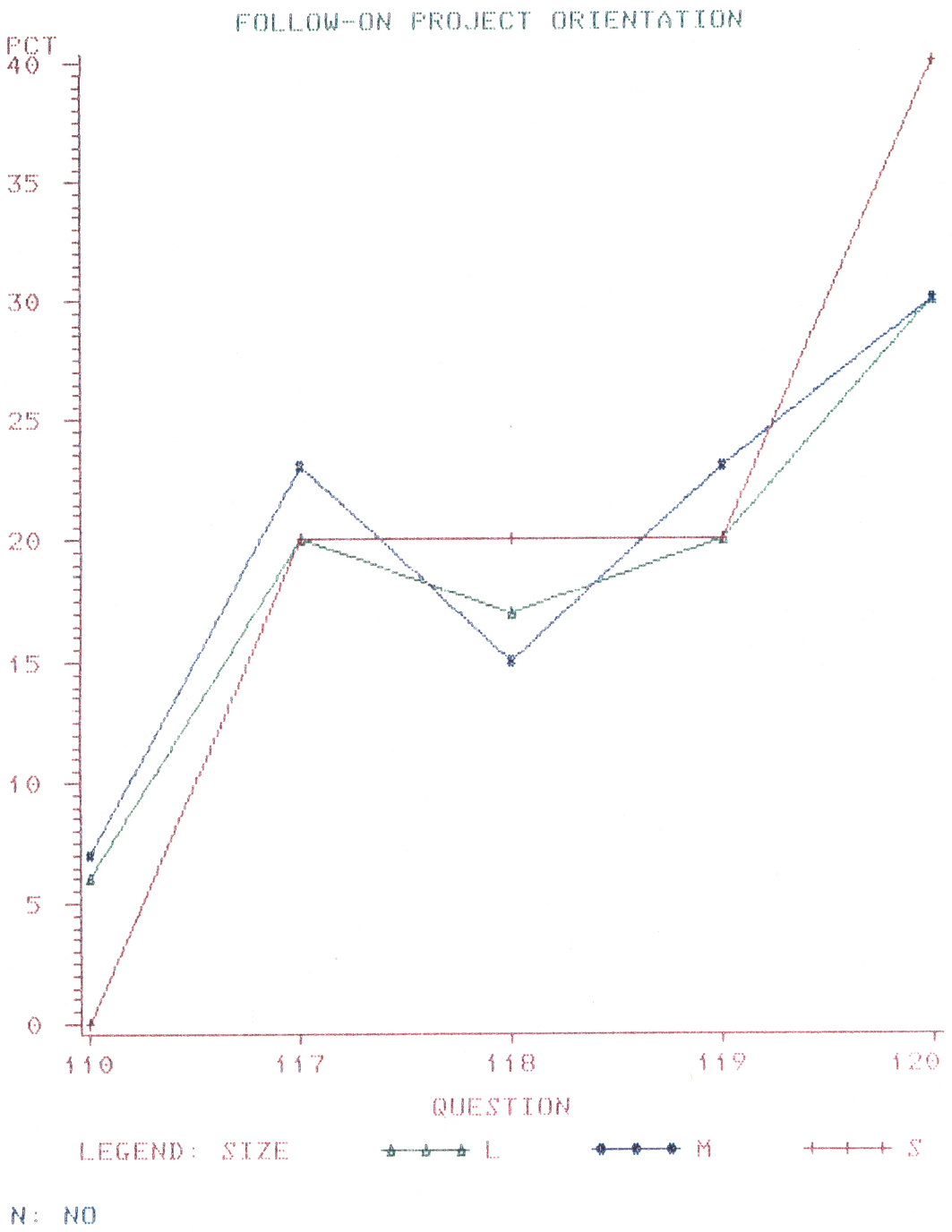
Table 10.1.1

Follow-on Project Orientation on Systems by One-hundred and Twelve
U.S. Corporations
February, 1982

Questionnaire Response by Number and Percent	Business Systems Planning Questionnaire Questions 108	109	110	111	112	113	114	115	116	117	118	119	12
Large#													
Yes‡			37							24	22	24	
Pct.(%)			39.4							25.5	23.4	25.5	
No‡			6							19	16	19	
Pct.(%)			6.4							20.2	17.0	20.2	
Other∂	49	24		35	30	34	35	29	34				76
Pct.(%)	52.2	25.5		37.2	31.9	36.2	37.2	30.9	36.2				80.9
No Response	45	70	51	59	64	60	59	65	60	51	56	51	18
Pct.(%)	47.8	74.5	54.2	62.8	57.1	63.8	62.8	69.1	63.8	45.3	59.6	45.3	19.1
Grand Total##													
Yes‡			44							28	26	28	
Pct.(%)			39.4							25.0	23.2	25.0	
No‡			7							23	19	23	
Pct.(%)			6.2							20.6	17.0	20.6	
Other∂	59	28		42	36	40	42	35	40				91
Pct.(%)	52.6	25.0		37.5	32.2	35.7	37.5	31.3	35.7				81.2
No Response	53	84	61	70	76	72	70	77	72	61	67	61	21
Pct.(%)	47.4	75.0	54.4	62.5	67.8	64.3	62.5	68.7	64.3	54.4	59.8	54.4	18.8

\# Corporations by size according to annual sales.
Grand total of responses by small, medium, and large corporations.
‡ "Yes" and "No" responses to questionnaire (see Appendix A).
∂ Checked-off responses to one or more of the list of items in the question other than "Yes" or "No."

GRAPH 10.1



N: NO

Therefore, forty-four, or 39.4 percent of the respondents indicated that at least one person on the BSP study team was chosen from the data processing function, with the idea that he would remain for the follow-on activities (See question 110, and Tables 10.1-10.1.1 and Graph 10.1).

[e.g., Associated Grocers of Colorado, Inc., along with seven, or 6.2 percent of the other corporations answered the question "No", and did not given an explanation of their answer.]

10.1.1.1 Follow-on Activities Preparation

The follow-on activities and the emphasis placed on each of them will vary from one BSP study to another, because of the variations in the findings and conclusions that may result from the BSP studies. In preparing for the follow-on activities, forty-two, or 37.5 percent of the corporations that responded to question 111, checked one or more of the activities that they conducted (See Tables 10.1-10.1.1 and Graph 10.1).

[e.g., Western North America Corporation, checked the following activities that they conducted in preparing for the follow-on activities:

1. MIS functions were changed or added to provide a controlled environment for the development and implementation of the information architecture identified in the BSP study.
2. A detailed Information Systems plan was developed that reflected the planned changes.
3. "Three systems were chosen for implementation."]

10.1.1.2 Project Team Member Orientation

The I/S director should provide orientation for project team

members before the beginning of each of the follow-on projects. BSP principles and objectives should be summarized since many of the team members will not be familiar with the concept. In order to be able to build upon the outputs and become familiar with them, it is very important that everyone on the project team understand exactly how the BSP study was conducted.

Thirty-six, or 32 percent of the respondents checked one or more of the topics for project team orientation as illustrated in question 112 (See Tables 10.1-10.1.1 and Graph 10.1).

[e.g., The Wisconsin Public Service Corporation checked the following topics for their project team orientation:

1. Data base concepts.
2. Overview of BSP study methodology.
   a. Introduction to follow-on activities.
      (1) Relation to the BSP study.
3. Introduction of tools and techniques.

The respondent also indicated that they had their own brand of "methodology."]

10.1.2 MIS Effective Support of the Business

Information Systems initiates MIS as the keystone for the effective support of the business. In order to efficiently and effectively support the business, the concept of MIS must be defined first. Continual emphasis on MIS is also very important.

One or more of the activities in question 113, were checked by forty, or 35.7 percent of the respondents that answered the survey, as being projected goals of their corporation (See Tables 10.1-10.1.1, and Graph 10.1).

[e.g., The respondents for Abbott Laboratories, checked the following activities that projected the goals of their corporation:

1. Development of the information architecture over a period of years.
2. The processes of managing an I/S are to be refined and changed continuously to properly plan, measure, and control required I/S resources.]

10.1.2.1 MIS Follow-on Projects

The MIS follow-on projects, as covered in section 9.9 will emanate from:

1. Requirements to support I/S objectives.
2. Changes resulting from the development and implementation of the first systems.
3. Recommended changes to solve I/S support problems and MIS problems.

In putting MIS in perspective, forty-two, or 37.5 percent of the respondents checked one or more of the recommendations listed in question 114 (See Tables 10.1-10.1.1 and Graph 10.1).

[e.g., The respondent for Amdahl checked-off only one recommendation:

1. Emphasis on Information Systems planning and control and on data administration.]

10.1.2.2 The Activities of an I/S Business

Many of the activities for performing a BSP study in the I/S function have already been accomplished. These activities make a significant start in understanding the whole I/S function, even though they have to be expanded.

In addition to the activities that have already been discussed for performing a BSP study in the I/S function, thirty-five, or 31.3 percent of the respondents checked one or more of them in question 115 (See Tables 10.1-10.1.1 and Graph 10.1).

[e.g., Wisconsin Public Service, did "not" perform any of these activities until after the BSP "study" was completed according to their respondent.]

10.1.3 Information Architecture Project

The level of detail in the BSP study, determines the amount of follow-on effort required in the architecture area. The basic architecture definition should be completed at the beginning of a follow-on project, if the information architecture was not completely defined as outlined in section 9.7.

The architecture refinement should include:

1. A configuration of the major I/S groupings.
2. The subsystem breakout of each system.
3. Subsystem interrelation.
4. Data flow among subsystems.

Therefore, in addition to the activities that have been included in the information architecture project, forty, or 35.7 percent of the corporations that responded, checked one or more of these activities in question 116 (See tables 10.1-10.1.1 and Graph 10.1).

[e.g., Amdahl Corporation only checked one of these activities:

1. Evaluation of the technical implications of the information architecture, including control systems, DB/DC requirements, and potential distribution of both information and systems.]

10.1.3.1 Subsystem Description

Using the information architecture defined in the BSP study, a description of each subsystem was prepared by twenty-eight, or 25 percent of the corporations that responded to question 117.

[e.g., However, according to the respondent for Armstrong World Industries, Inc., of Lancaster, Pennsylvania, the question was answered with a definite "No." He explained further by indicating that their information architecture was "only" defined (in the BSP study) "for the first four major systems."]

10.1.3.2 Examining the Current Systems

For data processing systems currently in use or under development, twenty-six, or 23.2 percent of the respondents conducted a careful examination to determine how each one related to the subsystems described in the information architecture (See question 118, Tables 10.1-10.1.1, and Graph 10.1).

[e.g., Deere and Company, in its response to question 118, indicated that it was "too early" in their BSP study to conduct an examination, and therefore answered the query "No."]

10.1.3.3 Data Base Generation

The support of the business processes by the data classes, is an integral part of the information architecture definition in the BSP study. Therefore, the architecture implementation will be supported by sets of data bases which were generated by the logical grouping of related data classes.

Twenty-eight, or 25 percent of the respondents logically grouped the related data classes to yield a set of data bases that supported the architecture implementation (See question 119, Tables 10.1-10.1.1 and Graph 10.1).

[e.g., The University of Illinois responded by answering the

question with a "No;" and further explained that the "data classes have been planned in concept, but actual implementation is long and discontinuous."]

10.1.4 High-priority System Development

A high-priority system should be developed and implemented first, according to the recommendations of the BSP team. Care should be taken that this system is not developed "by itself," as development of the system begins. A certain direction has been set by the BSP study for the implementation of systems.

Therefore, the business processes must be supported by the first development and implementation. Ninety-one, or 81.2 percent of the responding corporations checked two or less of the items that were developed and implemented, as illustrated in question 121 (See Tables 10.1-10.1.1 and Graph 10.1).

[e.g., The Western North America Corporation specified their own development in the form of implemented "used purchased software" (See question 121).]

10.2 Data Dictionary: A Tool to Support Business Systems Planning

The "data dictionary" was used as a tool by twenty-one, or 18.8 percent of the surveyed corporations to support the Business Systems Planning (BSP) studies (See question 122, Table 10.2-10.2.1, and Graph 10.2).

[e.g., The respondent for Mobil Oil Corporation, indicated an answer of "No," as did thirty-seven, or 33.1 percent of the other

surveyed corporations. However, all the respondents failed to explain why they answered question 122 with a "No."]

10.2.1 Data Dictionary Implementation

Prior to the preparation phase of the BSP study, the dictionary was considered to be ready (by twelve, or 10.7 percent of the respondents) with the data model (BSP subject categories, relationships and attributes) installed and necessary report programs written, debugged and installed in the dictionary (See question 123, Tables 10.2-10.2.1 and Graph 10.2).

[e.g., Baker Knapp & Tubbs, Inc., (furniture mfg.) of Grand Rapids, Michigan, (a subsidiary of North American Philips Co.) indicated an answer of "No" to the above question, but failed to explain why. Thirty-three, or 29.5 percent of the respondents also answered "No" to question 123.]

The use of the "data dictionary" by eleven, or 9.8 percent of respondents, improved the quality of the BSP study and (or reduced the duration of the study by allowing the study teams to concentrate on the analysis of problems (See question 124, Tables 10.2-10.2.1 and Graph 10.2).

[e.g., Southern Co. Services, Inc. answered the above question (question 124) "No", by further explaining that the data dictionary was "not used for a Data Processing plan."]

According to sixteen, or 14.3 percent of the corporations who answered question 125 with a "Yes", the dictionary did help to maintain the consistency of analysis data and reduced possible redundancy and errors (See Tables 10.2-10.2.1 and Graph 10.2).

[e.g., However, Abbott Laboratories decided to answer the above question (question 125) with a "No," and not give a reason as to why they did. Also, nineteen, or 17 percent of the respondents answered the above question with a "No."]

The BSP data base, according to seven (a very poor response), or 6.2 percent (question 126) of the respondents, was able to identify implementable systems, support the system design and data modeling activities and generate test plans to help ensure that the systems that were developed satisfied the requirements (in association with the data dictionary).

[e.g., Amdahl Corporation answered question 126 with a "No," because they were "not looking at systems implementation now."]

As the business situations and associated information requirements changed, only seven, or 6.2 percent of the respondents were able to update the data base with only incremental changes (in association with the data dictionary). For further information, see question 127, Tables 10.2-10.2.1, and Graph 10.2.

[e.g., General Electric Corporation was <u>not</u> able to update the data base with only incremental changes. In addition, so were twenty-one, or 18.8 percent of the other corporations. Unfortunately, eighty-four, or 75 percent of the respondents, chose not to answer question 127 at all.]

The data dictionary was able to meet one or more of the minimum requirements for only sixteen, or 14.3 percent of the surveyed corporations (See question 128, Tables 10.2-10.2.1 and Graph 10.2).

[e.g., Amdahl Corporation checked-off all of the minimum re-

Table 10.2

Data Dictionary: A Tool to Support Bsp by One-hundred and Twelve U.S. Corporations
February, 1982

Questionnaire Response by Number and Percent	Business Systems Planning Questionnaire							
	Questions							
	122	123	124	125	126	127	128	129
Small#								
Yes¥	1	1	1	1				
Pct.(%)	20.0	20.0	20.0	20.0				
No¥	1	1	1	1	2	2		
Pct.(%)	20.0	20.0	20.0	20.0	40.0	40.0		
Other@							1	1
Pct.(%)							20.0	20.0
No Response	3	3	3	3	3	3	4	4
Pct.(%)	60.0	60.0	60.0	60.0	60.0	60.0	80.0	80.0
Medium#								
Yes¥	2	1	1	2	1	1		
Pct.(%)	15.4	7.7	7.7	15.4	7.7	7.7		
No¥	5	4	3	2	3	2		
Pct.(%)	38.5	30.8	23.1	15.4	23.1	15.3		
Other@							2	2
Pct.(%)							15.4	15.4
No Response	6	8	9	9	9	10	11	11
Pct.(%)	46.1	61.5	69.2	69.2	69.2	77.0	84.6	84.6

\# Corporations by size according to annual sales.
\#\# Grand total of responses by small, medium, and large corporations.
¥ "Yes" and "No" responses to questionnaire (see Appendix A).
@ Checked-off responses to one or more of the list of items in the question other than "Yes" or "No."

Table 10.2.1

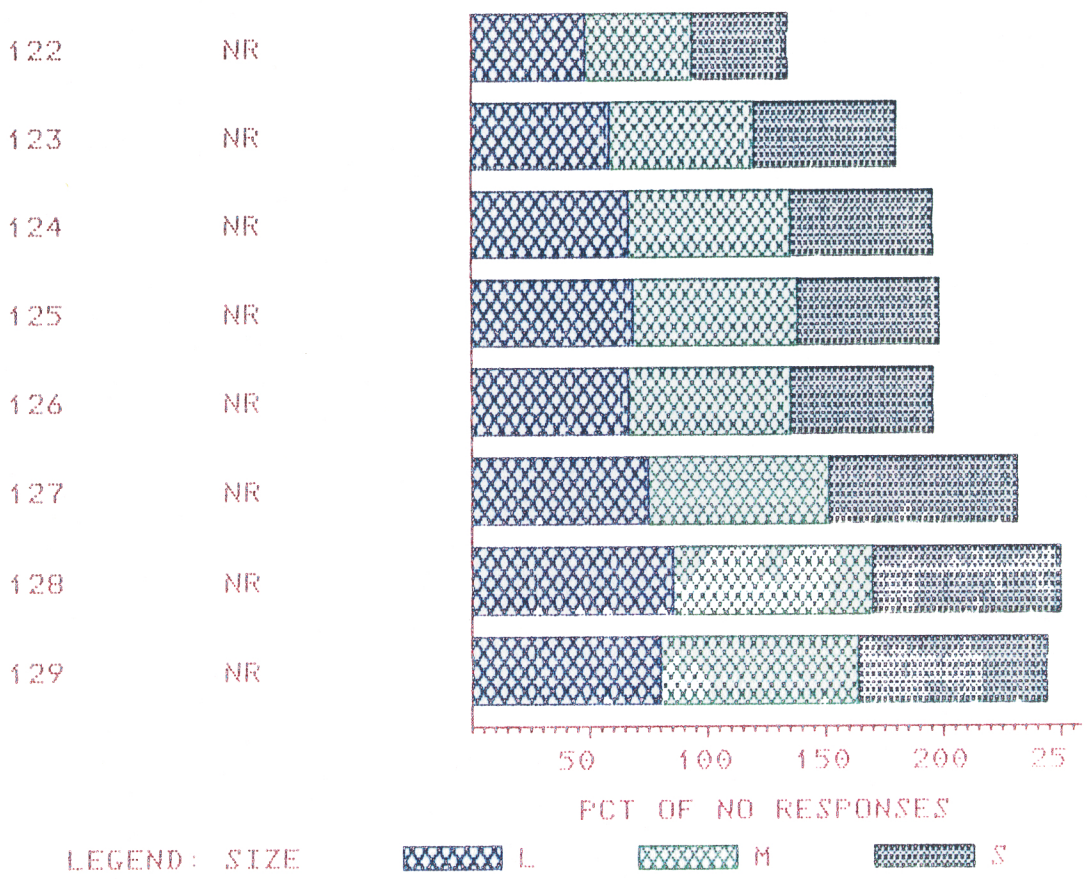
Data Dictionary: A Tool to Support Bsp by One-hundred and Twelve U.S. Corporations
February, 1982

Questionnaire Response by Number and Percent	Business Systems Planning Questionnaire Questions 122	123	124	125	126	127	128	129
Large#								
Yes¥	18	10	9	13	6	6		
Pct.(%)	19.1	10.6	9.6	13.9	6.4	6.4		
No¥	31	28	22	16	25	17		
Pct.(%)	33.0	29.8	23.4	17.0	26.6	18.1		
Other@							13	18
Pct.(%)							13.9	19.1
No Response	45	56	63	65	63	71	81	76
Pct.(%)	47.3	59.6	67.0	69.1	67.0	75.5	86.1	80.9
Grand Total##								
Yes¥	21	12	11	16	7	7		
Pct.(%)	18.8	10.7	9.8	14.3	6.2	6.2		
No¥	37	33	26	19	30	21		
Pct.(%)	33.1	29.5	23.2	17.0	26.8	18.8		
Other@							16	21
Pct.(%)							14.3	18.8
No Response	54	67	75	77	75	84	96	91
Pct.(%)	48.1	59.8	67.0	68.7	67.0	75.0	85.7	81.2

\# Corporations by size according to annual sales.
Grand total of responses by small, medium, and large corporations.
¥ "Yes" and "No" responses to questionnaire (see Appendix A).
@ Checked-off responses to one or more of the list of items in the question other than "Yes" or "No."

GRAPH 10.2

DATA DICTIONARY: A TOOL TO SUPPORT BSP



NR: NO RESPONSE

quirements stated in question 128, including one of their own: "conceptual data base design."]

The data dictionary was able to offer one or more of the capabilities (that are listed in question 129) for twenty-one, or 18.8 percent of the corporations that responded to the survey (See Tables 10.2-10.2.1 and Graph 10.2).

[e.g., Again, Amdahl Corporation checked all the capabilities listed in question 129, and added: Supported "end user query (focus)."]

10.2.2 Data Dictionary Facilities

One or more of the facilities of the dictionary were used as a tool to support the BSP study by fourteen, or 12.3 percent (a very poor response) of the respondents who answered the survey for their corporations (See question 130, Tables 10.2.2-10.2.2.1 and Graph 10.2.2).

[e.g., Standard Oil of California checked the following facilities (of question 130) of the dictionary that were used to support their BSP study:

1. Extensibility facility.
2. Program access facility.
3. "Inquiry IMS."]

New subject categories can be created by the extensibility facility. Therefore, only sixteen, or 14.3 percent of the respondents checked one or more of the BSP data that was defined through the creation of the new subject categories in question 131 (See Tables 10.2.2-10.2.2.1 and Graph 10.2.2).

[e.g., However, the Louisiana Dept. of Education, Baton Rouge,

Table 10.2.2

Data Dictionary Facilities by One-hundred and Twelve
U.S. Corporations
February, 1982

Questionnaire Response by Number and Percent	Business Systems Planning Questionnaire			
	Questions			
	130	131	132	133
Small#				
Yes¥				1
Pct.(%)				20.0
No¥				1
Pct.(%)				20.0
Other@		1		
Pct.(%)		20.0		
No Response	5	4	5	3
Pct.(%)	100.0	80.0	100.0	60.0
Medium#				
Yes¥			1	1
Pct.(%)			7.7	7.7
No¥			2	2
Pct.(%)			15.3	15.3
Other@	2	2		
Pct.(%)	15.4	15.4		
No Response	11	11	10	10
Pct.(%)	84.6	84.6	77.0	77.0

\# Corporations by size according to annual sales.
Grand total of responses by small, medium, and large corporations.
¥ "Yes" and "No" responses to questionnaire (see Appendix A).
@ Checked-off responses to one or more of the list of items in the question other than "Yes" or "No."

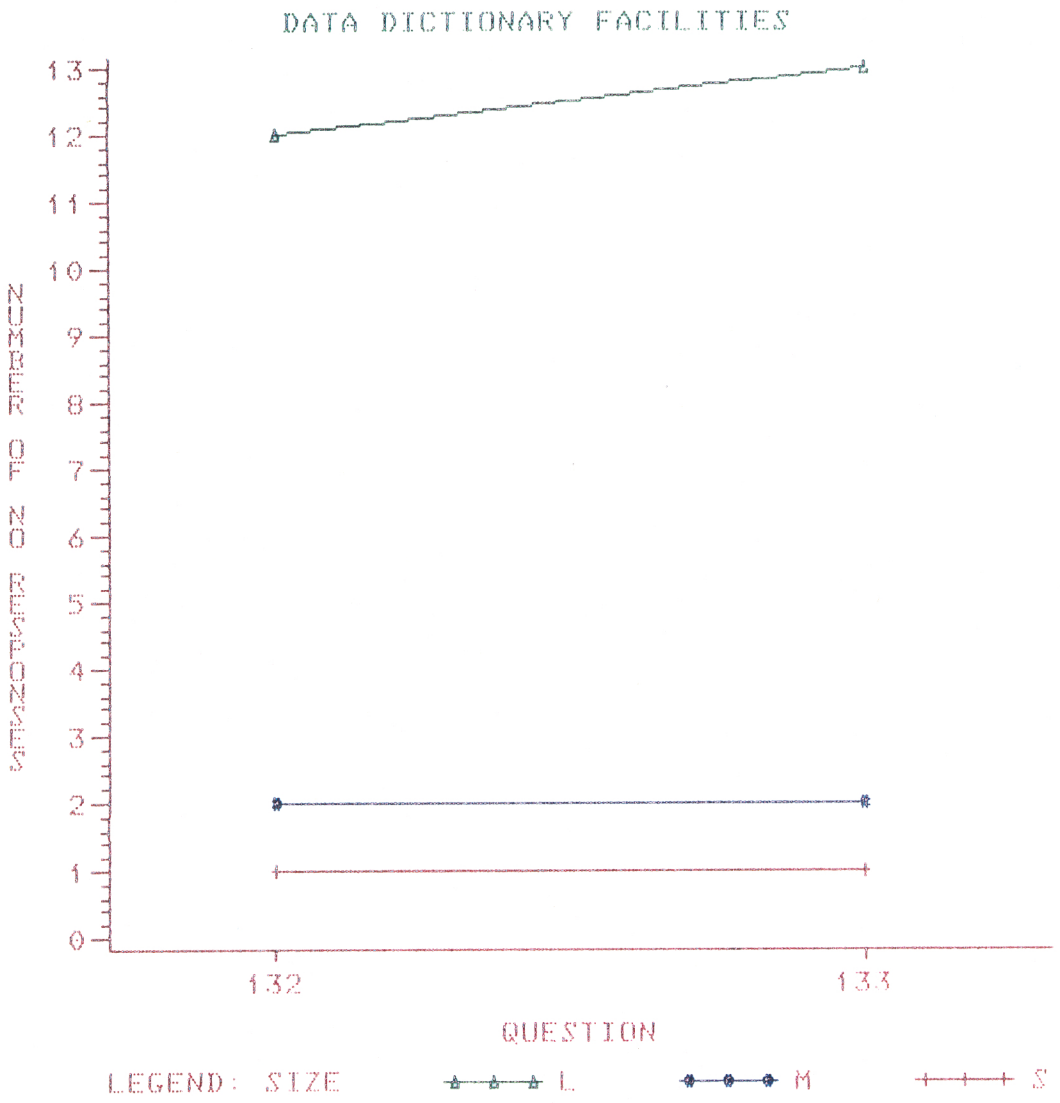
Table 10.2.2.1

Data Dictionary Facilities by One-hundred and Twelve
U.S. Corporations
February, 1982

Questionnaire Response by Number and Percent	Business Systems Planning Questionnaire			
	Questions			
	130	131	132	133
Large*				
Yes*			8	10
Pct.(%)			8.5	10.6
No*			12	13
Pct.(%)			12.8	13.9
Other@	12	13		
Pct.(%)	12.8	13.9		
No Response	82	81	74	71
Pct.(%)	87.2	86.1	78.7	75.5
Grand Total**				
Yes*			9	12
Pct.(%)			8.0	10.7
No*			14	16
Pct.(%)			12.3	14.3
Other@	14	16		
Pct.(%)	12.3	14.3		
No Response	98	96	89	84
Pct.(%)	87.7	85.7	79.7	75.0

\$ Corporations by size according to annual sales.
\$\$ Grand total of responses by small, medium, and large corporations.
* "Yes" and "No" responses to questionnaire (see Appendix A).
@ Checked-off responses to one or more of the list of items in the question other than "Yes" or "No."

GRAPH 10.2.2



N: NO

Louisiana, checked only one element (of question 131) that was defined through the creation of the new subject categories and "not connected with BSP:"

1. Instruments.]

Was the program access facility (PAF) able to gain access to the BSP data in computer processible forms? If so, were programs written to manipulate data, produce reports in the desired format (as described in question 82) of the "Process/data" matrix, and identify the information architecture? Only nine, or 8 percent of the responding corporations answered both of the above questions with a "Yes" (See question 132, Tables 10.2.2-10.2.2.1 and Graph 10.2.2).

[e.g., Insurance Company of North America (INA), answered "No" to both questions. Furthermore, fourteen, or 12.3 percent of the surveyed corporations also answered "No" to the above question. In addition, all of the corporations that answered "No", failed to explain why they did.]

Was the BSP data identified and defined in terms of the dictionary subject categories, attributes and relationships? If so, was a BSP data model developed as a "starter" model to encourage each study team to add, delete or modify certain subject categories, relationships and attributes to best reflect their purpose and emphasis of the study? Twelve, or 10.7 percent of the corporations that were surveyed, answered "Yes" to both questions in question 133 (See Tables 10.2.2-10.2.2.1 and Graph 10.2.2).

[e.g., However, Standard Oil of California, answered the first question with a "Yes", and the second with a "No." The respondent

further explained in their "No" answer, that their BSP data model was "not" developed as "a starter model" (for question 133).]

10.2.3 Subject Categories

The respondents were then asked to refer to the example of a BSP data model in Appendix "O", of the questionnaire, in order to answer question 134. In referring to Appendix "O", sixteen, or 14.3 percent of the surveyed corporations checked one or more of the subject categories that were included in their BSP data model (See Tables 10.2.3-10.2.3.1 and Graph 10.2.3).

[e.g., Amdahl Corporation checked the following subject categories in answering question 134:

1. Organization.
2. Process.
3. Data class.
4. Data file.
5. "Data entities and attributes."]

In order to describe the goals and objectives of the business and its organizational units, the objective subject category is used. However, only seven, or 6 percent of the corporations that responded to the survey (question 135), documented their goals and objectives, and related them to the organizational units and the business processes (See Tables 10.2.3-10.2.3.1 and Graph 10.2.3).

[e.g., However, Fireman's Fund Insurance Co., of San Francisco, California, did not document their goals and objectives in question 135, but indicated that their "study objective was to build a model for the business."]

In order to describe the various organizational units of the business, the organizational subject category is used. Eleven, or 9.6

Table 10.2.3

Subject Categories by One-hundred and Twelve
U.S. Corporations
February, 1982

Questionnaire Response by Number and Percent	Business Systems Planning Questionnaire									
	Questions									
	134	135	136	137	138	139	140	141	143	144
Small$										
Yes‡			1			1				
Pct.(%)			20.0			20.0				
No‡		1		1	2	1		1		
Pct.(%)		20.0		20.0	40.0	20.0		20.0		
Other@	1								1	
Pct.(%)	20.0								20.0	
No Response	4	4	4	4	3	3	5	4	4	5
Pct.(%)	80.0	80.0	80.0	80.0	60.0	60.0	100.0	80.0	80.0	100.0
Medium$										
Yes‡		1	1	1	1	1	1	1		1
Pct.(%)		7.7	7.7	7.7	7.7	7.7	7.7	7.7		7.7
No‡		2	2	2	1	1	2	2		2
Pct.(%)		15.3	15.3	15.3	7.7	7.7	15.3	15.3		15.3
Other@	2								1	
Pct.(%)	15.3								7.7	
No Response	11	10	10	10	11	11	10	10	12	10
Pct.(%)	84.7	77.0	77.0	77.0	84.6	84.7	77.0	77.0	92.3	77.0

$ Corporations by size according to annual sales.
$$ Grand total of responses by small, medium, and large corporations.
‡ "Yes" and "No" responses to questionnaire (see Appendix A).
@ Checked-off responses to one or more of the list of items in the question other than "Yes" or "No."

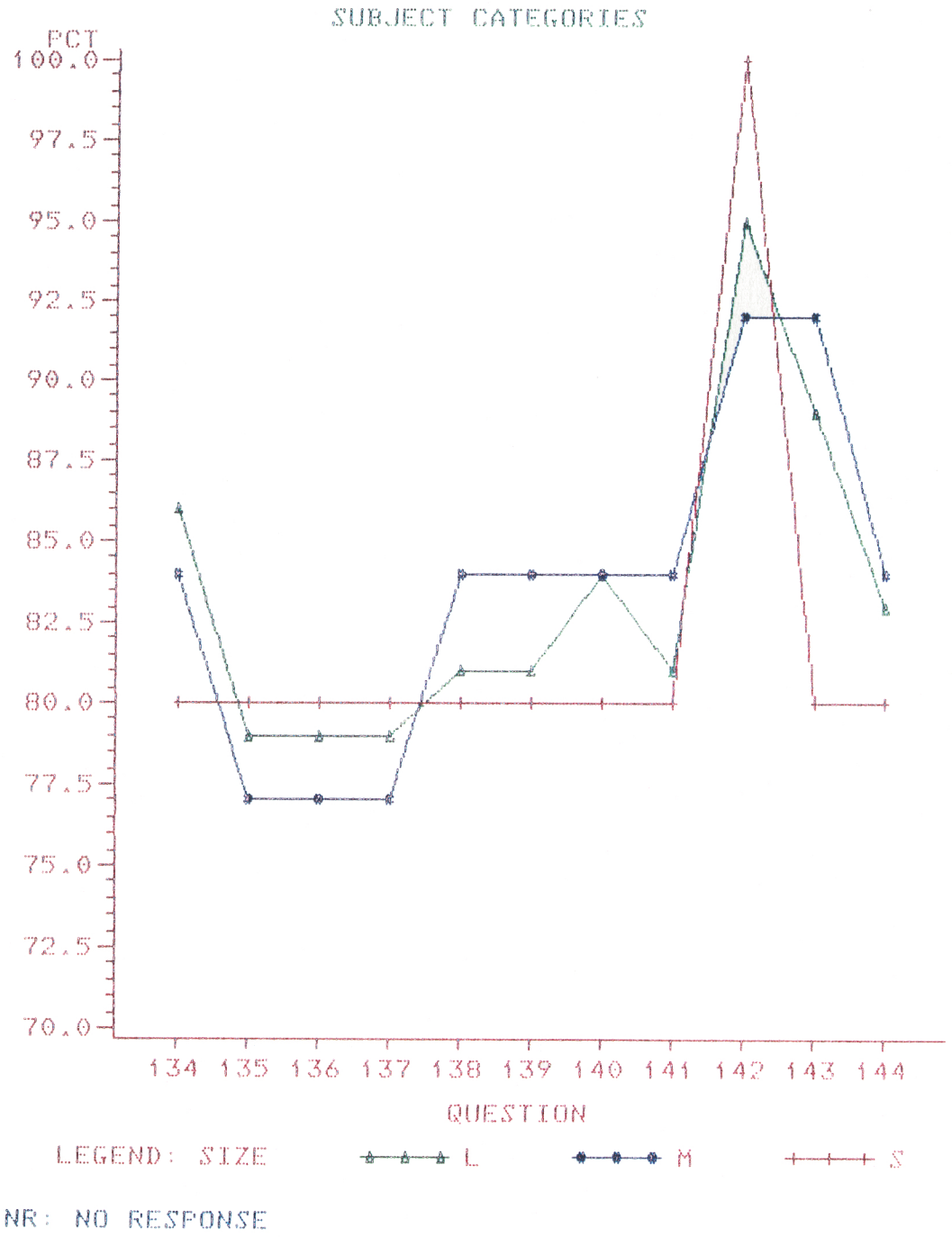
Table 10.2.3.1

Subject Categories by One-hundred and Twelve
U.S. Corporations
February, 1982

Questionnaire Response by Number and Percent	Business Systems Planning Questionnaire									
	Questions									
	134	135	136	137	138	139	140	141	143	144
Large*										
Yes*		6	9	6	8	10	8	8		6
Pct.(%)		6.4	9.6	6.4	8.5	10.6	8.5	8.5		6.4
No*		13	10	13	9	7	7	9		10
Pct.(%)		13.8	10.6	13.8	9.6	7.5	7.5	9.6		10.6
Other@	13								10	
Pct.(%)	13.8								10.6	
No Response	81	75	75	75	77	77	79	77	84	78
Pct.(%)	86.2	79.8	79.8	79.8	81.9	81.9	84.0	81.9	89.4	83.0
Grand Total**										
Yes*		7	11	7	9	12	9	9		7
Pct.(%)		6.0	9.6	6.0	8.0	10.7	8.0	8.0		6.2
No*		16	12	16	12	9	9	12		12
Pct.(%)		14.3	10.7	14.3	10.7	8.0	8.0	10.7		10.7
Other@	16								12	
Pct.(%)	14.3								10.7	
No Response	96	89	89	89	91	91	94	91	100	93
Pct.(%)	85.7	79.7	79.7	79.7	81.3	81.3	84.0	81.3	89.3	83.1

* Corporations by size according to annual sales.
** Grand total of responses by small, medium, and large corporations.
* "Yes" and "No" responses to questionnaire (see Appendix A).
@ Checked-off responses to one or more of the list of items in the question other than "Yes" or "No."

GRAPH 10.2.3



NR: NO RESPONSE

percent of the respondents who answered question 136 for their corporation generated the "organization/process" matrix (See Appendix A of the questionnaire) for this category (See Tables 10.2.3-10.2.3.1 and Graph 10.2.3).

[e.g., According to the Insurance Co. of North America (INA), they did not generate a "organization/process" matrix. In addition, twelve, or 10.7 percent of the responding corporations, also failed to generate an "organization process" matrix (See question 136).]

The process category also describes the business processes discussed in questions 42 to 61. A "system/process" matrix (Appendix "F" of the questionnaire) was generated from this category by only seven, or 6 percent of the respondents who answered question 137 (See Tables 10.2.3-10.2.3.1 and Graph 10.2.3).

[e.g., Baker, Knapp & Tubbs, Inc. (a subsidiary of North American Philips) also answered question 137 with a "Yes", but failed to explain why.]

The data class subject category also describes those data classes identified by the activities discussed in questions 62 to 66. This category was very helpful in data modeling activities by nine, or 8 percent of the responding corporations (See question 138, Tables 10.2.3-10.2.3.1 and Graph 10.2.3).

[e.g., This category was not very helpful in data modeling activities for Standard Oil of California because, as the respondent states: "We should have developed a follow-on project in order to pursue this."]

The problems that were discovered in the course of the interviews, are described by the problem category. These problems were

informational in nature for only twelve, or 10.7 percent of corporations that were surveyed (See question 139, Tables 10.2.3-10.2.3.1 and Graph 10.2.3).

[e.g., Amdahl Corporation indicated that the problems that were discovered during the course of the interview were not informational in nature as far as they were concerned, because it was "irrelevant" in their particular situation.]

All of the possible solutions for the problems are described in the solutions subject category. Only nine, or 8 percent of the respondents indicated that their solutions were as informal as the interviewee's opinions and suggestions or as formal proposals made by the BSP study team (See question 140, Tables 10.2.3-10.2.3.1, and Graph 10.2.3).

[e.g., However, Associated Grocers of Colorado, along with nine, or 8 percent of the other corporations, answered question 140 with a "No."]

The computer systems for the automated support of the business processes are described by the systems category. This category helped to generate the "organization/process" matrix in Appendix "D" (of the questionnaire (See question 68 for further information)) for only nine, or 8 percent of the responding corporations (See question 141, Tables 10.2.3.-10.2.3.1, and Graph 10.2.3).

[e.g., The Insurance Co. of North America answered question 141 with a "No," because the respondent did not know whether an "organization/process" matrix was generated at all.]

The "containers" data is described by the datafile category. Only twelve, or 10.7 percent of the corporations that were surveyed

checked one or more of the "containers" of data (listed in question 143) as pertaining to their datafile (See Tables 10.2.3-10.2.3.1, and Graph 10.2.3).

[e.g., Amdahl Corporation checked only one "container of data" as it pertained to their datafile:

1. Conceptual entities.]

Notes or reminders that are used for the BSP study team members are described in the memo category. Only seven, or 6.2 percent of the surveyed corporations indicated that the memo category allowed them flexibility in the recording of such things as "impressions" formed by the interviewers or problems, or potential problems, though not explicitly stated (See question 144, Tables 10.2.3-10.2.3.1 and Graph 10.2.3).

[e.g., Again, Amdahl Corporation answered this particular question (question 144) with a "No," indicating that their "documents were not handled by a true DB system."]

10.2.4 BSP Data Model

Was the installation of the BSP data model in the dictionary performed by a data base administrator (DBA), or a systems programmer with a working knowledge of the dictionary? This question was answered with a "Yes" by only nine, or 8 percent of the corporations that responded to the survey (See question 145 and Tables 10.2.4-10.2.4.1 and Graph 10.2.4).

[e.g., Southern Co. Services, Inc., also answered with a "Yes," and explained that they had a BSP "systems" model which was installed by their "systems programmer" (in answering question 145).]

Table 10.2.4

BSP Data Model by One-hundred and Twelve
U.S. Corporations
February, 1982

Questionnaire Response by Number and Percent	Business Systems Planning Questionnaire	
	Questions	
	145	146
Small*		
Yes*		
Pct.(%)		
No*	1	1
Pct.(%)	20.0	20.0
Other@		
Pct.(%)		
No Response	4	4
Pct.(%)	80.0	80.0
Medium*		
Yes*	1	1
Pct.(%)	7.7	7.7
No*	2	1
Pct.(%)	15.3	7.7
Other@		
Pct.(%)		
No Response	10	11
Pct.(%)	77.0	84.6

* Corporations by size according to annual sales.
** Grand total of responses by small, medium, and large corporations.
* "Yes" and "No" responses to questionnaire (see Appendix A).
@ Checked-off responses to one or more of the list of items in the question other than "Yes" or "No."

Table 10.2.4.1

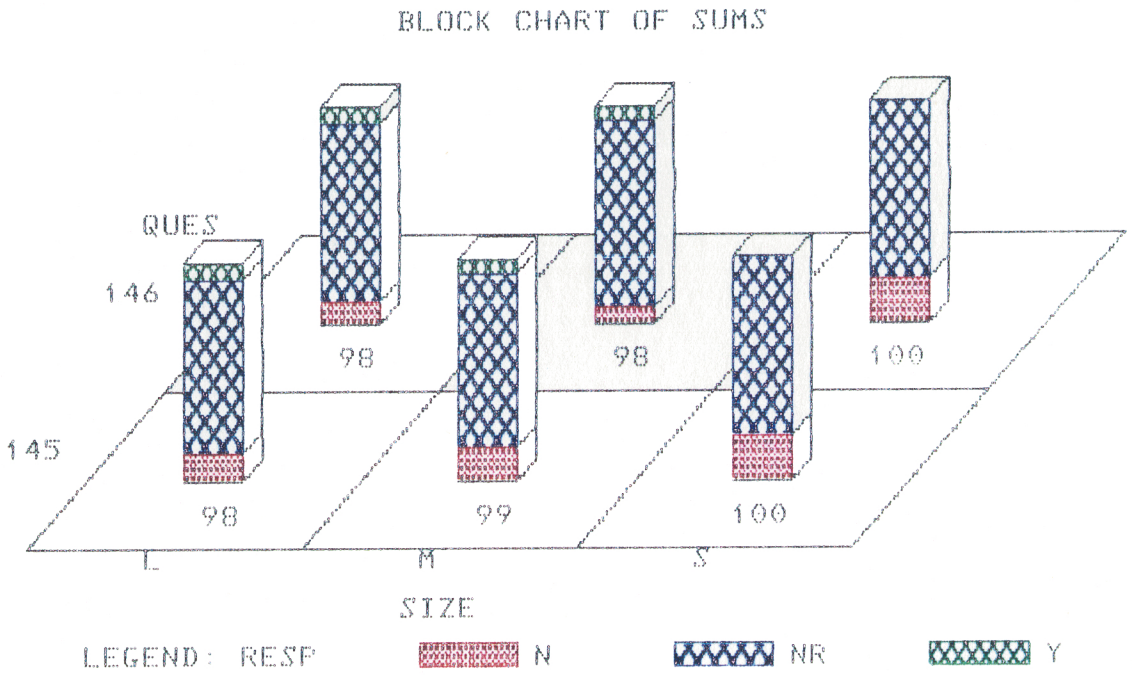
BSP Data Model by One-hundred and Twelve
U.S. Corporations
February, 1982

Questionnaire Response by Number and Percent	Business Systems Planning Questionnaire	
	Questions	
	145	146
Large*		
Yes*	8	8
Pct.(%)	8.5	8.5
No*	13	10
Pct.(%)	13.9	10.6
Other@		
Pct.(%)		
No Response	73	76
Pct.(%)	77.6	80.9
Grand Total**		
Yes*	9	9
Pct.(%)	8.0	8.0
No*	16	12
Pct.(%)	14.3	10.7
Other@		
Pct.(%)		
No Response	87	91
Pct.(%)	76.7	81.3

* Corporations by size according to annual sales.
** Grand total of responses by small, medium, and large corporations.
* "Yes" and "No" responses to questionnaire (see Appendix A).
@ Checked-off responses to one or more of the list of items in the question other than "Yes" or "No."

GRAPH 10.2.4

BSP DATA MODEL



N: NO Y: YES NR: NO RESPONSE

L: LARGE M: MEDIUM S: SMALL

Having decided on the BSP data model (in terms of the subject categories, their attributes and relationships), only nine, or 8 percent of respondents (who answered question 146 for their corporations) were able to indicate that their BSP data model was defined to the dictionary using the extensibility facility (See Tables 10.2.4-10.2.4.1 and Graph 10.2.4).

[e.g., However, Abbott Laboratories, along with twelve, or 10.7 percent of the other corporations answered question 146 with a "No," but failed to explain why.]

10.2.5 BSP Data Dictionary Reports

According to twelve, or 10.7 percent of the respondents, the BSP data that was stored in their dictionary data bases was retrieved, analyzed, manipulated and presented in a form that was most convenient for the BSP study team members (See question 147, Tables 10.2.5-10.2.5.1 and Graph 10.2.5).

[e.g., Standard Oil of California's respondent answered question 147 with a "Yes," and indicated: "However, this was/is evolutionary. Standard dictionary reports were insufficient."]

One or more of the outputs that were listed in question 148 (of the questionnaire) were checked by fourteen, or 12.5 percent of the responding corporations as being used by their BSP study team members (See Tables 10.2.5-10.2.5.1 and Graph 10.2.5).

[e.g., Western North America Corporation checked off all of the following outputs that were used by their study team members:

1. Descriptive reports.
2. Analysis reports.
3. Ad hoc query output.]

Table 10.2.5

BSP Data Dictionary Reports by One-hundred and Twelve
U.S. Corporations
February, 1982

Questionnaire Response by Number and Percent	Business Systems Planning Questionnaire			
	Questions			
	147	148	149	150
Small#				
Yes*	1			
Pct.(%)	20.0			
No*	1			1
Pct.(%)	20.0			20.0
Other@			1	
Pct.(%)			20.0	
No Response	3	5	4	4
Pct.(%)	60.0	100.0	80.0	80.0
Medium#				
Yes*	1			
Pct.(%)	7.7			
No*	1			2
Pct.(%)	7.7			15.4
Other@		2	2	
Pct.(%)		15.4	15.4	
No Response	11	11	11	11
Pct.(%)	84.6	84.6	84.6	84.6

\# Corporations by size according to annual sales.
\#\# Grand total of responses by small, medium, and large corporations.
* "Yes" and "No" responses to questionnaire (see Appendix A).
@ Checked-off responses to one or more of the list of items in the question other than "Yes" or "No."

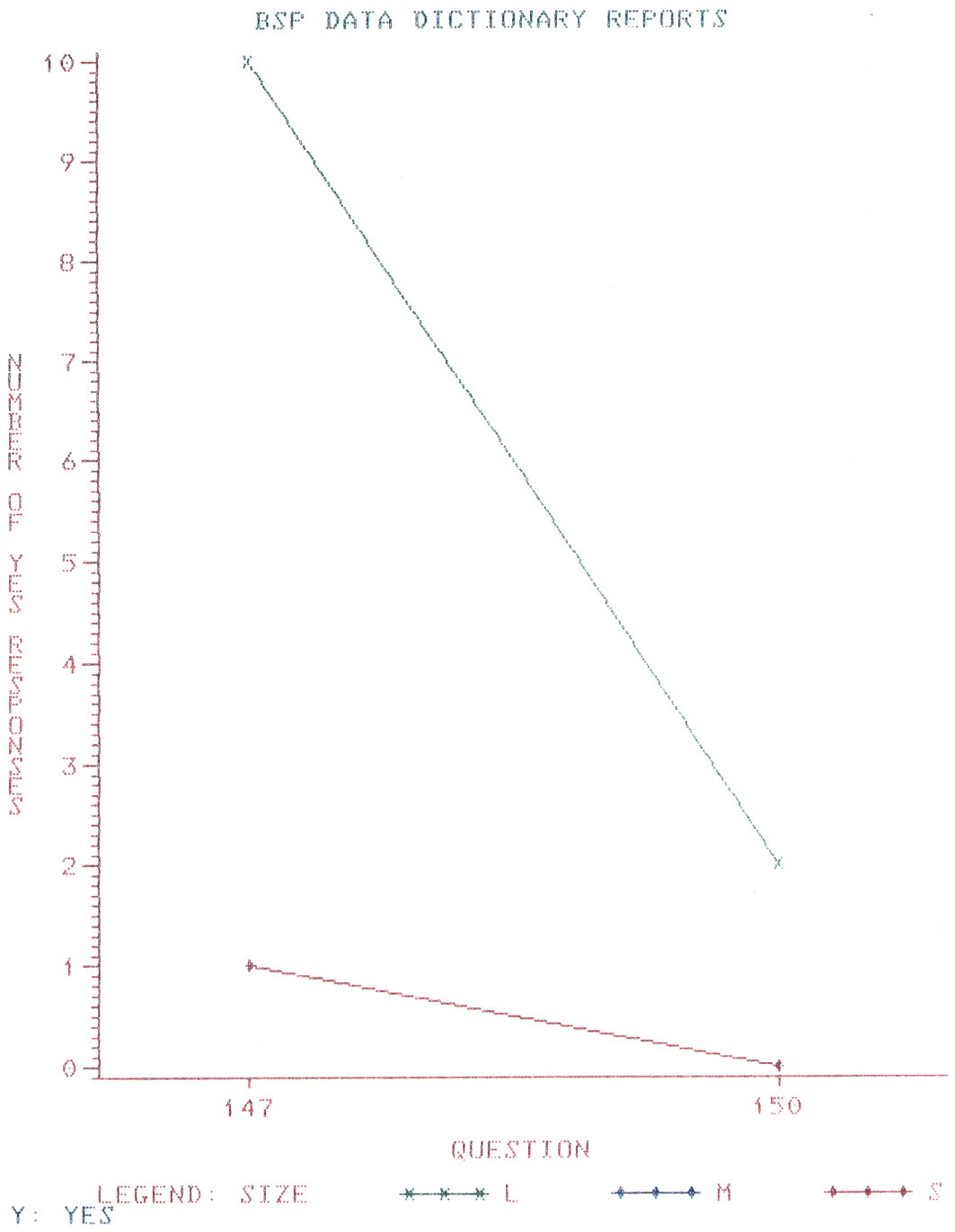
Table 10.2.5.1

BSP Data Dictionary Reports by One-hundred and Twelve
U.S. Corporations
February, 1982

Questionnaire Response by Number and Percent	Business Systems Planning Questionnaire Questions 147	148	149	150
Large#				
Yes‡	10			2
Pct.(%)	10.6			2.2
No‡	10			16
Pct.(%)	10.6			17.0
Other@		12	18	
Pct.(%)		12.8	19.2	
No Response	74	82	76	76
Pct.(%)	78.8	87.2	80.8	80.8
Grand Total##				
Yes‡	12			2
Pct.(%)	10.7			1.7
No‡	12			19
Pct.(%)	10.7			17.0
Other@		14	21	
Pct.(%)		12.5	18.7	
No Response	88	98	91	91
Pct.(%)	78.6	87.5	81.3	81.3

\# Corporations by size according to annual sales.
Grand total of responses by small, medium, and large corporations.
‡ "Yes" and "No" responses to questionnaire (see Appendix A).
@ Checked-off responses to one or more of the list of items in the question other than "Yes" or "No."

GRAPH 10.2.5


BSP DATA DICTIONARY REPORTS
NUMBER OF YES RESPONSES
10
9
8
7
6
5
4
3
2
1
0
147
150
QUESTION
LEGEND: SIZE
L
M
S
Y: YES

Twenty-one, or 18.7 percent of the corporations that were surveyed checked one or more of the reports listed in question 149 that were used by their BSP study team members (See Tables 10.2.5-10.2.5.1 and Graph 10.2.5).

[e.g., However, Amdahl Corporation only checked one of the reports, their own, under the Descriptive Reports category:

1. "Data Entities vs Processes Organizations" Report.]

Having established a BSP data base with the initial BSP study, only two (a very, very poor response), or 1.7 percent of the participants updated their data base with follow-on "mini" studies when appropriate, and ran "program access facility" (PAF) programs to obtain various reports for analysis and planning purposes (See question 150, Tables 10.2.5-10.2.5.1, and Graph 10.2.5).

[e.g., Fireman's Fund Insurance Co., was only one of two corporations that updated their BSP data base with "mini" studies. They indicated that it was their "intent" to do so all along anyway (See question 150).]

10.3 Distributed Information Systems: Operational Controls

With respect to distribution, several of the matrices developed in the BSP study could be very useful in developing the architecture extensions. In order to ensure that the physical locations for systems and data requirements are included, the process and data flow analysis should be extended. The preparation of the location/organization, location/process, and location/data matrices, should be done immediately.

Therefore, the question was asked: Was a process/data matrix for each location prepared with additional parameters on the axis to include data use, security, auditibility, date occurrence, activity volumes, response required, and criticality? In response, nine, or 8.0 percent of the respondents indicated their answer with a "Yes" to question 120 (See Tables 10.3-10.3.1 and Graph 10.3).

[e.g., However, the Western North America Corporation responded with a "No" to question 120, indicating that the "need for operational systems took priority" first.]

The computer age is creating a new menace, due to the explosive growth in computer technology: A vastly expanded potential for computer crime and the inadvertent destruction of data files.

However, fifty-one, or 45.5 percent of the responding corporations have implemented into their long-range I/S (BSP) plan, a facilities plan that incorporates EDP (electronic data processing) accounting control procedures into the system to prevent access by unauthorized individuals. (See questions 120 and 151, Appendix "N" (of the questionnaire), Tables 10.3-10.3.1 and Graph 10.3).

[e.g., The University of Illinois, however, does not plan to install complete EDP accounting control procedures to prevent access by unauthorized individuals. Furthermore, the respondent indicated that they didn't plan to install the EDP package in the "explicit" manner as I had "indicated."]

Fifty-eight, or 51.7 percent of the corporations that were surveyed checked one or more of the general controls in question 152, that were incorporated in their distributed system (See Tables 10.3-10.3.1 and Graph 10.3).

Table 10.3

Operational Controls by One-hundred and Twelve
U.S. Corporations
February, 1982

Questionnaire Response by Number and Percent	Business Systems Planning Questionnaire Questions 120	151	152	153	154	155	156	157	158	159	160
Small#											
Yes¥	2						3	3		2	
Pct.(%)	40.0						60.0	60.0		40.0	
No¥		2						1		2	3
Pct.(%)		40.0						20.0		40.0	60.0
Other@			2	3	2	2			2		
Pct.(%)			40.0	60.0	40.0	40.0			40.0		
No Response	3	3	3	2	3	3	2	1	3	1	2
Pct.(%)	60.0	60.0	60.0	40.0	60.0	60.0	40.0	20.0	60.0	20.0	40.0
Medium#											
Yes¥	1	6					6	5		3	2
Pct.(%)	7.7	46.2					46.2	38.5		23.1	15.4
No¥	4	1					1	2		5	6
Pct.(%)	30.8	7.7					7.7	15.4		38.5	46.2
Other@			7	6	6	6			6		
Pct.(%)			53.8	46.2	46.2	46.2			46.2		
No Response	8	6	6	7	7	7	6	6	7	5	5
Pct.(%)	61.5	46.1	46.1	53.8	53.8	53.8	46.1	46.1	53.8	38.4	38.4

\# Corporations by size according to annual sales.
#¤ Grand total of responses by small, medium, and large corporations.
¥ "Yes" and "No" responses to questionnaire (see Appendix A).
@ Checked-off responses to one or more of the list of items in the question other than "Yes" or "No."

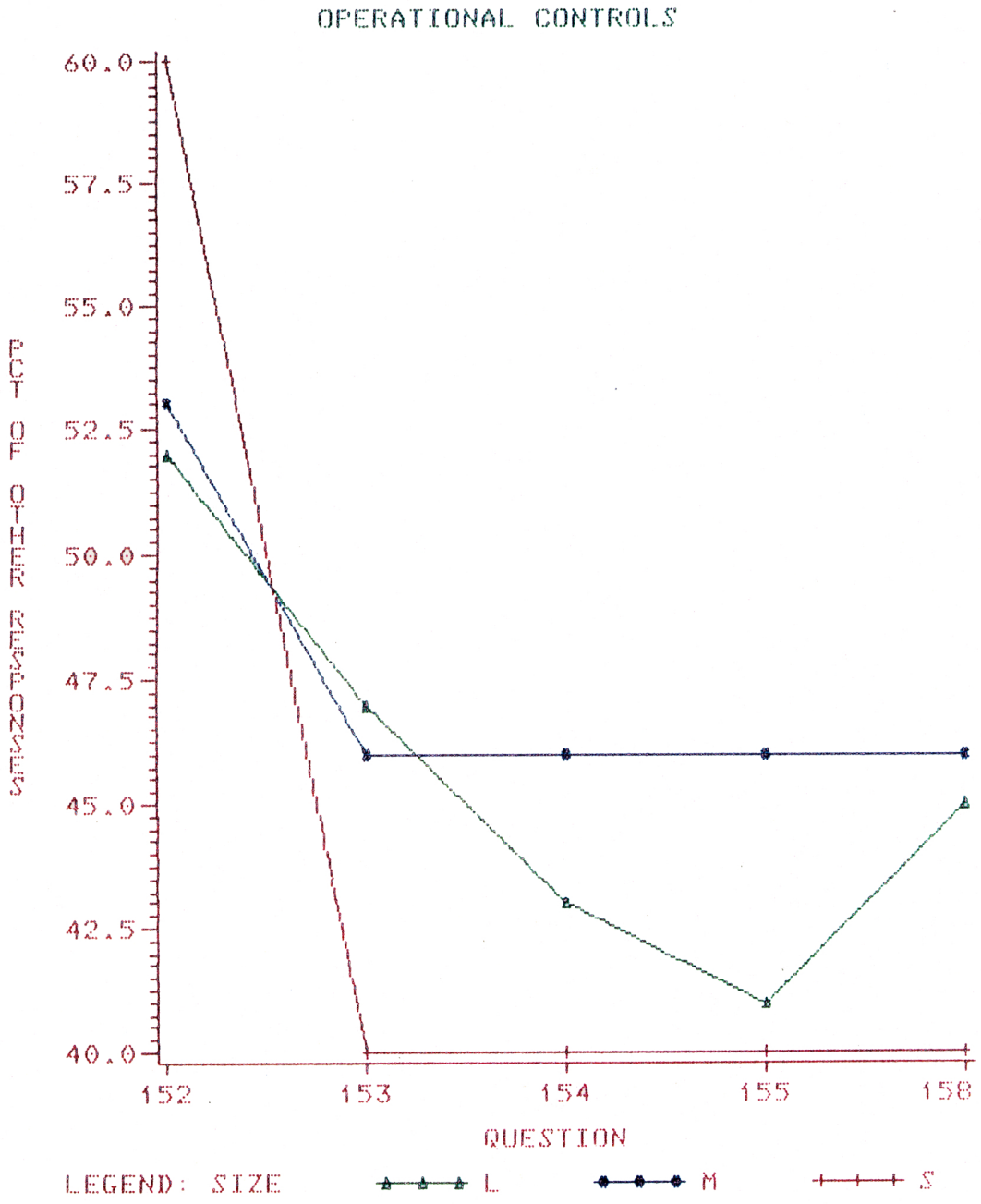
Table 10.3.1

Operational Controls by One-hundred and Twelve
U.S. Corporations
February, 1982

Questionnaire Response by Number and Percent	Business Systems Planning Questionnaire										
	Questions										
	120	151	152	153	154	155	156	157	158	159	160
Large#											
Yes¤	8	43					45	39		24	12
Pct.(%)	8.5	45.8					47.8	41.5		25.5	12.8
No¤	29	6					6	18		35	45
Pct.(%)	30.9	6.4					6.4	19.2		37.2	47.9
Other@			49	45	41	39			43		
Pct.(%)			52.2	47.9	43.6	41.5			45.8		
No Response	57	45	45	49	53	55	43	37	51	35	37
Pct.(%)	60.6	47.8	47.8	52.1	56.4	58.5	45.8	39.3	54.2	37.3	39.3
Grand Total##											
Yes¤	9	51					54	47		29	14
Pct.(%)	8.0	45.5					48.2	42.0		25.9	12.6
No¤	35	7					7	21		42	54
Pct.(%)	31.3	6.2					6.2	18.8		37.5	48.2
Other@			58	54	49	47			51		
Pct.(%)			51.7	48.3	43.7	42.0			45.6		
No Response	68	54	54	58	63	65	51	44	61	41	44
Pct.(%)	60.7	48.3	48.3	51.7	56.2	58.0	45.6	39.2	54.4	36.5	39.2

\# Corporations by size according to annual sales.
Grand total of responses by small, medium, and large corporations.
¤ "Yes" and "No" responses to questionnaire (see Appendix A).
@ Checked-off responses to one or more of the list of items in the question other than "Yes" or "No."

GRAPH 10.3



O: OTHER

[e.g., The Western North America Corporation did not check any of the general controls, (in question 152) because they were not in their distributed system.]

However, fifty-four, or 48.3 percent of the surveyed corporations checked one or more of the application controls (that are listed in question 153) that were incorporated into their distributed system (See Tables 10.3-10.3.1 and Graph 10.3).

[e.g., Brown & Root, Inc., checked the following application controls in answering question 153:

1. Input controls.
2. Processing controls.
3. Output controls.
4. "Data Set Security."
5. "Sub Data Set Security."]

Controls that relate to rejection, correction, and resubmission of data that was initially correct, are called input controls. Forty-nine, or 43.7 percent of the corporations that responded to the survey, checked one or more of the input controls (in question 154) that provided reasonable assurance (See Tables 10.3-10.3.1 and Graph 10.3).

[e.g., First City Bancorporation of Texas, Inc., Houston, Texas, checked all of the input controls in question 154. Their respondent stated that: "Although we have only <u>one</u> distributed system (Letters of Credit) the procedures/processes are in place to effect this as much as is practical."]

According to forty-seven, or 42 percent of the respondents who answered question 155 for their corporation, one or more of the processing controls designed for their distributed system provided them

reasonable assurance and was therefore checked-off (See Tables 10.3-10.3.1 and Graph 10.3).

[e.g., Virginia Technical Institute, of Blacksburg, Virginia, checked-off the following processing controls in question 155:

1. All transactions were processed as authorized:
   a. "Generally, manual and in some cases inadequate (as seen by IA's)."
2. No authorized transactions were omitted.]

Fifty-four, or 48.2 percent of the participants indicated that their output controls were designed to assure the accuracy of the processing result and to make sure that only authorized personnel received the output (See question 156, Tables 10.3-10.3.1 and Graph 10.3).

[e.g., Hallmark Cards, Inc., of Kansas City, Missouri, answered question 156 "Yes," but failed to state why.]

The problem of having remote access to the computer is compounded by the rapidly increasing move by business to distributed processing -- where computing power is scattered throughout an organization. Forty-seven, or 42 percent of respondents set up sophisticated computer security controls to offset the threat to on-line data by remote access terminals (See question 157, Tables 10.3-10.3.1 and Graph 10.3).

[e.g., General Electric Corporation, answered question 157 with a "Yes" and "No," indicating that all sophisticated computer security controls had been set up, "except for 'crytography' and 'terminal identity validation'."]

The corporations that answered question 157 with a "Yes," were now required to check one or more of techniques in question 158, that may have been used by their corporations to achieve computer security.

Fifty-one, or 45.6 percent responded to the above question this time (an increase of 10.9 percent). Furthermore, see Tables 10.3-10.3.1 and Graph 10.3 for further information.

[e.g., First City Bancorporation of Texas, Inc., checked-off the following techniques that may have been used to achieve computer security (See Appendix D for further information on Computer Security Safeguards):

1. Security software.
2. Audit software.
3. Encryption.
4. Emergency recovery.

The respondent further explained (in his response to "Audit Software" in question 158), that: "There is no such thing as audit software which can produce 'sophisticated audit reports' which allows auditors 'not trained' in DP to use the computer. However, we do have auditors who have been trained to produce reports."]

According to the Business Week article: "Computer Crime: The Spreading Danger to Business," (April 20, 1981), there is audit software packages which can produce "sophisticated audit reports" which allow auditors "not trained" in DP to use the computer. Ironically though, even with such a simple package as mentioned above, a majority of internal auditors would still be so overwhelmed by the computer's complexity, that they would even then, find it hard to understand such a package.

One major limitation of access-control software, however, is that it does not protect a company against the most troublesome of computer frauds, those that are committed by employees while they perform their assigned tasks. Programmers in twenty-nine, or 25.9 percent of the corporations that were surveyed, were denied all access

to files and programs that they had written once the software was put into operation (See question 159, Tables 10.3-10.3.1 and Graph 10.3).

[e.g., General Electric Corporation, again, answered this type of question with a "Yes" and "No," in that they "are moving toward this -- and are almost halfway done."]

Programs that expose a company to fraud can even be written by honest programmers. Only fourteen, or 12.6 percent of the participants had programs that had audit controls that allowed the computer to isolate frauds automatically (See question 160, Tables 10.3-10.3.1 and Graph 10.3).

[e.g., Indiana Blue Cross, of Indianapolis, Indiana, answered question 160 "No." Their respondent explained, that they do have some audit controls to isolate frauds "within reason." But, that "all frauds could not be isolated automatically." However, the Business Week article [12, p. 86] mentioned in the analysis of question 158, does indicate that there are audit controls available to "isolate frauds" automatically.]

10.3.1 EDP Audits: Why Do They Fail?

A recent survey of major companies has disclosed that they lack well trained EDP auditors to plug up employee fraud, because auditors failed to keep pace with computer technology, thus being considered ineffective in making a strong case for computer controls. Sixty-three, or 56.2 percent of the respondents, indicated that their internal auditors did not possess the skills that are needed to set up computer controls and conduct computer audits. However, forty-four,

or 39.2 percent of the respondents answered "Yes" to question 161 (See Tables 10.3.2-10.3.2.1 and Graph 10.3.1).

[e.g., Pennsylvania Power & Light Co., of Allentown, Pennsylvania, also answered "Yes" to question 161, and indicated that their "senior man was an ex systems analyst."]

Internal auditors often start an investigation on the hunch that something is wrong. However, when it comes to computer operations, they usually don't have the expertise to dig deeper without audit software. If your corporation is in such a precarious condition, have steps been taken to acquire audit software packages that will allow the internal auditors to try to audit through the computer, and not around it?

Seventy, or 62.5 percent of the respondents answered the above question (question 162) with a "No" (See Tables 10.3.2-10.3.2.1 and Graph 10.3.1).

[e.g., The Louisiana State Department of Education also answered question 162 with a "No," indicating that: "After a new internal auditor has been hired and trained, a decision will be made on the purchase of the software."]

If internal auditors do not get up to speed with computer technology, they will be of no value to their firms by the end of the 1980's. The day of the manual auditor is gone. In view of the above statements, fifty-one, or 45.6 percent of the corporations that responded to the survey, checked one or more of the internal control steps that are currently being performed by their internal audit staff (See question 163, Tables 10.3.2-10.3.2.1 and Graph 10.3.1).

Table 10.3.2

EDP Audits: Why Do They Fail? by One-hundred and Twelve
U.S. Corporations
February, 1982

Questionnaire Response by Number and Percent	Business Systems Planning Questionnaire		
	Questions		
	161	162	163
Small‡			
Yes‡	2	2	
Pct.(%)	40.0	40.0	
No‡	3	3	
Pct.(%)	60.0	60.0	
Other@			2
Pct.(%)			40.0
No Response			3
Pct.(%)			60.0
Medium‡			
Yes‡	5	4	
Pct.(%)	38.5	30.8	
No‡	7	8	
Pct.(%)	53.9	61.6	
Other@			6
Pct.(%)			46.2
No Response	1	1	7
Pct.(%)	7.6	7.6	53.8

‡ Corporations by size according to annual sales.
‡‡ Grand total of responses by small, medium, and large corporations.
‡ "Yes" and "No" responses to questionnaire (see Appendix A).
@ Checked-off responses to one or more of the list of items in the question other than "Yes" or "No."

Table 10.3.2.1

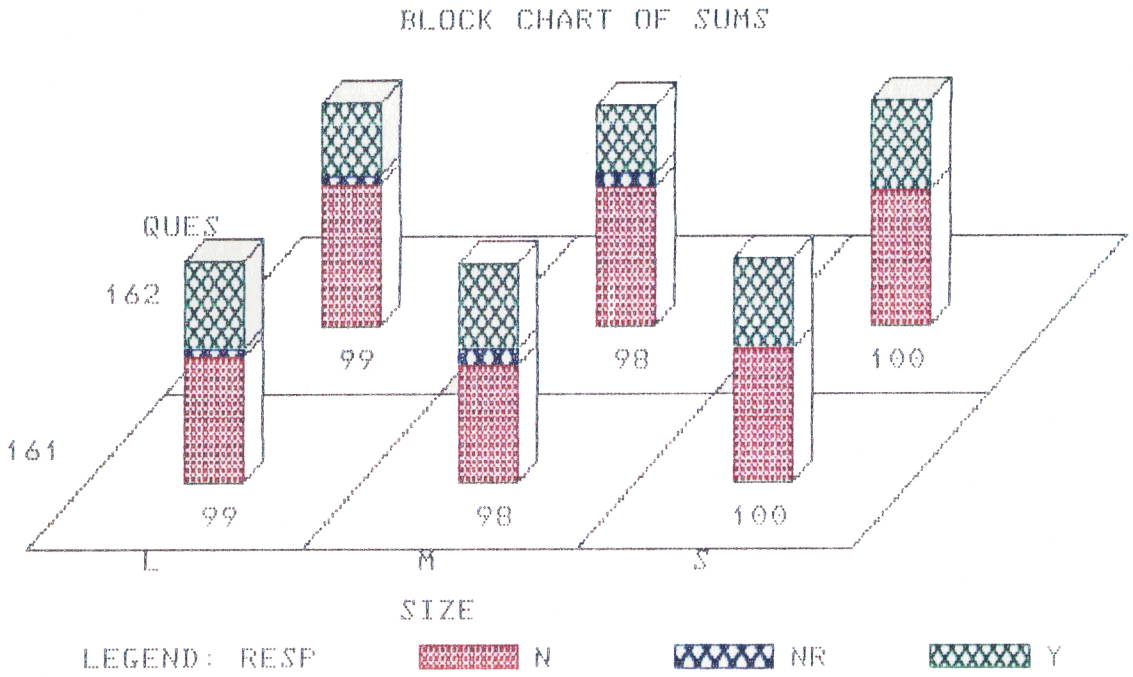
EDP Audits: Why Do They Fail? by One-hundred and Twelve U.S. Corporations
February, 1982

Questionnaire Response by Number and Percent	Business Systems Planning Questionnaire		
	Questions		
	161	162	163
Large$			
Yes‡	37	31	
Pct.(%)	39.4	33.0	
No‡	53	59	
Pct.(%)	56.4	62.8	
Other@			43
Pct.(%)			45.8
No Response	4	4	51
Pct.(%)	4.3	4.2	54.2
Grand Total$$			
Yes‡	44	37	
Pct.(%)	39.2	33.1	
No‡	63	70	
Pct.(%)	56.2	62.5	
Other@			51
Pct.(%)			45.6
No Response	5	5	61
Pct.(%)	4.4	4.4	54.4

$ Corporations by size according to annual sales.
$$ Grand total of responses by small, medium, and large corporations.
‡ "Yes" and "No" responses to questionnaire (see Appendix A).
@ Checked-off responses to one or more of the list of items in the question other than "Yes" or "No."

GRAPH 10.3.1

EDP AUDITS: WHY DO THEY FAIL



N: NO Y: YES NR: NO RESPONSE

L: LARGE M: MEDIUM S: SMALL

[e.g., Monarch Marketing Systems of Dayton, Ohio, checked only one of the internal control steps (in question 163) that are currently being performed by their internal audit staff:

1. The internal auditor's review of a firm's system of accounting control encompassed all significant and relevant manual, mechanical, and EDP activities and the interrelationship between EDP and user departments.]

Chapter 11

BUSINESS SYSTEM PLANNING -- A FINANCIAL ANALYSIS APPROACH

Were the one-hundred and twelve U.S. corporations that responded to the survey managing their information resources effectively? Did the results realize a better bottom line for those corporations that effectively managed their information resources by the use of a Business Systems Planning methodology? The answers to these questions are "No" and "Yes."

The focus of a recent research project of major and successful U. S. corporations was conducted by A. T. Kearney (an international management consulting firm) to determine the answers to the above questions [24, p. 1]. This chapter will focus on and be fashioned after the A. T. Kearney study to help answer the same questions. More and more companies are being forced to look at their assets in a different way, according to the experience that A. T. Kearney has had. In analyzing and delivering information, recent studies show that from 10 to 95 percent of a corporation's assets may be tied up in analyzing and delivering information [Ibid., p. 1]. An even larger percentage of these assets will be devoted to producing information in the near future. Therefore, according to Kearney "how does a company plan, organize, monitor and control the people, equipment, systems and money which combine to produce effective decision making information?"

11.1 Financial Analysis Findings

According to the financial analysis just conducted, those corporations that were able to answer the above question and successfully implement the solution, outperformed the rest of the financial analysis survey by an average of 34 percent in terms of key financial measures such as return on equity, return on total capital and net profit margins (See Graphs 11.1-11.3).

Michael Rolfe, a Kearney Vice President in charge of the company's Information Resource Management Group, warns about jumping to conclusions; "a company that manages the information agent well probably does a lot of things well. That company typically has a well thought out long-range business plan, manpower plan, capital budgets and plans -- and probably monitors its performance against these plans. Effective management of information resources appears to be one attribute of a successful company" [Ibid., pp. 1-2].

11.2 Financial Analysis Results

The financial analysis results were based upon extensive research using the latest financial publications, questionnaires, and telephone interviews of 68, or 60.7 percent of the responding U. S. Corporations. These corporations were selected based upon the availability of data in terms of a five-year average of return on equity, return-on-total capital, and net profit margins. These companies exceeded their respective industry performance for these three financial ratios by 6.5 percent, 12.0 percent and 18.1 percent, respective-

ly, on the average. The criteria used to select participants was not only limited to financial performance. Specific and detailed responses to the questionnaire and telephone interviews, in regard to the successful or unsuccessful implementation and use of a Business System Plan, led to the inclusion of these corporations in the analysis.

11.3 The Sample

The survey was comprised of corporations from a variety of industries. Approximately 75 percent of the sample corporations were manufacturers and conglomerates. The remaining participants were service industry companies -- primarily banks and insurance concerns. Annual revenues ranged from $4 million to $64 billion for the sample corporations. Telephone interviews were conducted with Vice Presidents of Information Systems Departments.

Michael May, a Kearney Principal who managed their research project, points to its uniqueness. "We selected the nation's premier firms in order to determine the common success factors in effectively managing the information resources. What we found was startling. Only 8 percent of these most successful companies were successful in terms of managing the information agent in order to make other resources more productive. This was not just a conclusion reached by A.T. Kearney but one shared by a majority of the participants. They were very self critical" [Ibid., p. 3].

What I found was also startling. Fifty-seven percent of the

corporations surveyed made other resources more productive in terms of managing the information agent.

11.4 Information Resource Management

Information resource management is not a new concept. The concept was created between 1967 and 1973 [Ibid., p. 3]. Even today, major business publications and newspapers are flooded with the topic. We are evolving into an "information economy" where an ever increasing percent of our work force is deployed in the information business, according to such popular theorist as Alvin Toffler [Ibid., p. 3]. In light of all of this discussion, the findings of this financial analysis (along with Kearney's study findings) are interesting and unique. According to Irene Pulfer (formally, a senior consultant with Kearney, and now a consultant with Slavin Associates of San Francisco, California); "it appears that even in the most successful companies -- a lot has been said about the need to focus on the management of the information agent, but even after fifteen years, very little has been done to reap the benefits from more effective management" [Ibid., p. 3].

The question now is: "Why has so little been done?" The findings of this analysis as well as Kearney's points to top management as the key. Viewing information as a company asset or resource, makes top management feel uncomfortable. Perceiving information as an intangible asset, is often difficult for senior executives.

According to Michael Rolfe, "Information should not be viewed like other company resources contrary to popular belief, it should be treated as a facilitating agent which enables management to better

leverage a company's tangible assets. It is the glue which holds the business together and enables a company to make sound decisions concerning resource deployment, allocation and results analyses" [Ibid., p. 4].

Due to its perceived highly technical nature, very little has been done to tackle the problem of information resource management in U.S. industry at the senior executive level. One of the study participants for Kearney, described his company's top management, "Our senior executives are terrorized by technology. Computers, systems and software changes are so rapid that they cloud the real business decisions that are involved" [Ibid., p. 4]. Also, the data processing technocrats have not been able to prove the real benefits, so top management has not taken the information resource management ball and run with it. This financial analysis provides evidence that the existence of real bottom line figures are real. Therefore, it appears that the effective management of the information resources may enhance the success of the company, while many factors contribute to that success.

11.5 Managing the Information Agent: Financial Performance Overview

Companies who figure out how to effectively manage their information agent, have a real goldmine available to them. Graphs 11.1, 11.2, and 11.3 show the relationship of the 68 corporations and their financial performance. Several interesting findings surfaced in a comparison of the financial performance of the 68 corporations:

1. The 57 percent of the corporations who had formal Business

Systems Planning, outperformed the rest of the companies by 34 percent, in terms of an average of return of equity, return on total capital, and net profit margins over a five-year period.

2. Nineteen percent of the sample corporations had no formal Business Systems Planning. The formal BSP group financially outperformed this group by 61.1 percent.

3. Four percent of the corporations had a mixture of Business Systems Planning and other strategic planning methodologies (that is, the non-BSP plan was not part of the business plan). The formal BSP group outperformed this group by 14.8 percent in terms of the financial ratios.

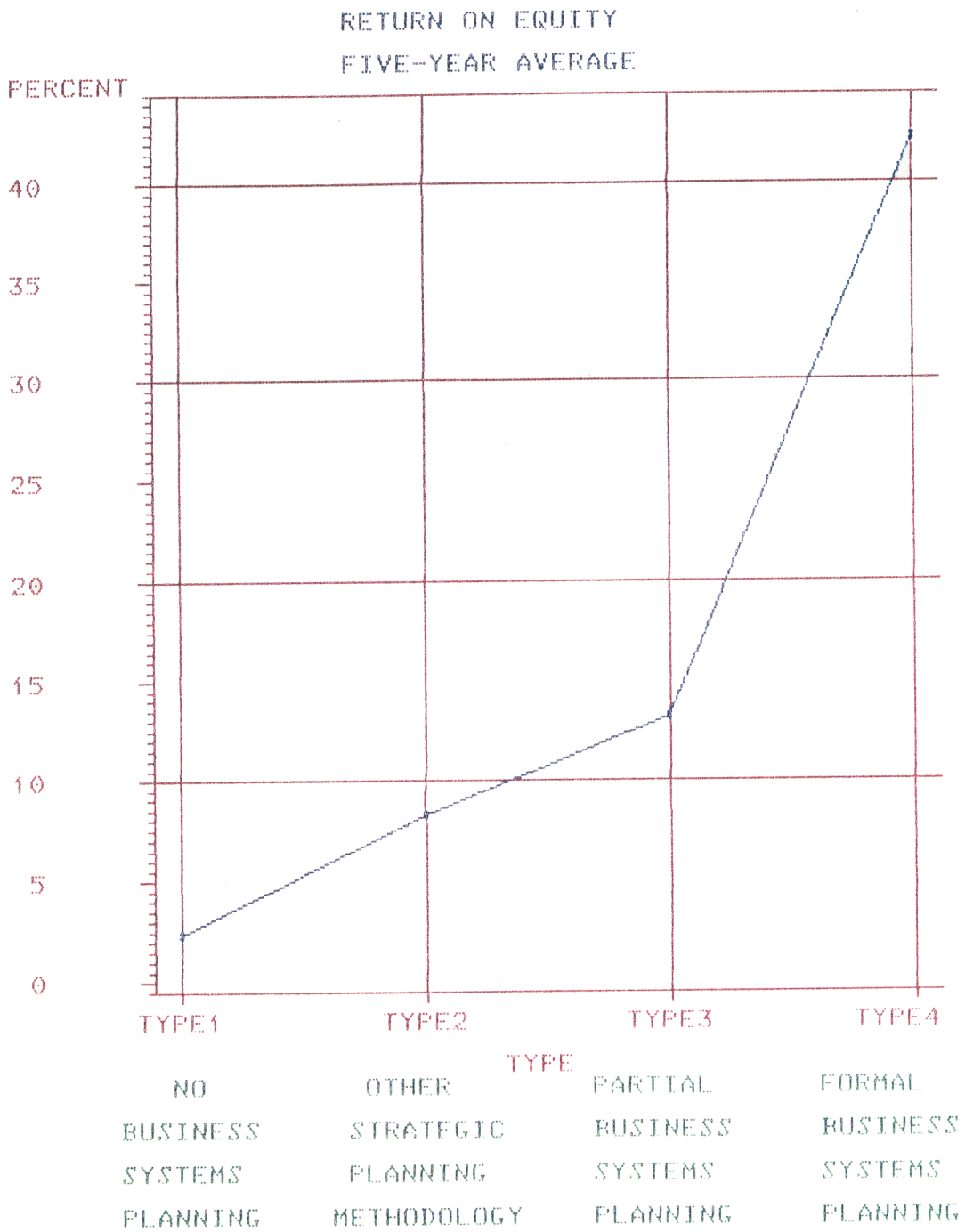
4. Nineteen percent of the sample had no formal Business Systems Planning, but did have another strategic planning methodology. Again, the formal BSP group outperformed this group by 26.1 percent. It appears from this financial analysis that corporations make a major stride in realizing financial gains at the point where formal Business Systems Planning is implemented.

11.6 Top Management Involvement and Commitment

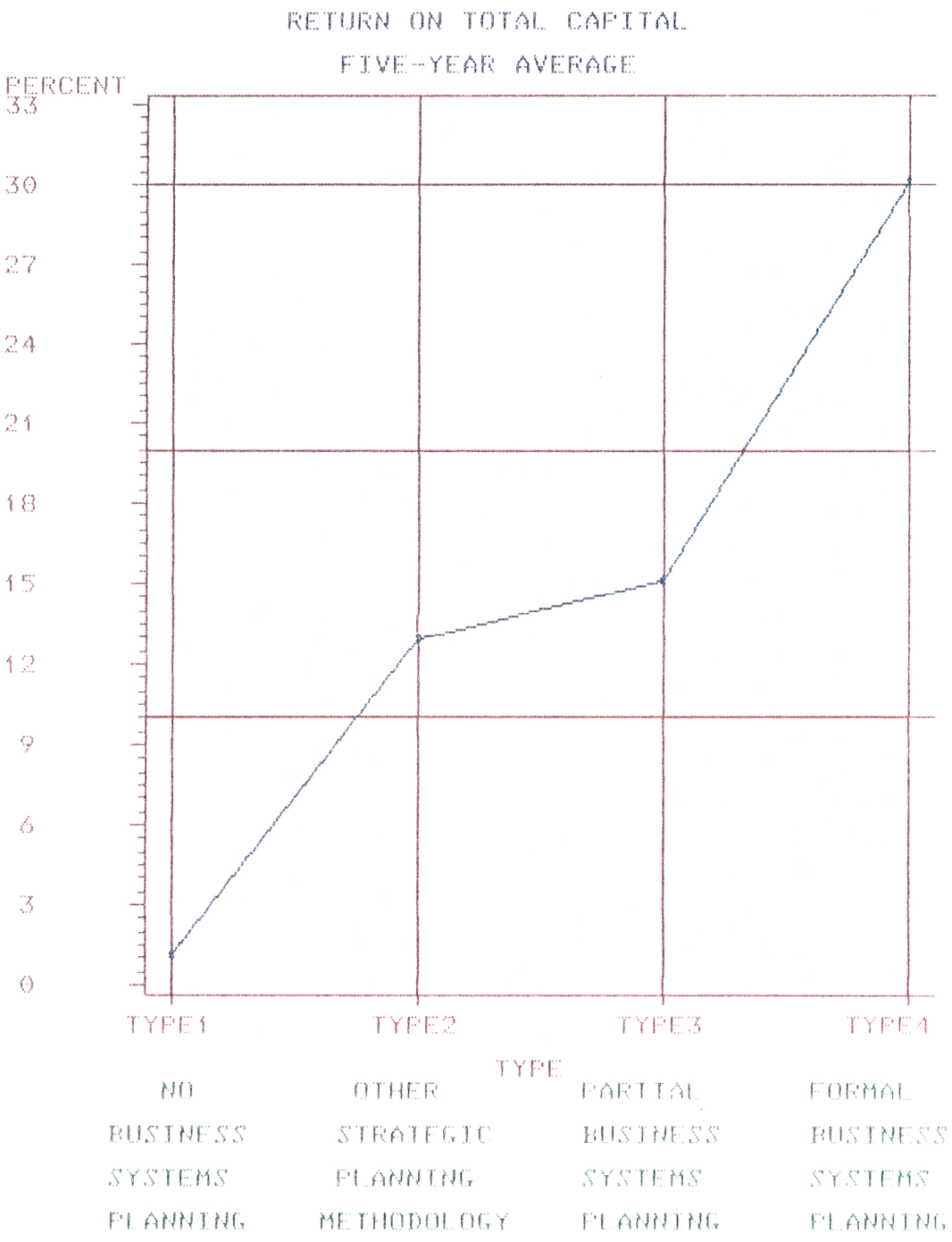
The A. T. Kearney "study participants were asked to comment on what they considered to be the crucial information resource management issues facing executives in the next decade" [Ibid., p. 9]. Arising with surprising frequency, was top management involvement and commitment, productivity and integration of new technology.

Mentioned most often, was top management and commitment to manage the information resources. In order to ensure that the infor-

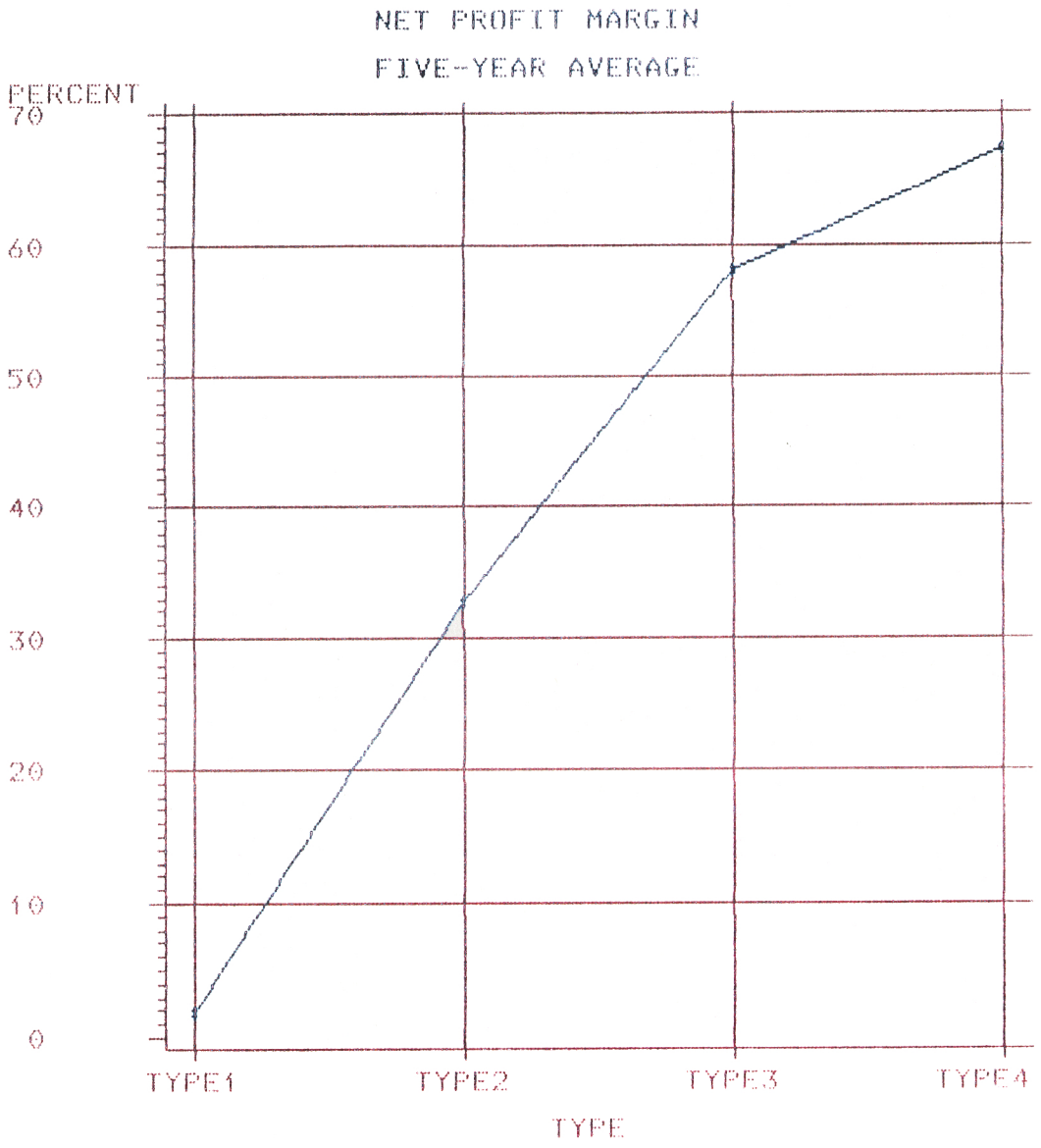
GRAPH 11.1


RETURN ON EQUITY
FIVE-YEAR AVERAGE
PERCENT
40
35
30
25
20
15
10
5
0
TYPE1
TYPE2
TYPE3
TYPE4
TYPE
NO BUSINESS SYSTEMS PLANNING
OTHER STRATEGIC PLANNING METHODOLOGY
PARTIAL BUSINESS SYSTEMS PLANNING
FORMAL BUSINESS SYSTEMS PLANNING

GRAPH 11.2


RETURN ON TOTAL CAPITAL
FIVE-YEAR AVERAGE
PERCENT
33
30
27
24
21
18
15
12
9
6
3
0
TYPE1
TYPE2
TYPE3
TYPE4
TYPE
NO BUSINESS SYSTEMS PLANNING
OTHER STRATEGIC PLANNING METHODOLOGY
PARTIAL BUSINESS SYSTEMS PLANNING
FORMAL BUSINESS SYSTEMS PLANNING

GRAPH 11.3



NO BUSINESS SYSTEMS PLANNING	OTHER STRATEGIC PLANNING METHODOLOGY	PARTIAL BUSINESS SYSTEMS PLANNING	FORMAL BUSINESS SYSTEMS PLANNING

mation agent is effectively managed, the above refers to the actual quality of time that senior executives commit to planning, reviewing and following up on. One of Kearney's participants' said, "Top management has not accepted the responsibility. We are getting the Chief Executive's involvement, but I'm not sure we are getting his commitment" [Ibid., p. 9]. According to Kearney, over 75 percent of their sample companies had steering committees comprised of top management whose purpose is to manage the information resources. The steering committee is an old concept. It appears however, that more is required of senior management than merely sitting on a steering committee, even in light of the Kearney study findings and the participants' responses. One of Kearney's study participtants; who was among the 8 percent who effectively managed their information resources said, "Our Chief Executive Officer assigns responsibility for each aspect of information delivery alternative development to a senior operating or line manager. Actual costs versus planned costs are reported to the C.E.C. quarterly and our M.B.O (Management by Objective) program holds executives accountable" [Ibid.].

11.7 Managing Information Resources to Leverage the Productivity of Other Resources

The second most mentioned issue of the Kearney Study was: "Managing the information resources to leverage the productivity of the other resources" [Ibid., p. 10]. New pressure is put on American companies to increase their return-on-assets, as U.S. productivity continues to decline and foreign productivity increases. Effective

management of the information resources holds the key to vast productivity improvement gains, according to most of Kearney's study participants. Almost 55 percent of the work force will be employed in the information business by 1988, according to one study [Ibid.].

Characterizing the nature of successful corporate productivity programs in the U.S. today (Managing for Excellence), was another one of Kearney's recent research projects. This project "focused on management of the information resources as an integral part of those corporate productivity programs which were considered most successful and achieved the greatest financial results" [Ibid.].

11.8 Integration of New Technology

Frequently voiced as a major business issue by Kearney's study group, was the "integration of new technology" into the business [Ibid.]. The fact that U.S. companies face a significant problem in "uncoupling" from their existing technology to implement a new technology -- while not disturbing the ongoing business operations, is of some concern to Kearney's participants because technological changes in hardware, software, and supporting services are so rapid and complex.

11.9 Summary

In regard to effective management of the information agent, most successful U.S. corporations are in the "infant" stages [Ibid., p. 11]. Also, in order to productively leverage other resources, this

financial analysis has made a compelling argument that only a few corporations really understand how to effectively manage the information agent. They financially outperformed other corporations in the analysis, as a consequence. Their superior performance does appear to be an attribute of the "most" successful firms, but is probably not the only reason. Therefore, as a result of the Kearney research project and this financial analysis, interested corporations can now obtain a better understanding of how well they'll be able to manage their information agent through the use of Business Systems Planning.

Vol #2

BUSINESS SYSTEMS PLANNING: AN IMPLEMENTATION APPROACH

by

JOHN ROBERT VACCA

B.B.A., Washburn University, 1976
M.B.A., Emporia State University, 1978

A MASTER'S THESIS

submitted in partial fulfiliment of the

requirements for the degree

MASTER OF SCIENCE

Department Of Computer Science

KANSAS STATE UNIVERSITY
Manhattan, Kansas

1982

Approved by:

Major Professor

SPEC
COLL
LD
2668
T4
1982
V32
vol. 2
c. 2

A11202 578953

TABLE OF CONTENTS

Page

List of Tables xxv

List of Figures. xxvii

List of Graphs xxviii

List of Plates xxx

Volume

I

Part

I. INTRODUCTION 1

Chapter

1. INTRODUCTION. 1

1.1 The Problem 5

1.1.1 Purpose of the Study. 5

1.1.2 Importance of the Study 6

1.1.3 Delimitations of the Study. 7

1.2 Methods and Procedures. 8

II. REVIEW OF RELATED LITERATURE 13

Introduction 13

Chapter

2. BUSINESS SYSTEMS PLANNING -- PRINCIPLES, CONCEPTS, AND METHODOLOGY OVERVIEW. 15

2.1 BSP Concepts. 15

2.1.1 Goals and Objectives of the Business. 15

2.1.2 Management Needs. 15

2.1.3 Consistency of Information Throughout the Organization. 16

2.1.4 Organization and Management Change. . 17

Volume

Part

Chapter

Page

2.1.5 Strategy Implementation 18

2.2 Major Activities of the BSP Study 20

2.2.1 Obtaining the Commitment. 21

2.2.2 Proper Study Preparation. 23

2.2.3 The Kickoff Meeting 23

2.2.4 Identifying the Business Processes. . 24

2.2.5 Data Class Grouping 24

2.2.6 Business Analysis and the Relationships of Systems. 25

2.2.7 Ascertaining the Executive Perspective 25

2.2.8 Analyzing Business Problems 26

2.2.9 Identifying Information Architecture. 26

2.2.10 Establishing Architecture Priorities. 27

2.2.11 Management of Information Systems . . 27

2.2.12 Recommendations and Action Plan Development 28

2.2.13 Final Report and Executive Presentation. 28

2.3 Obtaining the Commitment. 29

2.3.1 Selecting the Study Scope 29

2.3.2 Establishing the Study Objectives . . 30

2.3.3 BSP Study Business Reasons. 31

2.3.4 Study Team Selection. 32

2.4 Study Preparation 35

2.4.1 Study Team Orientation. 36

Volume — Page

Part

Chapter

2.4.2 Data Gathering. 36

2.4.3 Team Education. 38

2.4.4 The Study Work Plan Development . . . 38

2.4.5 BSP Control File. 39

2.4.6 Study Report. 39

2.4.7 Executive Interview List. 45

2.4.8 Executive Briefing Session. 46

2.4.9 Control Room Preparation. 46

2.4.10 Administrative Support. 47

2.4.11 Executive Sponsor Review. 47

2.5 Summary 48

3. BUSINESS SYSTEMS PLANNING -- METHODOLOGY DETAILS 49

3.1 Beginning the Study 49

3.1.1 Executive Sponsor's Opening 49

3.1.2 Study Work Plan Review. 49

3.1.3 Review of the Business. 50

3.1.4 Review of Information Systems 51

3.2 Review of the Business Processes. 51

3.2.1 Defining Processes. 52

3.2.2 Life Cycle. 52

3.2.3 Process Identification Overview . . . 53

3.2.4 The Use of Outputs. 59

3.2.5 Approach Expansions and Variations. . 60

Volume — Page

Part

Chapter

3.3 Describing Data Classes 62

3.3.1 The Business Entity Method. 62

3.3.2 The Business Process Method 64

3.3.3 Regrouping and Cross-analyzing. . . . 64

3.3.4 Processes to Data Classes 66

3.4 Current Systems Support 66

3.4.1 I/S Support of Processes. 66

3.4.2 Current Data Usage Review 67

3.4.3 Summary of Current Systems Support. . 68

3.5 Executive Perspective 68

3.5.1 Interview Schedule Confirmation . . . 69

3.5.2 Confirming the Interview Schedule . . 69

3.5.3 Preparation of General Questions. . . 70

3.5.4 Role Assignment for Team Members. . . 71

3.5.5 Commence the Interview. 72

3.5.6 Summarize Interview Notes 74

3.6 Assessing Findings and Conclusions. 74

3.6.1 Interview Data Summary. 74

3.6.2 Categorizing Interview Data 76

3.6.3 Interface Processes to Data 77

3.6.4 Summary of Assessing Findings and Conclusions 77

3.7 Information Architecture Review 78

3.7.1 Creating the Architecture Diagram . . 78

3.7.2 Flow of Data. 79

Volume — Page

Part

Chapter

3.7.3 Identifying Subsystems. 79

3.7.4 Prerequisite Analysis 80

3.7.5 Use of the Information Architecture . 80

3.8 Evaluating Architecture Priorities. 80

3.8.1 Evaluate Selection Criteria 81

3.8.2 Criteria and Systems Analysis 82

3.8.3 System Prerequisites Identification . 82

3.8.4 Recommendations, Documentation, and Presentation of Systems 82

3.8.5 Financial Justification 83

3.9 Specific BSP Study Recommendations and Action Plans. 83

3.10 Preparing the Study Report and Executive Presentations 82

3.10.1 Preliminary Report Outline. 85

3.10.2 Preparation of Report 85

3.10.3 Medium Presentation 86

3.10.4 Presentation to Executives. 86

3.11 Summary 87

4. BUSINESS SYSTEMS PLANNING -- FOLLOW-ON ACTIVITIES OVERVIEW 89

4.1 Management Information Systems. 91

4.2 Architecture Follow-on Effort Requirements. 94

4.3 Developing and Implementing the High-Priority System 97

4.4 Summary 99

Volume

Part

Chapter

	Page
5. PLANNING, MEASUREMENT, AND CONTROL OF MANAGEMENT INFORMATION SYSTEMS.	100
5.1 The MIS Purpose	100
5.2 MIS Module Activities Flow.	101
5.3 MIS Outputs	104
5.4 The Management System -- How Effective Is It?	105
5.4.1 Effectiveness in the I/S Business . .	106
5.4.2 The Total Management System	106
5.4.3 Monitoring the Total Management System	107
5.5 Decision Support For Management Information Systems	108
5.5.1 Planning for Data Systems	108
5.5.2 Strategic Planning In MIS	109
5.6 Information Systems -- Why Do They Fail?. .	111
5.6.1 A Descriptive Model For Information Systems	112
5.6.2 Testing the Propositions of The Descriptive Model	112
5.6.3 User Attitudes and Perceptions of Information Services Staff and Systems	113
5.6.4 Use of Information Systems by the Decision Maker.	114
5.6.5 The Descriptive Model of Information Systems	114
5.6.6 Successful Information Systems. . . .	115

Volume — Page

Part

Chapter

5.7 Planning, Developing, and Managing Management Information Systems. 116

5.7.1 Executive Preparation for MIS 116

5.7.2 System Design 117

5.7.3 System Implementation 117

5.8 Risk Analyses, Risk Factors, and Strategies. 118

5.8.1 Risk Analysis Implementation. 118

5.8.2 Application of Risk Analysis Implementation. 119

5.8.3 Risk Analysis Implementation Success. 120

5.9 Business Systems Planning Through Data Base Planning 121

5.9.1 Integrating Business Plans With Systems Plans 121

5.9.2 Data Base Performance and Stability . 122

5.9.3 Developing the Data Base Management Systems Through the View of the User. 123

5.9.4 DBMS -- Why Has It Failed?. 124

5.9.5 Planning for Tomorrow's Information Systems 124

5.10 Summary 125

6. THE DATA DICTIONARY 130

6.1 Use of the Data Dictionary in BSP 130

6.2 An Approach in Using Release 3 of IBM's Data Dictionary to Support BSP. 131

6.3 The Data Dictionary, What Is It?. 132

6.4 The Data Dictionary, Why Consider It? . . . 137

Volume — Page

Part

Chapter

6.5 BSP Subject Categories, Attributes, and Relationships 137

6.6 BSP Data Dictionary Facilities. 141

6.7 BSP Data Model Installation 141

6.8 Analysis and Inquiry Reports. 142

6.9 Developing a Global Keyword Glossary. . . . 143

6.10 Identifying Useful Reports. 146

6.11 PAF Programs. 147

6.12 The Data Dictionary, Why Use It?. 148

6.13 BSP Study Preparation 148

6.14 Summary 150

7. DISTRIBUTED INFORMATION SYSTEMS 153

7.1 Planning for Distributed Information Systems 154

7.2 Documenting Distribution Requirements . . . 155

7.3 Distribution Decisions. 156

7.4 Implementation and Creation of the Resource Plan 158

7.5 Dynamic Aspects of Operational Control. . . 158

7.6 Security/Privacy Administration Function. . 161

7.7 Deficiency of EDP Controls -- Who Is To Blame?. 164

7.8 Summary of Distributed Information Systems. 166

Summary of The Review of the Literature 168

III. PRESENTATION AND INTERPRETATION OF DATA 170

Volume — Page

Part

Chapter

8. BUSINESS SYSTEMS PLANNING STUDY ACTIVITIES OVERVIEW. 176

8.1 Major Activities. 176

8.1.1 Gaining the Commitment. 177

8.1.2 Defining the Study Objectives 182

8.1.3 BSP Study Obstacles 183

8.1.4 Supporting the Study Team 184

8.2 Preparation Plan. 187

8.2.1 Allocation and Preparation Activities. 191

8.2.2 Data Accumulation 191

8.2.3 BSP Education Plan. 192

8.2.4 The Study Work Plan 192

8.2.5 The Control File. 193

8.2.6 The Study Report. 193

8.2.7 Invitation Letter 194

8.2.8 Briefing Session. 195

8.2.9 Executive Sponsor Review Meeting. . . 195

9. BUSINESS SYSTEMS PLANNING METHODOLODY DETAILS OVERVIEW. 197

9.1 The Opening Meeting 197

9.1.1 Purpose of the Opening Meeting. . . . 198

9.1.2 Executive Sponsor's Opening 198

9.1.3 Work Plan Review. 202

9.1.4 Business Related Information. 202

9.1.5 Study Preparation Summary 203

Volume — Page

Part

Chapter

9.2 Business Processes. 203

9.2,1 Business Process Definition 207

9.2.2 Predefinition of Business Processes . 207

9.2.3 Resource Management 208

9.2.4 Overview of Process Identification. . 208

9.2.4.1 Products/Service Identification. 209

9.2.4.2 Resource Processes Support. . 210

9.2.4.3 Process Grouping. 211

9.2.5 Business Process Output 216

9.2.6 Business, Product, Service Diversity. 216

9.2.6.1 External Assistance 217

9.2.6.2 Optional Methods for Identifying Business Processes 217

9.2.6.3 Business Process Model. . . . 217

9.3 Data Class Definition 218

9.3.1 The Business Approach 222

9.3.2 The Process Approach. 222

9.3.3 Cross-Referencing and Regrouping. . . 222

9.4 Business Systems Analysis 223

9.4.1 Data Processing Support 224

9.4.2 Current Data Usage. 228

9.5 Interviewing and Interview Analysis 229

9.5.1 Executive Identification. 234

9.5.2 Interview Schedule Confirmation . . . 234

Volume — Page

Part

Chapter

9.5.3 Interview Questions 234

9.5.4 Role Assignment for Team Members. . . 235

9.5.5 Holding the Interview 236

9.5.6 Interview Documentation 236

9.6 Business Problems 237

9.6.1 Interview Data Summarization. 237

9.6.2 Interview Data Classification 241

9.6.3 Data to Processes Relation. 241

9.7 Identifying Information Architecture. . . . 242

9.7.1 Architecture Diagram Development. . . 246

9.7.2 Data Flow Determination 246

9.7.3 Identifying Subsystems. 247

9.7.4 Prerequisite Analysis 247

9.8 Architectural Priority Establishment. . . . 248

9.8.1 Selection Criteria Establishment. . . 252

9.8.2 Criteria and List Systems Applications. 253

9.8.3 Identification of System Prerequisites 253

9.8.4 Subsystems Recommendations. 254

9.9 Review of Management Information Systems (MIS) 254

9.9.1 Purpose of Management Information Systems 258

9.9.1.1 MIS Module Objectives 258

9.9.1.2 Inputs to MIS 259

Volume — Page

Part

Chapter

9.9.2 Flow of MIS in a BSP Study. 259

9.9.2.1 Generating I/S Objectives . . 260

9.9.2.2 MIS Support of Architectural Priorities. 261

9.9.2.3 I/S Support Problems and Non-I/S Problems. 261

9.9.2.4 Current Problems in Management Information Systems 262

9.9.2.5 Consolidating MIS Changes . . 262

9.9.3 MIS Output Summarization. 262

9.10 Planning the Recommended Follow-on Project. 263

9.11 Final Report and Executive Presentation . . 267

9.11.1 Preliminary Report Outline. 271

9.11.2 Primary Report Writing Responsibility. 271

9.11.3 Report Presentation 272

9.11.4 The Executive Presentation. 272

10. BUSINESS SYSTEMS PLANNING: FOLLOW-ON PROJECTS, DATA DICTIONARY, AND DISTRIBUTED INFORMATION SYSTEMS. 274

10.1 Follow-on Project Orientation. 274

10.1.1 Continuation of BSP Study Through Follow-on Activities. 275

10.1.1.1 Follow-on Activities Preparation 279

10.1.1.2 Project Team Member Orientation 279

10.1.2 MIS Effective Support of the Business 280

Volume — Page

Part

Chapter

10.1.2.1 MIS Follow-on Projects. . . . 281

10.1.2.2 The Activities of an I/S Business. 281

10.1.3 Information Architecture Project. . . 282

10.1.3.1 Subsystem Description 282

10.1.3.2 Examining the Current Systems 283

10.1.3.3 Data Base Generation. 283

10.1.4 High-priority System Development. . . 284

10.2 Data Dictionary: A Tool to Support Business Systems Planning 284

10.2.1 Data Dictionary Implementation. . . . 285

10.2.2 Data Dictionary Facilities. 290

10.2.3 Subject Categories. 295

10.2.4 BSP Data Model. 301

10.2.5 BSP Data Dictionary Reports 305

10.3 Distributed Information Systems: Operational Controls. 309

10.3.1 EDP Audits: Why Do They Fail? 317

11. BUSINESS SYSTEMS PLANNING -- A FINANCIAL ANALYSIS APPROACH. 323

11.1 Financial Analysis Findings 324

11.2 Financial Analysis Results. 324

11.3 The Sample. 325

11.4 Information Resource Management 326

11.5 Managing the Information Agent: Financial Performance Overview. 327

11.6 Top Management Involvement and Commitment . 328

Volume — Page

Part

Chapter

11.7 Managing Information Resources to Leverage the Productivity of Other Resources . . . 332

11.8 Integration of New Technology 333

11.9 Summary 333

II

IV. SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS. 335

12. SUMMARY. 337

12.1 Activities. 338

12.1.1 Commitment. 338

12.1.2 Study Objectives. 339

12.1.3 Study Obstacles 339

12.1.4 Study Team Support. 339

12.2 Plan Preparation. 340

12.2.1 Activity Preparation and Allocation . 340

12.2.2 Accumulation of Data. 341

12.2.3 Education Plan. 341

12.2.4 Work Plan 341

12.2.5 File Control. 341

12.2.6 Report. 342

12.2.7 Letter of Invitation. 342

12.2.8 Briefing. 342

12.2.9 Review Meeting With the Executive Sponsor 342

12.3 Summary of the Initial Meeting. 343

12.3.1 Purpose of the Initial Meeting. . . . 343

Volume Page

Part

Chapter

12.3.2 Executive Sponsor's Initial Meeting . 343
12.3.3 Plan. 343
12.3.4 Preparation Summary 343
12.4 Summary of Business Processes 344
12.4.1 Defining the Business Process 344
12.4.2 Managing the Resources. 344
12.4.3 Process Identification Summary. . . . 344
12.4.3.1 Grouping Process. 345
12.4.4 Diversification of Product/Services . 345
12.4.4.1 Outside Assistance. 345
12.4.4.2 Model of Business Process . . 346
12.5 Data Class Definition Summary 346
12.5.1 Business Entity 346
12.5.2 The Process Concept 346
12.5.3 Regrouping and Cross-analyzing. . . . 346
12.6 Analysis of Business Systems. 347
12.6.1 The Support of Data Processing. . . . 347
12.6.2 Current Automated Data. 348
12.7 Interview Analysis. 348
12.7.1 General Questions 349
12.7.2 Assignment of Roles for Team Members. 349
12.7.3 Conducting the Interview. 349
12.7.4 Documentation of the Interview. . . . 349
12.8 Problems of the Business. 350

Volume — Page

Part

Chapter

12.9 Defining the Information Architecture . . . 350
12.9.1 Determination of Data Flow. 350
12.10 Establishment of a Controlled Environment . 351
12.10.1 Establishing Selection Criteria . . . 351
12.10.2 System Prerequisites. 351
12.11 MIS 352
12.11.1 MIS Flow in the BSP Study 352
12.11.1.1 I/S Objectives Generation . . 352
12.11.1.2 MIS Support 353
12.11.1.3 I/S and Non-I/S Support Problems. 353
12.11.1.4 MIS Current Problems. 353
12.12 Presentation and Final Report 353
12.12.1 Report Writing. 353
12.12.2 Presentation of the Report. 354
12.12.3 Presentation to the Executives. . . . 354
12.13 Project Orientation Follow-on 354
12.13.1 Continuation of the BSP Study 354
12.13.1.1 Preparation of Follow-on Activities. 355
12.13.1.2 Orientation of Project Team Members 355
12.13.2 Effective Support of MIS in the Business. 355
12.13.2.1 Follow-on Projects for MIS. . 356
12.13.2.2 I/S Business Activities . . . 356

Volume — Page

Part

Chapter

12.13.3 Architecture Projects 356

12.13.3.1 Generation of Data Bases. . . 356

12.13.4 System Development. 357

12.14 Data Dictionary Facilities to Support BSP . 357

12.14.1 Objective Subject Category. 358

12.14.2 Organizational Subject Category . . . 358

12.14.3 Problem Category. 358

12.14.4 Solutions Subject Category. 358

12.14.5 Datafile Category 358

12.14.6 Memo Category 359

12.14.7 The Data Model. 359

12.15 Operational Controls in Distributed Information Systems 359

12.15.1 EDP Audits. 360

12.16 Financial Analysis. 361

13. CONCLUSIONS. 362

13.1 The Main BSP Activities 362

13.2 BSP Preparation Plan. 362

13.3 The BSP Opening Meeting 363

13.4 BSP Business Processes. 363

13.5 BSP Data Class Definition 364

13.6 Business Systems Planning Analysis. 365

13.7 BSP Interview Analysis. 365

13.8 BSP Business Problems 365

Volume — Page

Part

Chapter

13.9 BSP Information Architecture Identification. 366

13.10 BSP Architectural Priority Establishment. . 367

13.11 BSP/MIS 367

13.12 BSP Planning and Follow-on Project. 368

13.13 BSP Follow-on Project Orientation 368

13.14 BSP/Data Dictionary 369

13.15 Operational Controls for Distributed Information Systems 371

13.16 Financial Analysis Conclusions. 372

14. RECOMMENDATIONS. 374

14.1 Concepts. 374

14.2 Activities of the BSP Study 375

14.3 Obtaining the BSP Study Commitment. 375

14.4 BSP Study Preparation 377

14.5 BSP Beginning 379

14.6 Business Processes for BSP. 380

14.7 The BSP Data Classes. 380

14.8 The BSP Executive Perspective 381

14.9 BSP Findings and Conclusions. 382

14.10 BSP Architecture Review 382

14.11 BSP Architecture Priorities 383

14.12 BSP Recommendation and Plans. 383

14.13 BSP Report and Presentation 384

14.14 BSP Architecture Follow-on Requirements . . 384

Volume — Page

Part

Chapter

14.15 BSP High-Priority System. 385

14.16 Additional Managerial and Systems Considerations. 385

14.16.1 Systems 385

14.16.2 Current Management Report 386

14.16.2.1 Enhancement of Management Reports 386

14.16.2.2 Development of General Management Information. . . 386

14.16.3 Information Systems Architecture Recommendations 387

14.16.4 Subsystems Implementation Recommendations 388

14.17 BSP Planning, Measurement, and Control of MIS 388

14.17.1 BSP/MIS Purpose 388

14.17.2 BSP/MIS Activities Flow 389

14.17.3 BSP/MIS Outputs 390

14.17.4 The Effectiveness of MIS. 390

14.17.5 MIS Decision Support. 390

14.17.6 Why Do Information Systems Fail?. . . 391

14.17.7 MIS Planning, Development, and Management. 391

14.17.8 Risk Analyses, Factors, and Strategies. 392

14.17.9 Data Base Planning Through BSP. . . . 392

14.18 Data Dictionary Support of BSP. 393

14.18.1 BSP Study Support Tool. 393

Volume — Page

Part

Chapter

14.18.2 Minimum Requirements for the BSP Study Support Tool. 394

14.18.3 Facilities to Support BSP Studies . . 394

14.18.4 BSP Reports 395

14.18.5 NETWORK Reports 395

14.18.6 STRUCTURE Report. 396

14.18.7 SUMMARY Report. 396

14.18.8 SELECT Report 396

14.18.9 Future Data Dictionary Research . . . 397

14.19 BSP in the Distributed Information Systems of the Future 399

14.19.1 Information Architecture. 400

14.19.2 Recommendations for Sizing Distributed Systems 401

14.19.3 Computer Security Safeguards. 402

14.19.3.1 Security/Privacy Administration Functions. . 402

14.19.4 Deficiences and Recommendations of the Management of EDP Control . . . 403

14.19.5 Office of the Future. 406

14.19.5.1 Office Management Changes . . 406

14.19.5.2 Services in the Paperless Executive Office. 416

14.20 General Recommendations 419

BIBLIOGRAPHY. 423

APPENDIXES. 429

A. Letter and Questionnaire. 430

B. List of Two-hundred and Twelve U. S. Corporations that Responded to the Survey by Geographical Area. 489

C. List of Two-hundred and Twelve Small, Medium, Large U.S. Corporations that Responded to the Survey by Annual Sales. 509

D. List of Eighty-eight Computer Security Safeguards and Vulnerability Category Abbreviations with Associated Meanings For Detecting and Preventing Intentional Computer Misuse 519

GLOSSARY. 569

List of Tables

Table		Page
III.1	Questionnaire Response by Two-hundred and Twelve Corporations in the United States Where Business Systems Planning Programs are Being Implemented. . .	172
8.1	Major Activities by One-hundred and Twelve U.S. Corporations	178
8.2	Preparation Plan by One-hundred and Twelve U.S. Corporations	188
9.1	The Opening Meeting by One-hundred and Twelve U.S. Corporations	199
9.2	Business Processes by One-hundred and Twelve U.S. Corporations	204
9.2.2	Business Processes by One-hundred and Twelve U.S. Corporations	212
9.3	Data Class Definition by One-hundred and Twelve U.S. Corporations	219
9.4	Business Systems Analysis by One-hundred and Twelve U.S. Corporations.	225
9.5	Interviewing and Interview Analysis by One-hundred and Twelve U.S. Corporations	230
9.6	Business Problems by One-hundred Twelve and U.S. Corporations	238
9.7	Identifying Information Architecture by One-hundred and Twelve U.S. Corporations	243
9.8	Architectural Priority Establishment by One-hundred and Twelve U.S. Corporations	249
9.9	Review of Management Information Systems by One-hundred and Twelve U.S. Corporations	255
9.10	Planning the Recommended Follow-on Projects by One-hundred and Twelve U.S. Corporations	264
9.11	Final Report and Executive Presentation by One-hundred and Twelve U.S. Corporations	268
10.1	Follow-on Project Orientation by One-hundred and Twelve U.S. Corporations	276

Table		Page
10.2	Data Dictionary: A Tool to Support BSP by One-hundred and Twelve U.S. Corporations	287
10.2.2	Data Dictionary Facilities by One-hundred and Twelve U.S. Corporations.	291
10.2.3	Subject Categories by One-hundred and Twelve U.S. Corporations	296
10.2.4	BSP Data Model by One-hundred and Twelve U.S. Corporations	302
10.2.5	BSP Data Dictionary Reports by One-hundred and Twelve U.S. Corporations.	306
10.3	Operational Controls by One-hundred and Twelve U.S. Corporations	311
10.3.2	EDP Audits: Why Do They Fail by One-hundred and Twelve U.S. Corporations	319

List of Figures

Figure		Page
2.1	Top-down Analysis With Bottom-up Implementation	19
2.2	BSP Study Flow	22
2.3	Sample Study Team Organization	33
2.4	BSP Study Control Points	40
2.5	Task Control Sheet: Commitment and Preparation	41
2.6	Task Control Sheet: Pre-interview	42
2.7	Task Control Sheet: Interviewing	43
2.8	Task Control Sheet: Analysis & Recommendations	44
3.1	Definition of Business Processes	54
3.2	Business Process Matrix	61
3.3	Information Life-cycle	63
3.4	Input-process-output Examples	65
3.5	Data Reduction Steps	75
4.1	Flow of MIS in a BSP Study	96
5.1	Data Base System	102
6.1	Data Flow	134
6.2	Information Architecture	135
6.3	Global Keyword Glossary	145
7.1	Information Requirements Summary	157
7.2	Development of a Distributed Information System Plan	159

List of Graphs

Graph		Page
III.1	Questionnaire Response	173
8.1	Major Activities	180
8.2	Preparation Plan	190
9.1	The Opening Meeting.	201
9.2	Business Processes	206
9.2.1	Business Processes	214
9.3	Data Class Definition.	221
9.4	Business Systems Analysis.	227
9.5	Interviewing and Interview Analysis.	232
9.6	Business Problems.	240
9.7	Identifying Information Architecture	245
9.8	Architectural Priority Establishment	251
9.9	Review of Management Information Systems	257
9.10	Planning the Recommended Follow-on Projects. . . .	266
9.11	Final Report and Executive Presentation.	270
10.1	Follow-on Project Orientation.	278
10.2	Data Dictionary: A Tool to Support BSP	289
10.2.2	Data Dictionary Facilities	293
10.2.3	Subject Categories	298
10.2.4	BSP Data Model	304
10.2.5	BSP Data Dictionary Reports.	308
10.3	Operational Controls	313
10.3.1	EDP Audits: Why Do They Fail	321
11.1	Return on Equity: Five Year Average.	329

Graph		Page
11.2	Return on Total: Capital Five-year Average	330
11.3	Net Profit Margin: Five-year Average	331

List of Plates

Plate		Page
B.1	One-hundred and Twelve U.S. Corporations that Responded to the Survey by State	490
B.2	Sixty-eight Midwest Corporations that Responded to the Survey by Region and State.	495
B.3	Fifty-eight Eastern Corporations that Responded to the Survey by Region and State.	500
B.4	Twenty-seven Western Corporations that Responded to the Survey by Region and State.	503
B.5	Fifty-nine Southern Corporations that Responded to the Survey by Region and State.	508

VOLUME II

PART IV

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

PART IV

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

The purpose of this study was to develop an ideal strategic Information Systems plan to help implement the Business Systems Planning concept, with special emphasis on its support of both the short- and long-term information needs in the daily operations of U.S. Corporations.

Therefore, the procedure for completion of this research study involved the study of related literature (PART II) and various methods being used to implement Business Systems Planning or some form of strategic planning in U.S. Industry (PART III). PART IV (this part) will contain a summary (Chapter 12), conclusions (Chapter 13), and recommendations (Chapter 14) for further work.

Two-hundred and twelve letters and questionnaires (see Appendix C, p. 509) were sent to small, medium, and large U.S. Corporations that were known to be developing new or existing methods of implementing the BSP Concept, requesting copies and asking questions about their implementation procedures and data models. One-hundred and twelve usable questionnaires were returned.

Chapter 12

SUMMARY

Business Systems Planning (BSP) is a structured approach to assist a corporation in establishing an Information Systems plan to satisfy its near- and long-term information requirements. In order to determine their own information requirements, hundreds of corporations across the U.S. have used the methodology.

When developing independent applications for various user departments, BSP will contrast sharply with the traditional approach. The different information needs of general management, functional management, and operational management, are recognized by the BSP study. Systems are designed with a general management perspective and are aligned with the corporation's business goals, therefore, planning is done from the top down. Data is treated as a valuable corporate resource that is planned and managed like other resources. Therefore, at the completion of a five- to seven-month BSP study, the corporation will be on its way to a comprehensive long-range Information System and an action plan for short-term results. If a BSP is structured, documented, supported by education, and has proven results, it will be successful.

However, the most pertinent material relating to the Business Systems Planning methodology developed through this study, was found in the questionnaires that were returned by a number of U.S. Corporations.

The corporations benefited from BSP by gaining a better working relationship with their User departments and top executives

within the organization, thus obtaining top management's approval of the long- and short-term plans. Also, the corporations developed an in-depth knowledge of their business. The applications that were identified tended to be of major nature and developed a high-yield. Key strategies, such as data base, interactive, and distributed processing with central control, are now supported. Therefore, the BSP concept provided the opportunity to introduce the information center concept to satisfy many of the top-management information needs.

12.1 Activities

The BSP major activities are summarized as being carried out in varying degrees.

12.1.1 Commitment

The commitment to start a BSP study was made by the top executive of most corporations. The BSP study was not started by any of the corporations unless their top executives were committed to being involved.

A majority of the U.S. Corporations indicated that a team leader was selected to coordinate the study activities. The corporations had team leaders who worked full time in the study, and directed team activities.

Again, a majority of corporations indicated that there wasn't any problem in obtaining access to executive management to explain the objectives and expected results of the BSP study.

12.1.2 Study Objectives

Good objectives should be capable of being stated clearly and concisely. In view of the above comments, many of the corporations indicated that their study objectives were defined and satisfied by the study team.

12.1.3 Study Obstacles

When doing a BSP study, several factors have become more of an obstacle than others. For many corporations the following factors were an obstacle to doing a BSP study:

1. Major reorganization or transformation of control taking place.
2. Geographical diversity, necessitating significant travel time.
3. Well over 20 executives who must be interviewed.
4. Multiple independent sub-organizations with autonomous decision making processes and with unique lines of product/services serving diverse markets.

12.1.4 Study Team Support

The selection of the team members became very important to quite a few of the corporations. This importance was based upon the study team being responsible for determining the information needs of the entire business and recommending the nature of its data processing operations. Also, many fundamental responsibilities were assigned to the study team.

A BSP study is intensive in nature, and was best performed by the corporations on a full-time basis; this further compounded their problem of team selection. Part-time studies were often characterized by deadline and continuity problems, even though they appeared to be easier to support by the corporations.

Manpower requirements fell within the following limits, since the intent and methodology of BSP were reasonably followed by many of the corporations, and the study team was full time. Many of the corporations indicated that their resources fell within the following limits:

1. Number of team members -- 4 - 7.
2. Number of weeks -- 6 - 8.

Quite a few of the individuals that were selected by the executive sponsors of the corporations to lead the team, became responsible for the success of the study. Therefore, having knowledge of business matters and broad perspectives of the business, were requirements that the corporations felt team leaders should have.

Many of the chief executive officers of the corporations signed the study announcement letter composed by the team leader. The team leader then distributed the letters to the executives who controlled the major functions within the scope of the study.

12.1 Plan Preparation

The team leaders prepared preparation plans in a large number of the corporations.

12.2.1 Activity Preparation and Allocation

Quite a few of the corporation team leaders held a half-to full day orientation session to brief the study teams.

12.2.2 Accumulation of Data

The study teams established reference libraries of both business and information systems documentation to provide a basis of information for a majority of the corporations in the areas of general business and information systems.

12.2.3 Education Plans

Team members understood the principles of BSP methodology, to enable a smooth, coordinated entry into the BSP study. A review of the nature of the output that was expected served as an advantage to the team members, in addition to some understanding of the method of implementation.

12.2.4 Work Plans

An intensive study activity was required for appropriate planning and assignment of tasks. The work plan documented all known tasks indicating major resource allocation required to complete the study.

12.2.5 File Control

The control file included all material pertaining to the study. Because of the nature and number of the documents involved, they were stored in lockable filing cabinets by many of the corporations.

12.2.6 Report

An outline was established as early as possible by quite a

large number of corporations. The team members were then assigned the responsibility for sections of the report. During the study period, the assigned members coordinated and delivered their section.

12.2.7 Letter of Invitation

The executives for a fair number of corporations were able to prepare for the interview because an invitation letter was sent at least one week before the interview. Confirmation of the time and place for the interview was also accomplished. The study announcement letter that was previously signed by the chief executive officer referenced the importance of the executive participation in the study. Also, within the body of the invitation letter was a list of topics for discussion during the interview.

12.2.8 Briefing

The selected executives for an average number of corporations attended a briefing session, prior to the commencement of the executive perspective segment of the BSP study. During this preparation phase, the executive briefing session was prepared, presenters selected and exhibits prepared, so that the session could be delivered at the appropriate time during the study activities.

12.2.9 Review Meeting With the Executive Sponsor

The completion of the study preparation was indicated by a successful review meeting with the executive sponsor by an average number of corporations. All issues were resolved at this time.

12.3 Summary of the Initial Meeting

12.3.1 Purpose of the Initial Meeting

The main purpose of the opening (initial) meeting insured that each team member was conversant with the information that had been gathered and discussed those facts that were not part of the information. The team leaders for some corporations walked through the business facts that had been gathered and made subjective comments and additions on facts that could not be readily documented.

12.3.2 Executive Sponsor's Initial Meeting

The executive sponsors opened the meeting for a below average number of responding corporations, emphasized the business reasons for initiating the study, and explained the significance of the high-priority programs to the companies.

12.3.3 Plan

The study team leaders reviewed the work plans for less than half of the corporations.

12.3.4 Preparation Summary

A copy of the presentation was made available to the team members of many of the corporations, while they were developing their conclusions and recommendations. These copies helped them later in the study, during the interviews.

12.4 Summary of Business Processes

One of the most overwhelming and important activities during the BSP study was the identification of the business processes for many of the corporations. The major output that resulted from identifying the business processes was a list of all of the processes, a description of each, and the identification of those that were a key to the success of the business.

12.4.1 Defining the Business Processes

For purposes of the BSP study, the Business Processes were defined as "groups of logically related decisions and activities required to manage the resources of the business" for an average number of corporations. Furthermore, they were studied and identified.

12.4.2 Managing the Resources

The job of the manager for very few of the corporations was to manage the resources most efficiently and effectively to support the goals of the business.

12.4.3 Process Identification Summary

Since preparatory work was completed in collecting information on planning and samples of the organization plans, it was not too difficult for a few of the corporations to identify the processes involved. The processes were grouped into strategic planning and management control. Furthermore, the corporations defined a seven-

year plan or development plan as a "long range plan." They further defined an operating plan, management, resource plan, and contract, as "management control." In addition, the budget also served as a major tool for management planning and control in a few of the corporations.

12.4.3.1 Grouping Processes

The business process was related to the organizational structure of the business and helped the study teams identify any additional people that should be interviewed and further clarified their understanding of the business processes. Furthermore, the study teams did complete a matrix before completing the process descriptions for a small number of the corporations.

In selecting the area of the business to be studied in more detail, very few of the corporations identified the processes to the business success, thus, being unable to later size up the importance of the problems identified, and the identification of items to be stressed in the executive interviews.

12.4.4 Diversification of Product/Services

A very small number of corporations had product/services that were too diversified to have common processes in connection with the various divisions or parts of the company.

12.4.4.1 Outside Assistance

Even though the team members were selected with the aim of having their combined knowledge cover the entire business unit, very few of the corporations indicated that there were voids.

12.4.4.2 Model of the Business Process

As an alternate approach to identifying the business processes, a simple model of the business was used by a small number of the corporations.

12.5 Data Class Definition Summary

The data classes were identified into the two approaches below by a medium number of the corporations, since they had already been defined and grouped into logically related categories:

1. Business entity.
2. Business process.

12.5.1 Business Entity

A small number of the corporations were concerned about their "business entities," and therefore kept information about them. Similar to the example in "Appendix B" of the questionnaire, the corporations' study teams developed matrices to identify the data classes related to those entities.

12.5.2 The Process Concept

The second approach used by a small amount of the corporations was the identification of the data classes, which used the previously defined business processes.

12.5.3 Regrouping and Cross-analyzing

By cross-analyzing "Appendix B" (of the questionnaire) and the "input-process-output diagrams" and regrouping on the basis of com-

monalties or inconsistencies in level, a few of the corporations were able to compile a manageable list of 30 to 60 data classes.

12.6 Analysis of Business Systems

The purpose of analyzing Business/Systems relationships for some corporations was to show how data processing currently supported the business, in order to develop recommendations for future action. Also, the currently existing organizations, business processes, information systems (applications), and data files were analyzed by the corporations in order to identify voids and redundancies, help clarify responsibilities, and further the understanding of the business.

Therefore, various matrices were developed using the combinations of the four elements above. However, some of the corporations eventually found out that matrices could not indicate the extent of support needed or the value of their support to each of the processes, even though they provided an overview of the current and planned data processing support of the business.

12.6.1 The Support of Date Processing

The study teams for a few of the corporations annotated the organization/process matrix in order to obtain a businesswide picture of existing and planned data processing support. Notations were used on the matrix by the corporations to determine which organizations were receiving application support.

In order to create the notations, the teams for a quarter of the corporations assigned a number to each of the current systems,

then posted this number to the appropriate intersections on the organization/process matrix.

12.6.2 Current Automated Data

For some of the corporations, the study teams clearly understood what data was currently automated and where, in order to determine which systems utilized certain portions of the data.

12.7 Interview Analysis

Part of the top-down approach for some of the corporations was determining the executive perspective. The purpose of using the top-down approach by the corporations was to validate the work done by their study teams, determine their objectives, problems, and the information needs and their value, and gain the executive rapport and involvement.

Interviewing and interview analysis for many of the corporations consumed more time during the study than any other activity, because the executive interviews were the primary source of information for determining the business problems and management's need for support in overcoming their problem and/or supporting new opportunities. Therefore, the interviews were not necessarily intended to gather data on the specific details and exact form of the information required by the interviewees.

Certain tasks were accomplished by an average number of the corporations in order for the interview to be successfully conducted.

12.7.1 General Questions

Before the interviews were conducted, the study teams for quite a few of the corporations prepared a list of general questions that applied to all interviewees. The teams also prepared specific questions for certain executives as needed.

12.7.2 Assignment of Roles For Team Members

One of the tasks that was performed by a number of the corporations when preparing for the interview was the assignment of roles for the team members to play during the interviews. However, several factors had to be considered when the corporations made these assignments.

Regardless of the number of people on the study team, many of the corporations had no more than four active team members present at any particular interview. Also, the same role in each interview was not played by any given team member.

12.7.3 Conducting the Interview

The study control tool for a number of corporations was the place where interruptions were least likely to occur, and where the matrices and charts were displayed on the walls for reference. For the corporations who had the control room close to executive offices, it was found to be convenient for the interviewees.

12.7.4 Documentation of the Interview

The study teams for many of the corporations kept the documentation of the interview current.

12.8 Problems of the Business

Some of the business problems for a few of the corporations were supplied as input during the fact gathering step. The knowledge of the team was expanded to complement the business problems, where they were then validated, explained, and added to the executive interview. Now, the problems were analyzed by the corporations and related to the business processes, in order to give guidance to the setting of project priorities, and to show clearly that better information helped to solve the problems.

12.9 Defining the Information Architecture

After a number of the corporations had acquired an understanding of the business processes and the data required to support them, their teams continued the analysis by determining how the data was managed to support the processes. Also, they could now be logically grouped into data bases, after the data classes had been identified. Information Systems for many of the corporations became vehicles used to insert data into and extract it from data bases, in order to formulate useful management information to support the business processes.

12.9.1 Determination of Data Flow

Very few of the corporations indicated the data creation and use by boxes and arrows, or eliminating the C's and U's by applying

names to the major system areas representing the completed information architecture.

12.10 Establishment of a Controlled Environment

The purpose of MIS for a few of the corporations was the eventual establishment of a controlled environment in which the information architecture was to be developed, implemented, and operated efficiently and effectively.

A portion of the information architecture that was implemented by a small number of corporations, was selected by the team and recommended to management. Therefore, the identification and recommendation of the follow-on projects by the corporations was done immediately, in order to begin the implementation as early as practical. Furthermore, the foundation for the implementation of Information Systems was established on a "pay as you go" basis.

12.10.1 Establishing Selection Criteria

Since data was being treated as a business source by a fair number of the corporations, the I/S projects were able to be evaluated by management in the same way their other business projects were evaluated. In evaluating new projects, the teams used whatever justification techniques were currently in existence.

12.10.2 System Prerequisites

During the architecture development activity, only a handful

of the corporations' teams prepared a matrix to identify systems prerequisites.

12.11 MIS

Since the total information architecture could not be developed and implemented at one time by many of the corporations, the teams had to establish priorities for the development of the systems and data bases.

12.11.1 MIS Flow in the BSP Study

Required MIS changes were developed through the following three channels by a few of the corporations:

1. I/S objectives.
2. Information architecture.
3. Problem analysis.

12.11.1.1 I/S Objectives Generation

The I/S objectives provided the framework first for some of the corporations, in order that they could provide consistency in the development and employment of I/S resources in the support of the business. Also, the I/S objectives were consistent with the objectives and management systems of the business, so as to serve as a guide for the development of the I/S follow-on activities.

Furthermore, the current I/S objectives were documented and discussed in the I/S director's presentation during the BSP study preparation phase.

12.11.1.2 MIS Support

A few of the corporations ensured that MIS supported their architectural priorities.

12.11.1.3 I/S and Non-I/S Support Problems

Another channel for identifying MIS changes for a very small amount of the corporations was "problem analysis." The I/S support problems and non-I/S problems were identified in the BSP study, and separated.

12.11.1.4 MIS Current Problems

Only a very small amount of the corporations even bothered to extract the MIS problems from the I/S review.

12.12 Presentation and Final Report

The generation of the final report and executive presentation for many of the corporations was the whole concept of obtaining executive management commitment and involvement for implementating recommendations from the BSP study. Even though the formats were agreed upon before the study, many of the reports had to be modified because of the results. Also, various parts of the report were now finalized and written.

12.12.1 Report Writing

During the study preparation phase, one-third of the corpora-

tions indicated that the primary writing responsibility of the report had been assigned.

12.12.2 Presentation of the Report

The principle factors that were considered by a small percentage of the corporations was in determining how the report should be presented in terms of type and size of the audience, and the accepted ways on making a presentation in the particular business environment. Consultation with the executive sponsor early in the study to obtain his advice on this subject, was most helpful in establishing the proper direction to take.

12.12.3 Presentation to the Executives

The executive presentation was developed in nearly half of the corporations by the material that was contained in the final draft of the report. Also, the principal aims of this presentation, was to inform management of the study's findings, recommendations, and to secure approval of the action plan.

Furthermore, the presentation took no longer than an hour in most of the corporations, and was concise. It ended with recommendations for the follow-on activities, and was logical and factual.

12.13 Project Orientation Follow-on

12.13.1 Continuation of the BSP Study

There was a great need for communications among the project teams of many of the corporations, in order to successfully implement

the project. The Information Systems Director also took over the responsibility for many of the projects, since the functions performed during the follow-on activities were part of the MIS responsibilities. Because the follow-on activities built upon the results of the information gathered during the BSP study, there was a need for continuity among team members.

12.13.1.1 Preparation of Follow-on Activities

Because of the variations in the findings and conclusions that resulted from the BSP studies, the follow-on activities and the emphasis placed on each of them by some of the corporations, carried from one BSP study to another.

12.13.1.2 Orientation of Project Team Members

Before the beginning of each of the follow-on projects, the I/S directors for a few of the corporations provided an orientation for the project team members. Since many of the team members were not familiar with the BSP concept, the principles and objectives were also summarized. It was also very important for everyone on the project team to understand exactly how the BSP study was conducted, in order to be able to build upon the outputs and become familiar with them.

12.13.2 Effective Support of MIS in the Business

In order to effectively support the business, the Information Systems of a fair number of corporations initiated MIS as a keystone. Therefore, the concept of MIS was defined first, in order to effi-

ciently and effectively support the business. Also very important, was the continual emphasis on MIS.

12.13.2.1 Follow-on Projects for MIS

The MIS follow-on projects for many of the corporations emanated from:

1. Requirements to support I/S objectives.
2. Changes resulting from the development and implementation of the first systems.
3. Recommended changes to solve I/S support problems and MIS problems.

12.13.2.2 I/S Business Activities

Many of the activities for performing a BSP study in the I/S function were accomplished by one-third of the corporations. Even though they had to be expanded, these activities made a significant start in understanding the whole I/S function.

12.13.3 Architecture Projects

The amount of follow-on effort required by some of the corporations in the architecture area determined the level of detail in the BSP study. At the beginning of the follow-on projects, the basic architecture definition was completed. Therefore, the architecture refinement included the following:

1. A configuration of the major I/S groupings.
2. The subsystem breakout of each system.
3. Subsystem interrelation.
4. Data flow among subsystems.

12.13.3.1 Generation of Data Bases

An integral part of the information architecture as defined by

some of the corporations in the BSP study, was the support of the business processes by the data classes. Therefore, the architecture implementation was then supported by sets of data bases which were generated by the logical grouping of related data classes.

12.13.4 System Development

According to the recommendations of the BSP teams for some of the corporations, a high-priority system was developed and implemented first. As development of the system began, care was taken to see that the system did not develop "by itself." Therefore, a certain direction was set by the BSP study for implementation of the systems.

Also, the business processes were supported by the first development and implementation.

12.14 Data Dictionary Facilities to Support BSP

New subject categories were created by a very small number of corporations that used the extensibility facility of the dictionary.

The program access facility (PAF) for very very few of the corporations, was able to gain access to the BSP data in computer processable form.

Again, only a very small number of the corporations were able to identify and define BSP data in terms of the dictionary subject categories, attributes and relationships. Therefore, a BSP data model was developed as a "starter" model to encourage each study team to add, delete or modify certain subject categories, relationships and attributes to best reflect their purpose and emphasis of the study.

12.14.1 Objective Subject Category

The "objective subject category" was used by only a handful of corporations to describe the goals and objectives of the business and its organizational units.

12.14.2 Organizational Subject Category

Like the "objective subject category" above, very few corporations used the "organizational subject category" to describe the various organizational units of the business.

12.14.3 Problem Category

Again, like the two categories above, a very small number of corporations used the "problem category" to discover problems during the interviews.

12.14.4 Solutions Subject Category

The low number of corporations that are using the subject categories is continuing into the use of the "solution subject category" (which describes all of the possible solutions).

12.14.5 Datafile Category

Likewise, very few corporations are using the "datafile category" which describes the "containers" data.

12.14.6 Memo Category

The pattern continues, only a handful of corporations are

using the "memo category" which describes the notes or reminders that are used by the BSP study team members.

12.14.7 The Data Model

Very few of the corporations used their data base administrator or a systems programmer with a working knowledge of the dictionary to install the BSP data model.

12.15 Operational Controls in Distributed Information Systems

Several of the matrices developed in the BSP study by some of the corporations, became very useful in developing the architecture extension with respect to distribution. Also, the process and data flow analysis was extended in order to ensure that the physical locations for systems and data requirements were included. Furthermore, the preparation of the location/organization, location/process, and location/data matrices was done immediately.

Therefore, the corporations did prepare a process/data matrix for each location with additional parameters on the axis to include data use, security, auditibility, date occurrence, activity volumes, required response, and criticality.

Many of the corporations were also well aware of the fact that due to the explosive growth in computer technology, a vastly expanded potential for computer crime and the inadvertent destruction of data files were becoming very apparent.

Nevertheless, many corporations used input controls that re-

lated to rejection, correction, and resubmission of data that was initially incorrect.

Less than half of the corporations had the problem of having remote access to the computer, and having the problem compounded by the rapidly increasing move by business to distributed processing (where computing power is scattered throughout an organization).

Some of the corporations found that one of the major limitations of access-control software was that it does not protect a company against the most troublesome of computer frauds, those that are committed by employees while they perform their assigned tasks. The corporations also found out that honest programmers can even write programs that can expose a company to fraud.

12.15.1 EDP Audits

A great number of corporations have indicated that major companies lack well trained EDP auditors to plug up employee fraud, because their auditors failed to keep pace with computer technology, thus being considered ineffective in making a strong case for computer controls.

In a great many corporations, internal auditors often start an investigation on the hunch that something is wrong. Also, internal auditors didn't have the expertise to dig deeper without audit software according to many corporations (when it comes to computer operations). Furthermore, a great number of corporations indicated that steps had not been taken to acquire audit software packages that would have allowed the internal auditors to try to audit through the computer, and not around it.

Quite a number of corporations felt that their internal auditors would not be of any value to them by the end of the 1980's, if they didn't get up to speed with computer technology. They felt that the day of the manual auditor was gone.

12.16 Financial Analysis

In summation, most U.S. Corporations have not been managing their information resources effectively. However, they did realize a better bottom line by effectively managing their information resources by using a Business Systems Planning methodology.

Chapter 13

CONCLUSIONS

The following conclusions are based upon information that was returned by the respondents from one-hundred twelve corporations throughout the United States concerning the BSP implementation approach. Although the conclusions derived from this approach are of a general nature, and do not necessarily represent a "black" and "white" solution to the problem of implementating BSP; they do however represent the opinions of this author and are believed to be viable ones, in contributing greatly to the BSP studies.

13.1 The Main BSP Activities

1. The commitment to start the BSP study was made by the top executives of the corporations.

2. Following the commitment by top management, team leaders were selected to coordinate the study team's activities.

3. There was no problem in obtaining access to executive management to explain the objectives and expected results of the BSP study.

13.2 BSP Preparation Plans

1. Team leaders were reluctant to establish an education plan for the teams.

2. Teams working under the guidance of the team leaders developed study work plans to keep with the scope and objectives previously established.

13.3 The BSP Opening Meeting

1. The kickoff meetings were not always attended by all of the study team members.

2. The team leaders, presented in summary form, all of the business related information gathered during the study preparation phase.

13.4 BSP Business Processes

1. Not all of the corporations defined their business processes.

2. The product/services of the organizations were not always identified.

3. The processes in the life cycle of the product/services, were however identified most of the time.

4. Most team members were taking notes on the decisions and activities associated with each of the processes as they were defined by the group.

5. The processes in the life cycle of each of the resources were not always identified.

6. Each of the process groups and their processes were not always listed on charts and displayed for the teams to view.

7. Many study teams failed to complete matrices before completing the process descriptions.

8. The process keys to business success were not always identified.

9. The various divisions or parts of the corporations or the product/services that were too diversified to have common processes, were not always grouped before process identification was begun.

10. Outside assistance was not always needed to fill any void that was not covered by the study teams.

11. Predefined checklists of processes were hardly ever used for the businesses being studied.

12. Models were always never used that could be expanded to fit the business in identifying the business processes.

13.5 BSP Data Class Definition

1. The data classes were always defined, and grouped into logically related categories.

2. Very few matrices were being developed by the study teams to help identify the data classes that were related to the business entities (See Appendix B of the questionnaire).

3. The business process approach was not used very effectively, and neither were a series of input-process-output diagrams (one for each of the 20 to 60 processes identified in the business process definition).

4. Not all of the study teams bothered to place the data classes on a matrix opposite the business processes.

13.6 Business Systems Planning Analysis

1. Not all of the corporations used the matrix as their main analysis tool to prepare the study teams for discussion with the executives, and determine requirements for information support.

2. The matrices did not provide an overview of the current and planned data processing support of the businesses.

3. Prior to creating the notations, only a few study teams created a system/organization matrix (See Appendix E, of the questionnaire) or a system/process matrix (Appendix F of the questionnaire).

4. The study teams were reluctant to develop a system/data file matrix (Appendix G, of the questionnaire) to provide an understanding of what data is currently automated and which systems utilize which portions of the data.

13.7 BSP Interview Analysis

1. During the BSP study preparation, most of the teams were able to identify the executives that were to be interviewed.

2. When the list of executives to be interviewed had been updated and confirmed, not all of the study teams confirmed the interview schedule.

3. The study teams did keep current with the documentation of the interview.

13.8 BSP Business Problems

1. Not all of the business problems were divided between

those which were information systems support problems and those which were non I/S problems.

2. Using the interview notes and worksheets, the teams failed to examine each line entry and establish whether it was in the category of:

a. I/S problems/solutions and values (existing systems).
b. I/S needs and values.
c. Non I/S problems.

3. The study teams failed to group the interview data by the use of matrices.

13.9 BSP Information Architecture Identification

1. Not all of the information architecture had been defined.

2. Diagrams were not always used to show the relationship of data to systems and the processes supported by each.

3. In developing the information architecture, the study teams did not always begin with the "process/data class matrix" (where the process axis is in the life cycle sequence based upon the key resource).

4. The study teams did not always arrange the data axis by taking all data classes created by the first process and grouping them to the left, or origin matrix.

5. As in number 4 above, the teams did not always group all of the data classes created by the first process, and also did not continue the grouping until all the data classes were covered.

6. The teams failed to prepare a final rearrangement of axes and use of two-way arrows to allow for preparations of a simplified

graphic architecture.

7. Not all of the subsystems were identified by the study teams.

8. Since most of the subsystems were not identified by the study teams, very few prerequisite analysis were made to determine which subsystems were in place before others could be created.

13.10 BSP Architectural Priority Establishment

1. Very few of the teams analyzed the major systems (potential benefits, impact, success, demand) that comprised the architecture as potential first-subsystems candidates, and also failed to rank them on a scale of 1 to 10.

2. The teams did a very poor job of reviewing the matrices that identified system prerequisites.

3. The study teams further failed to document the recommended first subsystems in most cases.

13.11 BSP/MIS

1. Only a few teams established priorities for the development of the systems and data bases.

2. The Management Information Systems analysis was hardly ever made at the level of the corporation's Information Systems top management, and it did not always include the planning and control aspects of the major I/S processes.

3. It was not always the purpose of the corporations' Manage-

ment Information Systems to manage the I/S resources in the most efficient and effective way, for the support of business (as part of the BSP study).

4. Most corporations failed to ensure that MIS would support the architectural priorities.

5. I/S support problems were hardly ever rearranged by type.

6. MIS problems were almost never extracted from I/S review.

7. Not all of the implied MIS changes were consolidated.

13.12 BSP Planning and Follow-on Projects

1. Very few of the corporations ever developed recommendations for an action plan to help assist management in its decisions regarding the recommended follow-up projects.

2. During the initial steps of preparing for the study and developing a work plan for conducting, many teams did not prepare a preliminary report outline.

3. The primary writing responsibility for each of the sections of the report were not always assigned during the study preparation phase.

4. Many of the study teams did not consult with the executive sponsors early in the study to obtain their advice on how to present the report.

13.13 BSP Follow-on Project Orientation

1. Many of the corporations had on-going BSP study groups.

2. In not too many instances was at least one person chosen from the BSP study team (in the area of the data processing function), with the idea that he would remain for the follow-on activities.

3. Even with the information architecture defined in the BSP study, a description of each subsystem was hardly even prepared.

4. For data processing systems currently in use or under development, very few careful examinations were ever conducted to determine how each one related to the subsystems described in the information architecture.

5. Related data classes were almost never logically grouped to yield a set of data bases that supported the architecture implementation.

13.14 BSP/Data Dictionary

1. The "data dictionary" was not used very effectively to support the BSP studies in the organizations.

2. Since the data dictionary was not used very effectively, it certainly did not improve the quality of the BSP study and/or reduce the duration of the study by allowing the study teams to concentrate on the analysis of problems.

3. The dictionary very rarely helped to maintain the consistency of analysis data or reduce possible redundancy and errors. Why? Because it was hardly used.

4. Prior to the preparation phase of the BSP study, the dictionary again, was hardly ever used, so it could not possibly be ready with the BSP data model (BSP subject categories, relationships

and attributes) installed and the necessary report programs written, debugged and also installed in the dictionary.

5. The BSP data bases were not able to identify implementable systems, basically because they were used by very few corporations. Furthermore, the BSP data bases were also not able to support systems design, data modeling activities, and generate test plans to help ensure that the systems that were developed satisfied the requirements (in association with the data dictionary).

6. As the business situations and associated information requirements changed, the data bases were still not able to be updated by incremental changes, because again, the data dictionary was hardly ever used.

7. The program access facilities (PAF) was only able to gain access to the BSP data in computer processible form for only a few of the corporations.

8. Again, programs were rarely written to mainpulate data, produce reports in the desired format of the "Process/data" matrix, or to identify the information architecture.

9. The BSP data was hardly ever defined in terms of the dictionary subject categories, attributes and relationships.

10. The BSP data model was never fully developed as a "starter" model to encourage each study team to add, delete or modify certain subject categories, relationships and attributes to best reflect their purpose and emphasis of the study.

11. The following categories were rarely ever used by the corporations in connection with the dictionary:

a. Objective Subset Category.
b. Organization Subject Category.

c. Process Category.
d. Data Class Subject Category.
e. Problem Category.
f. Solutions Subject Category.
g. Systems Category.
h. Major Systems Subject Category.
i. Datafile Category.
j. Memo Category.

12. The installation of the BSP data model in the dictionary was hardly ever performed by the data base administrator (DBA), or a systems programmer with a working knowledge of the dictionary.

13. Since the BSP data model was never really developed by the corporation in terms of the subject categories and their attributes and relationships, the model was therefore never really defined to the dictionary using the estensibility factility.

14. The BSP data that was supposedly stored in the dictionary data base was hardly ever retrieved, analyzed, manipulated and presented in forms most convenient for the BSP study team members.

15. The BSP data base was never really established with the initial BSP study, so it was hardly ever updated with follow-on "mini" studies as appropriate, and run with "program access facility" (PAF) programs to obtain various reports for analysis and planning purposes.

13.15 Operational Controls for Distributed Information Systems

1. A number of corporations have developed a facilities plan (in their long-range I/S (BSP) plan) to incorporate EDP accounting control procedures into the system to prevent access by unauthorized individuals.

2. Almost half of the corporations designed output controls to assure the accuracy of the processing result and to assure that

only authorized personnel received the output.

3. Many corporations have set up sophisticated computer security controls to offset the threat of on-line data bases by remote access terminals, however, they have not learned how to monitor them.

4. Most of the programmers in the corporations were not denied all access to files and programs that they had written once the security software was put into operation.

5. Very few programs had audit controls that allowed the computer to isolate frauds automatically.

6. A very small percentage of the internal auditors within most of the corporations possessed the skills that were needed to set up computer controls and conduct computer audits.

7. Steps in a majority of the corporations were never taken to acquire audit software packages that allowed the internal auditors to audit through the computer, and not around it. However, of the audit packages that were purchased, it is very doubtful that the internal auditors even knew how to use them.

13.16 Financial Analysis Conclusions

1. Most of the one-hundred and twelve U.S. corporations that responded to the survey were not managing their information resources effectively.

2. It was concluded financially, that the corporations that effectively managed their information resources by the use of a Formal Business Systems Planning methodology, realized a better bottom line.

3. It was also concluded that top management involvement and

commitment, and productivity and integration of new technology contributed to the success of the corporation.

Chapter 14

Recommendations

The following recommendations are based upon the information returned by the respondents from one-hundred and twelve U.S. Corporations, and from the review of the literature (Chapters 2-7):

14.1 Concepts

1. Business Systems Planning should support the goals and objectives of the business.

2. BSP should be able to translate business strategy into I/S strategy.

3. The I/S strategy should address the needs of all the levels of management within the business.

4. Business Systems Planning should provide consistency of information throughout the organization.

5. Data should be managed accordingly, when it is of considerable overall value to the organization.

6. A BSP should be able to live through organizational and management change.

7. Organizational and management change should be independent of the organizational structure, and should not be realized without the proper support vehicle for I/S.

8. The I/S strategy should be implemented by a subsystem within the total information architecture.

9. Top-down I/S planning with bottom-up implementation should be the basic concept to help implement I/S strategy using a subsystem within a total information architecture.

14.2 Activities of the BSP Study

1. BSP should be put into perspective, since it is part of the overall cycle for providing the business with required information.

2. In order for the team to work together, display relevant material on the walls, and conduct interviews, a control room should be established.

3. Business problems should be divided into those which are Information System support problems and those which are non I/S problems.

4. The team should establish priorities for the development of the systems and data bases.

14.3 Obtaining the BSP Study Commitment

1. Unless a top executive sponsor and some other executives are committed to being involved in a BSP study, it should not be started.

2. Because of the political climate that may exist in some corporations, the following recommendations may be appropriate in obtaining the commitment to perform a BSP study:

a. The top executive of the corporation should be contacted first by the proponents of the BSP study.

b. A small report should be written up (in plain english) and given to the top executive, explaining the benefits, cost savings, and a completion date for the BSP study.

c. The BSP study should be centered around a specific problem that the corporation is having, but has not yet tried to solve (Later the study could be expanded to other areas after the initial success).

d. The study should not overlap the problem solving of any other ongoing projects.

e. Recommendations should be made to the top executive to appoint his closest assistant as team leader.

f. The team leader should than appoint an individual in the Information Systems Department (or Data Processing Department) that he can work closely with.

g. Again, depending upon the political climate, a vendor should also be chosen as a third top member of the study team (he would be an advisor on the technical aspects of the study).

h. Three additional lower echelon members should also be selected very carefully. (It is vitally important to remember that all members must be able to work compatibly with each other. Friction between the members of the team will spell certain failure for the study).

(The recommendations above will give complete control of the BSP study to the top executive of the corporation, and insure its success.)

3. The boundaries should be defined for the BSP study scope and measurements for assessing effectiveness in each case.

4. The definition of the BSP study objectives should be complete and stated clearly and concisely.

5. A report should be presented by the current BSP participants to an executive of the organization to gain agreement on all issues of the study.

6. A meeting should result in a commitment, if the above report recommends proceeding with BSP.

7. The BSP study should be performed on a full-time basis, since it is so intensive in nature.

8. A study announcement letter should be composed by the team leader, and signed by the chief executive officer, where it should then be distributed to the executive who controls the major functions within the scope of the study.

14.4 BSP Study Preparation

1. The team leader and the executive sponsor should perform the final selection of team members.

2. A half-to full-day orientation session to brief the study team should be held by the team leader.

3. Allocation of preparation activities should also be discussed by the team leader.

4. The team should divide the activities among themselves.

5. The team should establish a reference library of both business and information systems documentation in order to provide a basis of information.

6. The team members should understand the principles of the BSP methodology, in order to enable a smooth, coordinated entry to the BSP study.

7. An education plan for the team should be established by the team leader.

8. The work plan should schedule study control points.

9. Any additional control points established in each particular study should be considered by the team.

10. Activity and project control checkpoints should be combined into a single action plan, after they have been established.

11. All the material pertaining to the study should be contained in the control file.

12. Documents should be stored in a lockable filing cabinet, because of the nature and number of documents involved.

13. The establishment of the outline and table of contents should be done as early as possible.

14. The team should endeavor to publish the documents as an ancillary output to the formal report, while the data and analysis are current.

15. A list should be prepared as early as possible of executives to be interviewed.

16. The team leader should prepare the tentative executive list and schedule.

17. The executive sponsor should review and approve a list of proposed executive participants.

18. A invitation letter should be sent at least one week before the interview to enable the executive to prepare for the interview.

19. The time and place for the interview should also be confirmed in the letter.

20. Prior to the commencement of the executive perspective segment of the BSP study, the selected executive should attend a briefing session.

21. So that the session may be delivered at the appropriate time during the study activities, the executive briefing session should select the presenters, prepare the exhibits, and prepare itself, during the preparation phase.

22. Before the major study activities are undertaken, administrative support should be estimated and organized.

23. Any issue that may have arisen during the preparation phase should now be resolved.

14.5 BSP Beginning

1. All study team members should attend the kickoff meeting.

2. The work plan and calendar developed during the study preparation phase should be reviewed by the study team leader.

3. The business related information gathered during the study preparation phase should be presented in summary form by the team leader.

4. The control room should have all posted information relevant to the study.

5. The material gathered during the study preparation should be presented in summary form by the director of I/S, or the team member representing I/S.

6. Discussions with the study team should be made of all projects installed or being developed.

7. Discussions on who has responsibility for data within the company, how data processing interfaces with its users, and the responsibility it has in the development and justification of applications is another area that should be reviewed.

8. During the interview, and when the team members are developing their conclusions and recommendations, a copy of the presentation should be made available to them.

14.6 Business Processes for BSP

1. Very little time should be spent in deciding in which stage a given activity will appear, since the life cycle is an artificial means for directing the team in thinking.

2. Not all of the team members will be working on the follow-on projects after the BSP study, and this, they should keep in mind at all times.

14.7 The BSP Data Classes

1. In order to arrive at a final list of 30 to 60 data

classes, the relation of data to the business entities should be used and their results cross-referenced.

2. A matrix should be created by placing the data classes opposite the business processes.

14.8 The BSP Executive Perspective

1. The team identifies the executives that should be interviewed during the BSP study preparation.

2. Managers, no more than two levels below the president should be selected by the team.

3. The study team should confirm the interview schedule, when the list of executives to be interviewed has been updated and confirmed.

4. Time should always be allowed for interview preparation.

5. Higher executives should always be interviewed first, not last.

6. Consideration should be given to individual abilities in determining who will serve in what role.

7. The study team should meet to discuss various matters that are specific to that interview, before each interview session.

8. The study control room should be a place where interruptions are least likely and where the matrices and charts can be displayed on the walls for reference.

9. The documentation of interviews should be kept current by the study team.

10. The two study team members who are taking notes during the

interview should pull the notes together and have them summarized and typed immediately after the interview has been concluded.

11. So that problem statements and key points appear in separate paragraphs, summaries should be formulated.

12. To keep the wall charts as accurate as possible, any changes resulting from the interview should be posted.

14.9 BSP Findings and Conclusions

1. The solving of non-I/S problems should not be the mission of the BSP team.

2. I/S problems/solutions or I/S needs and values should be cut from the worksheet.

3. For each business process group and its processes, a flipchart page should be created.

4. At a level handy to post to, the business process group and its processes should be arranged around the control room.

5. To ensure that all entries have been posted to the right process, the team should concentrate on one business process at a time.

14.10 BSP Architecture Review

1. The team should continue its analysis by determining how the data will be managed to support the process, having acquired an understanding of the business processes and the data required to support them.

2. The U's associated with a given process should be defined as a single usage subsystem, and each C should be defined as a "create" subsystem.

3. A description of the functions of each of the subsystems should be written when they have been identified.

14.11 BSP Architecture Priorities

1. A portion of the information architecture that is to be implemented first, should be selected and recommended to management.

2. I/S projects should be able to be evaluated by management in the same way other business projects are evaluated, since data is now being treated as a business resource.

3. The team should review the "system prerequisites identification" matrix once a first subsystem has been identified.

4. In order for the executive to evaluate the system, it should be described in sufficient detail.

14.12 BSP Recommendations and Plans

1. In order to help management provide proper direction, an action plan for every project should be developed identifying the key decisions and activities.

2. From the study work product to the particular project, the action plan should give the project manager a firm basis for a smooth transition.

14.13 BSP Report and Presentation

1. The team should prepare a preliminary report outline during the initial steps of preparing for the study and develop a work plan for conducting the study.

2. So that the final report reflects all of the team's comments, each of its sections should be reviewed by each of the members, since the document now materializing from that outline is to be a consensus of the entire team.

3. For use by top management, the first few pages of the report should summarize the most significant findings, conclusions, and recommendations.

4. Team members who plan to participate in future follow-on activities, should have supporting details included in the appendices.

5. Viewgraphs, or slides should be considered during the presentation, if the audience numbers more than a dozen.

6. Before the team drafts the final report, the conclusions, recommendations, and an action plan should be reviewed with the executive sponsor.

7. The presentation should last no longer than an hour and should be concise.

14.14 BSP Architecture Follow-on Requirements

1. The basic architecture definition should be completed at the beginning of a follow-on project, if the information architecture was not completely defined.

14.15 BSP High-Priority System

1. A high-priority system should be developed and implemented as a recommendation by the BSP team.

2. Care should be taken so that the system is not developed by itself, as development of that system begins.

14.16 Additional Managerial and Systems Considerations

14.16.1 Systems

1. A Performance Breakdown Structure (PBS) should be established.

2. The integration of PBS with the organization should be undertaken.

3. The current (revised) budget should be applied to PBS.

4. Baseline (revised budget) control through use of variance system or other formal change control systems should be devised.

5. Performance reporting based on the earned value approach should be established.

6. The implementation of a automated scheduling system that provides the capability to produce a summary schedule for the entire project or produce a summary schedule with selected segments expanded to a lower level of detail should be put in.

7. A standard corporate chart of accounts should be established on a subsidiary by subsidiary basis and, where warranted, standarized across subsidiary lines.

14.16.2 Current Management Reports

1. Current management reports should be designed for planning.

2. The reports should include all summary measurement and control information, particularly forecast and comparison.

3. The reports should be designed for on-line graphs.

4. The reports should be restructured to meet individual management needs.

14.16.2.1 Enhancement of Management Reports

1. The management reports should be improved to meet identified management needs by:

   a. Adding new information.

   b. Summarizing and restructuring the existing reports.

   c. Creating a common inter-departmental summary for general management.

2. Management should address the timely communication of the inter-departmental summary data.

14.16.2.2 Development of General Management Information

1. A Management Decision Support System (MDSS) should be required to plan, measure and control the business at the highest level.

2. General management information support requirements should be analyzed, defined and specifically detailed as a basis for future development.

3. If the Management Decision Support System is implemented, it should address the following:

   a. Standard data dictionary including definitions and computations.

   b. Communications, CPU to CPU.

   c. Transparent software and hardware systems.

   d. Transparent data base management systems.

   e. Raw data availability.

   f. Data base modeling simulation tools.

   g. Capacity measurement and planning tools.

   h. Highest level user query languages based on basic relational structures.

4. Provided that the study of the Management Decision Support System is accepted, then it should be staffed in order to be developed concurrently with other key projects.

14.16.3 Information Systems Architecture Recommendations

1. The objectives of designing an Information Systems Architecture is to determine how identified data classes should be managed to support identified processes and to define a set of systems and subsystems that would allow for implementation of the total architecture in orderly pieces. The methodology to follow is:

   a. Create a matrix of Process versus Data Class identifying data class relationship for each process.

   b. Sort the matrix of Process versus Data Class into logical systems by grouping similar processes together

based upon the created category of usage for data classes.

c. Identify systems relationship based upon the revising and use categories of usage for data classes.

d. Define logical subsystems for each system.

2. A Management and Control System should be implemented which records and maintains the data required to support the management, planning and control processes.

14.16.4 Subsystems Implementation Recommendations

1. Using criteria for priority selection, the study team should recommend that the corporation initially apply its resources towards the development of the five subsystems listed below:

a. Business Subsystem.

b. Deposits Subsystem.

c. Measurement and Control Subsystem.

d. Budget Monitoring Subsystem.

e. Project Management Subsystem.

14.17 BSP Planning, Measurement, and Control of MIS

The following recommendations will deal with those activities required to adequately review the Management Information Systems (MIS) function so as to recommend immediate changes and to specify MIS activities that are part of the BSP follow-on projects.

14.17.1 BSP/MIS Purpose

1. Study the facts relating to MIS produced in other modules

of the BSP study.

2. The following prerequisites to performing the MIS activities in the BSP study, are actions that are in other study modules and should be completed:

a. Study preparation.

b. Determining business requirements.

c. Determining architectural priorities.

14.17.2 BSP/MIS Activities Flow

1. Serving as input to the MIS portion of the action plan resulting from the BSP study, changes should be required by the following three channels to be consolidated into a list for developing MIS priorities:

a. I/S objectives.

b. Information architecture.

c. Problem analysis.

2. So as to serve as a guide for the development of I/S plans and strategies in the BSP follow-on activities, the I/S objectives should be consistent with the objectives and management systems of the business.

3. During the BSP study preparation phase, the current I/S objectives must be documented, and discussed in the I/S director's presentation.

4. The BSP study should separate problems into I/S support problems and non-I/S problems.

5. The long-range Information Systems Plan should receive

major emphasis during problem analysis and it must, of course, be one of the follow-on projects, since it is a major BSP objective.

14.17.3 BSP/MIS Outputs

1. Outputs that result from a BSP study should be summarized by in the following list:

   a. Findings and conclusions.

   b. I/S objectives.

   c. Definition of high-priority MIS projects.

   d. Action plan for follow-on projects.

14.17.4 The Effectiveness of MIS

1. An Information System should be managed by the same basic principles as any other business unit.

2. The objectives should be set within the overall objectives of the company that the I/S business serves, so that it can become effective.

3. The key groups of processes required in an I/S must be defined first.

4. The key to successful I/S management, is keeping the management system effective and efficient.

14.17.5 MIS Decision Support

1. Three types of activity should be distinguished for Decision Support of Management Information Systems.

   a. Supervision.

   b. Planning.

c. Goal setting.

2. Functional areas such as marketing, finance, logistics, and product management, should have planning needs that planning systems must concentrate upon.

3. Strategic information should be produced by the computing system in several of the following ways:

a. Problem dialogue models.

b. Statistical analysis of data.

c. Designing models to answer "What if" questions.

14.17.6 Why Do Information Systems Fail?

1. Organizational behavior variables should not be ignored in the design and operation of Information Systems.

2. If Information Systems are to succeed, user attitudes and perceptions must be favorable.

3. In order to design successful systems, an understanding of the factors associated with high levels must be obtained first.

4. If a system is to be successful, the relevant information for the problems faced by the user must be provided.

5. Three major groups in the organization must cooperate in order to design and operate successful Information Systems:

a. Management.

b. Users.

c. Information Services Department.

14.17.7 MIS Planning, Development, and Management

1. A Master Plan for implementation should be developed that

would spell out resources and timetables.

2. "Data Base Files" should be developed that would eliminate both file and program duplication and proliferation.

3. A Task Force should be set up to help integrate the organization and resolve different disciplines.

4. Data auditing and improvement should be undertaken immediately.

14.17.8 Risk Analyses, Factors, and Strategies

1. An implementation of risk analysis should be performed in addition to a cost/benefit analysis.

2. A model should be used to anticipate implementation difficulties, and to try to develop strategies that will increase the likelihood of success.

14.17.9 Data Base Planning Through BSP

1. In order to generate priorities, schedules and resources required for major systems development efforts, business plans and systems plans must be integrated.

2. Do not draw complex user views.

3. Use standard forms and methodology for gathering user views.

4. Make sure that concatenated keys are drawn properly.

5. Do not include hidden primary keys in user views.

6. Investigate user views for possible secondary keys before implementations.

7. Define future business plans.

8. Determine a business systems plan to support the business plan.

9. Develop a subject data base plan to support the business systems plan.

10. Implement a systems organization which includes user involvement on a project basis.

11. Utilize a standard methodology to ensure that all systems projects funnel through the same data administration function.

12. Make sure that all data is in the most stable form possible through normalization processes and stability analysis.

13. Evaluate data base and business performance requirements in order to establish the communications network required for operation.

14. Invoke a standard design process that includes dependable communications and feedback mechanisms between end user and systems personnel.

15. Separate the logical design of a system from its physical implementation technology.

14.18 Data Dictionary Support of BSP

The following recommendations supports the use of the Data Dictionary to help implement Business Systems Planning Studies.

14.18.1 BSP Study Support Tool

1. Large quantities of data should be stored, to help the

manipulation and analysis of complex relationships so that they can become more manageable.

2. Although the gathered BSP data are interrelated, a data base approach should be used to allow each piece of data to be stored only once.

3. An automated approach should be used so that information is less likely to be lost.

4. A BSP data base should be established to help identify implementable systems, support system design and data modeling activities, and generate test plans to help ensure that the systems developed do indeed satisfy the original requirements.

14.18.2 Minimum Requirements for the BSP Study Support Tool

1. A facility for describing various information-related enterprise phenomena, such as relationships between organizational units, business functions, and information being created and used should be created.

2. A facility for storing the above descriptions in a data base in computer-processable form should be set up.

3. A facility for adding, deleting, and changing such descriptive data in the data base should be used.

4. A facility for inquiry/analysis of the study data in the data base should be implemented.

14.18.3 Facilities to Support BSP Studies

1. The "Extensibility facility" should be used, so that

additional subject categories can be defined plus any associated relationships and attributes.

2. The "Program Access Facility" (PAF) should be used so that an installation can write various analysis programs which use the descriptive information stored in the Dictionary data base.

14.18.4 BSP Reports

1. A MATRIX report should be generated to present relationships between two categories of entities in a matrix format, and to show some of the following functional requirements:

   a. A special matrix should be generated showing an information architecture.

   b. The order of row names and column names for the matrix should be specifiable.

   c. Relationships of interest should be specifiable.

   d. Multiple relationships should be able to be shown at a single matrix position.

14.18.5 NETWORK Reports

1. A report (NETWORK) to present a network diagram of related subjects of interest should be generated and show some of the following functional requirements:

   a. Categories and relationships of interest should be selectively specified.

   b. The starting subject in the NETWORK diagram should be specified.

c. Names of subjects should be enclosed and lines should be used to identify relationships.

14.18.6 STRUCTURE Report

1. A STRUCTURE report should be generated to present a hierarchical structure of the subjects in a given category and show some of the following functional requirements:

a. Relationship names that imply hierarchies should be specified.

b. Selectivity should be allowed.

14.18.7 SUMMARY Report

1. A SUMMARY report should be generated to present for each subject specified: attribute date, relationships data, and text date; and to illustrate some of the following functional requirements;

a. Selectivity should be allowed.

b. The category name of the related subject name should be indicated.

c. If no related subject has been specified, it should be so indicated.

14.18.8 SELECT Report

1. A SELECT report should be generated to present a list of names of those subjects from the Dictionary data base to satisfy given selection criteria, and to implement some of the following functional requirements:

a. The selection criteria should allow for relationships or attributes as well as some combinations of both.

b. The selection criteria should allow some comparison operators, such as "greater than," "less than," and "not equal to," to be used with the values of attributes.

c. The selected subject names should be ordered before output according to the user's specification, such as in ascending order or descending order.

d. Subject names selected should be usuable as input to other report programs.

14.18.9 Future Data Dictionary Research

1. Investigation into the appropriate definition of subjects, relationships, attributes, and naming conventions so as to facilitate multiple requirements descriptions disciplines and techniques should be done.

2. Development of data models for subsequent phases.

3. Development of techniques for iterating through the different phases of the data models.

4. Identification and development of various inquiry and analysis reports to assist all phases of the system life cycle.

5. The study of management and personnel issues in this new environment so that the productivity of the information-providing services for the enterprise can be improved.

6. Development of an expanded Global Keyword Glossary to standardize names within and outside the organization.

7. The following future recommendations are examples of a complete program documentation data base that resides in the computer, and could be handled by the data dictionary. (Note: Some of these recommendations may already exist in some primitive form, but are mentioned here as a matter of information):

a. Mapping Data:

(1) All application programs should be able to access the data elements via the data dictionary, thus improving the data independence of the DBMS.

(2) The data dictionary should contain information about the locations and relationship between the elements, permitting various logical views of the same data base.

(3) Number (2) above should remove from the programmer any concerns about the physical storage of the data, allowing the underlying structure of records to be altered with no impact on existing programs.

b. Conversion of Data:

(1) Data should be translated from one standard storage form to another (fixed point to floating point).

(2) Data should be translated from standard storage forms to one of several user defined forms, thus allowing the structure of records to be transparently altered and their contents.

(3) The data dictionary should assure that it is

delivered to the application program in its original expanded form.

c. Validation of Update and Input:

(1) Data being input to the data base should be checked against pre-defined ranges of values or editing standards.

d. Distributed Data Base Mapping:

(1) Application programs should primarily access data at their own node in a network.

(2) The data dictionary at that node should maintain a dynamic listing of those elements most frequently accessed at remote nodes, and supply information about its node to other data dictionaries.

e. Relational Integrity:

(1) The data dictionary in a relational data base must be capable of reporting all relations affected by updating a given relation, prevent or otherwise qualifying an order to destroy a relation upon which further relations are defined, and prevent the insertion of "nonsense" relations, into the data base.

14.19 BSP in the Distributed Information Systems of the Future

The following recommendations are based on the use of Distri-

buted Information Systems requirements, planning, and a defined information architecture for use in present and future BSP studies.

14.19.1 Information Architecture

1. The project team must do the following, if the information architecture follow-on project is to add distributed I/S parameters to the architecture:

   a. Thoroughly understand the degree of distribution of each element.

   b. Understand the argument for and against distribution of the various elements.

   c. Be able to put into perspective all the factors that affect distribution and sharing of data processing resources.

   d. Appreciate the need for a long-range I/S plan and for development of a facilities plan to support the I/S plan.

2. To include physical locations for systems and data requirements, the process and data flow analysis should be extended.

3. A Process/Data matrix for each location should be prepared with additional parameters on the axis to include:

   a. Data use.

   b. Security.

   c. Auditability.

   d. Data occurrence.

   e. Activity volumes.

f. Response required.

g. Criticality.

14.19.2 Recommendations for Sizing Distributed Systems

The discussion of factors influencing sizing of distributed systems leads to two fundamental recommendations and their accompanying functions:

1. Establish long-term, in house expertise in sizing or hire appropriate outside experts as indicated by the following:

   a. Only knowledgeable, experienced analysis teams will be able to properly size distributed systems.

   b. For those groups without the resources to build up and maintain an in-house analysis team, a system sizing problem will be best handled by contracting out to an appropriate consulting firm, bringing in consultants to work with on-site staff, or hiring sizing experts for the term of a procurement.

2. Develop a measurement center as an integral part of a distributed computing system as indicated by the following:

   a. Sizing considerations for a comprehensive "capacity planning" process (where capacity planning is defined as the forecasting of future hardware and software requirements).

   b. Capacity planning should be done by using historical performance data.

   c. Data collection and analysis must be done carefully.

d. A long term commitment is required to properly instrument distributed systems, in their design phase if possible, and to establish and maintain an extensive performance measurement database spanning several years of measurement.

e. Questions of where, when, what, why and how to measure must be studied in the context of how the data can be used to feed the modeling and benchmarking activities that will be used to maintain and improve levels of performance.

14.19.3 Computer Security Safeguards

The following recommendations cover some but not all of the "Computer Security Safeguards" that may be found in Appendix D, page 519. Eighty-eight safeguards are described in this appendix. The CATEGORY descriptor identifies the organizational element responsible for the safeguard. The COMMENTS descriptor indicates whether the safeguard must be designed into the system or environment or whether "retrofit" (to furnish with newly available equipment) is possible. In some instances, the COMMENTS section contains additional information believed to be useful in understanding special characteristics of the safeguard.

For convenience, page 565 of this appendix contains an alphabetized listing of all vulnerability category abbreviations with their associated meanings.

14.19.3.1 Security/Privacy Administration Functions

1. Passwords and/or privilege lists should be established.

2. A user should supply a matching password to be allowed assess, because the passwords will be stored by the system.

3. A set of functions which a specific user, or class of users, can access, should be established by privilege lists.

4. The security administrator should be under control of a higher-level privilege list which prevents change to other areas not under that administrator's control.

5. In order to determine if access controls are being violated and if attempted violations have been prevented by the system's control mechanism, the security administrator should also monitor use of the system.

6. The system should have a very high level of integrity to insure security.

7. To protect data during transmission over a communications network, the method of encryption must be used.

14.19.4 Deficiences and Recommendations of the Management of EDP Controls

The following recommendations are designed to offer corrective action to those executives and managers who have been completely overwhelmed by the computer's complexity, and have failed to perform the following:

1. Properly train their Internal Audit staff.

2. Set up sophisticated anti-fraud measures.

3. Put qualified individuals in charge of setting up their internal financial controls (properly trained FCPA staff members with a strong EDP background).

4. The hiring of qualified external accountants (with a

strong EDP background) to help monitor the corporation's assets and internal controls.

The following recommendations are now offered:

1. All present internal audit staff members should be adequately trained to detect and prevent intentional computer misuse.

2. The use of a separate EDP group within an internal audit department (as is common among many corporations) should be terminated, because computer technology has advanced so far (and most corporations are now fully automated), that all internal auditors must now have a strong EDP background.

3. A yearly competency examination should be administered to all internal auditors to test their knowledge of EDP internal controls. The examination should be monitored by qualified external EDP auditors (usually in-house external auditors), and not by the internal auditors themselves. Often, as is the case in many corporations, these tests are monitored from within, and represent a bias attitude toward complacency, thus saving themselves from the embarrassment of "not having well trained EDP auditors to plug up employee fraud."

4. Any internal auditor who does not pass the yearly competency examination, should have the opportunity to take it again within three months. If the employee fails the test again, he should be reassigned or terminated.

5. All vacancies within present internal audit departments should be filled by Certified Public Accountants or individuals who have a very strong background in EDP.

6. Software packages should be purchased to allow the internal auditors to try to audit through the computer, and not around it

(See Appendix D for further recommendations on what type of computer security safeguards are available for internal auditors).

7. In a sense, the above recommendations (1 to 6) indicate a large scale reorganization of all internal audit departments if they fail to keep up with computer technology, because the day of the "manual" auditor is gone. This reorganization would include everyone, from the manager on down. In addition, the manager, above anyone else, should be a CPA himself, and have a strong background in EDP controls.

8. All external auditors that are assigned to a corporation should have a very strong EDP background, and be CPAs' themselves (and not just working toward one). Currently, most external auditors do not have a strong EDP background, and coupled with a poorly trained internal staff, could and probably have put a corporation in a very precarious condition.

9. Currently the Foreign Corrupt Practices Act provides criminal penalties for even the board of directors should a company fail to set up the proper internal financial controls. With the above being the case, corporations must put qualified individuals (CPAs' or internal auditors with a strong EDP background) in charge of setting up their internal financial controls. As is the case with many corporations, they have put very unqualified individuals on their FCPA staff (mainly because of political considerations), usually members of their poorly trained internal audit staff.

10. Finally, it is a matter of properly educating (training) a corporation's internal and external auditors, and the executives and

managers to firmly commit themselves to ensure that the proper controls are in place in the corporation.

14.19.5 Office of the Future

The following recommendations are based on the "Office of the Future," and how with proper strategic planning (such as Formal Business Systems Planning), the concept of electronics for automating office administrative functions and providing new types of office services will come about:

14.19.5.1 Office Management Changes

Possible types of machines and facilities in the office of the future:

1. FACILITIES IN AN EXECUTIVE'S OFFICE:
   a. Digital telephone with LED display.
   b. Telephone answering machine.
   c. Voicegram (speech mail) facility.
   d. Screen for receiving mail and messages.
   e. Word-processing terminal in communication with secretary or typing pool.
   f. Dictation system which permits on-line insertion and change of words.
   g. Future speech-input word-processing machine.
   h. Viewdata-like information system.
   i. Teletext facility (receives data broadcast on a television channel).
   j. Video type player.

k. Video type camera over desk (for complex communication by engineers, scientists, or designers).

l. Video access to local information room.

m. Personal computing.

n. Executive uses of computer terminal: mail and messages, information retrieval, data-base access, automated diary, automated in-basket work queue, action list, ability to place items on subordinates or other people's work queue, automatic followup, project status tracking, inspection and adjustment of mail types by secretary before it is sent.

2. SECRETARIAL OR SERVICE FACILITIES:

a. Electronic filing and retrieval.

b. Electronic mail (see next heading).

c. Word-processing facilities:

(1) Screen for composing, retrieving, merging, and editing text.

(2) Printer to print the composed document.

(3) Cursor to assist in inserting items into the text and moving paragraphs.

(4) Controller for a single machine, or shared logic controller for multiple machines.

(5) Word wrap (words typed beyond the right margin automatically go on to the next line).

(6) Right justification (with the right margin as well as the left aligned, as on the pages of a book).

(7) Tabs.

(8) Decimal positioning for typing columns of figures correctly aligned.

(9) Multiple type fonts.

(10) Some future word processors will have speech input, especially suitable for executives who do not like to type much.

d. Word processing machines in communication, for example, for a manager to adjust what a secretary has typed. A manager and secretary, or coauthors of a document, might talk by telephone while they inspect and adjust the document on the screen.

e. Copying machine and collators.

f. Cumminicating copies. A copying machine which can:

(1) transmit to distant copiers,

(2) control the accuracy of reception,

(3) receive and print output from a computer,

(4) digitize and transmit documents to computer or electronic filing systems.

g. Intelligent copier. A copying machine which can:

(1) edit,

(2) merge items onto one sheet,

(3) add corporate logoes, signatures, or forms,

(4) shrink or expand the copy,

(5) display input on a screen so that editing functions such as deleting certain items or adding items can be specified,

(6) possibly act as a multifunction communicating copier.

h. Graphics. Automated production of foils, flip charts, or slides.

3. ELECTRONIC MAIL FACILITIES:

a. Output:

(1) High-speed printer.

(2) Low-speed printer.

(3) Analog facsimile.

(4) Digital facsimile.

(5) Copying machine.

(6) Screen.

(7) Storage media.

(8) Computer.

(9) Speech.

b. Input:

(1) Keyboard.

(2) Word-processing machine.

(3) Analog facsimile.

(4) Digital facsimile.

(5) Copying machine.

(6) Speech computer.

(7) Optical scanner.

c. Sorting:

(1) Slow disk sorter.

(2) Tape sort.

d. Filing:

(1) Automatic filing for later retrieval.

(2) Automatic Searching.

e. Delivery:

(1) Immediate.

(2) Scheduled (at a specified time).

(3) Store and forward when possible.

(4) On demand.

f. Pattern:

(1) One-to-one.

(2) One-to-many (automatic use of mailing list).

(3) Broadcast.

g. Priority:

(1) Immediate.

(2) When resources are free.

(3) Overnight.

h. Organizational:

(1) Intercorporate.

(2) Interorganizational.

(3) Intracorporate.

(4) Intraorganizational.

i. Distance:

(1) Buildingwide.

(2) Citywide.

(3) Nationwide.

(4) Worldwide.

j. Control:

(1) Automatic labeling with time/date stamp and identification number.

(2) Positive controls to prevent loss or non delivery.

(3) Auditability.

4. FACILITIES FOR BETTER PERSON-TO-PERSON COMMUNICATION:

a. Facilities for sending, filing, and on-demand receipt of voicegrams.

b. Facilities for sending, filing, and on-demand receipt of messages.

c. Terminals or telephones which flash a light when a message is waiting.

d. "Mailbox" software.

e. Facsimile to dial conference calls and add on third parties to telephone calls.

f. Capability to dial conference calls and add on third parties to telephone calls.

g. Noninteractive still-image transmission, plus telephone.

h. Interactive freeze-frame video, plus telephone.

i. Full interactive video, picturephone quality.

j. Full interactive video, television quality, possibly with CATV (cable television) wiring in a building or complex.

k. Interactive video, switchable to higher-resolution still-frame transmission.

5. TELECOMMUNICATIONS CHANNELS:

   a. Telephone.

   b. Telex.

   c. TWX.

   d. Private data network.

   e. Public X.25 data network.

   f. Higher-level public data network (Bell's ACS, Videotext).

   g. Wideband data circuits like Bell's DDS.

   h. Wideband network (like Xerox's XTEN).

   i. Basic satellite earth station.

   j. Satellite earth station with variable bandwidth (like SBS).

   k. CATV (cable television).

   l. Wideband multipoint-addressing cable system (like Ethernet).

   m. Radio paging.

   n. Radio dispatching.

   o. Citizens' Band radio.

   p. Packet radio.

6. FACILITIES FOR WORKING AT HOME:

   a. Computer terminal.

   b. Word-processing machine.

   c. Telephone-answering machine.

   d. Dictating facilities, possible on-line access to a control dictation recording service.

e. Telex machines, or ability to connect to the telex network via a terminal used for other purposes.

f. Mail and message terminal.

g. Executive terminal with work queue (in-basket), action list, diary, and other facilities linked to the main office.

[In general, home facilities can provide an extension and continuity of office facilities for secretaries, executives, and professionals. They can also be used for part-time employment of persons who because of children or other reasons cannot work full time.]

7. COMMUNICATIONS ROOM:

a. Telex.

b. TWX.

c. Facsimile.

d. Other electronic mail machines.

e. Viewdata.

f. Hub of data networks.

g. Control facility for wideband network.

h. Radio communication, radio paging, dispatching.

i. Satellite earth station control.

8. MEETING ROOM:

a. Computer terminals.

b. Projector to display terminal output onto a large screen.

c. Slide and foil projectors.

d. Ability to transmit and display slides or foils from a

remote location, so that a distant person can make a graphic presentation.

e. Full interactive freeze-frame video.

f. Moving video -- television or picturephone.

g. Meeting room with multiple cameras and switching equipment for television or picturephone meetings.

h. Speakerphone.

i. Speech teleconferencing so that multiple delegates can hear and be heard remotely.

j. Facsimile machines.

k. Video tape, possibly with large-screen playback.

9. INFORMATION ROOM:

[A room where sources of information and information experts are concentrated so that managers can request data they need.]

a. Communication with managers' offices in the building may be by

(1) full television,

(2) freeze-frame video,

(3) terminal and telephone,

(4) printer.

b. Information may be displayed from

(1) terminals,

(2) special wall displays,

(3) slides,

(4) film-chain,

(5) video tape,

(6) color TV camera over desk or on chart board,

(7) facsimile,

(8) video disc,

(9) connections to multiple computer systems.

[The room may be connected to a corporate library.]

10. OPERATIONS ROOM:

[A room where a set of operations may be controlled, for example, shop floor control, delivery fleet control, control of police resources, cars, and ambulances, a power grid, maintenance operations.]

a. Special wall displays (manual).

b. Special wall displays controlled by computers and data transmission.

c. Computer terminals with operators able to intercommunicate.

d. Large screen (such as the NASA Mission Control Center).

e. Radio paging.

f. Radio dispatching.

g. Computer printouts for backup.

h. TV links to critical locations.

11. MASTER SWITCH:

a. Computerized PBX (private branch exchange), now call CBX.

b. CBX which interconnects terminals and telephones.

c. CBX which converts machine addresses into dialing commands.

d. Master switch capable of handling wideband bit streams (up to 64,000 bps: up to 256,000 bps; up to several million bps).

e. Interface to computer network or multiple networks.

12. BUILDING WIRING:

a. Radial twisted wire pairs (conventional telephone wiring).

b. Radial wire pairs handling a high bit rate.

c. CATV (cable television) wiring.

d. Wideband loop like Ethernet.

e. Optical fiber.

f. Packet radio.

g. Plug in the wall for attaching wide variety of terminals and electronic devices.

14.19.5.2 Services in the Paperless Executive Office

1. WORK-QUEUE MANAGEMENT:

a. Automated in-basket. "Paperwork" to be done available on the office screen; organized into queues of different types of activity; possibly organized by priority.

b. Ability to place items on the work queues of subordinates or other persons.

c. Automated follow-up, to see when tasks have been completed by other persons.

d. Automated executive diary.

e. Automated executive action list.

2. INFORMATION RETRIEVAL:

   a. Access to information needed when handling the work queue, e.g., customer records, project status reports, budget details.

   b. Access to corporate data-base systems.

   c. Access to information retrieval systems for searching for information.

   d. Access to external information sources.

   e. Access to mail files, document files, transaction archives, possibly using the help of a secretary.

   f. Access to a corporate information center where specialized staff search for information needed by management.

   g. Teletext service (broadcast data).

   h. Viewdata types of services.

3. WORD PROCESSING:

   a. Ability to check and change materials typed by a secretary on the office screen.

   b. Ability to retrieve modules of text for composing semistandard letters, contracts, proposals, and documents.

   c. Telephone communication with a typing pool or secretary, while both parties view and change the same text on the office screen.

   d. Dictation capability, possible with the capability for on-line insertion and change of dictated words.

e. Ability for two or more persons to jointly compose flip charts or documents, possibly while in distant offices.

f. At some future time, use of speech-input word processing in which words spoken appear on a screen and can be modified.

4. MAIL AND MESSAGES:

a. Ability to receive mail and messages on the office screen (electronic mailbox).

b. A flashing light which indicates when mail or messages are waiting to be received; different lights may indicate different levels of urgency.

c. Ability to send messages, with differing degrees of urgency.

d. Ability to receive and send speech messages (voicegrams) instead of typed memos. These messages are stored and forwarded. This can save much typing and increase communication.

e. Ability in inspecting one's electronic mailbox from remote locations, with appropriate security control.

5. COMPUTING:

a. Personal computing and calculation capability.

b. Ability to use programs or computer models created for the individual in question. These differ greatly from one type of executive to another.

c. Ability to use time-shared computers, carry out database processing, generate reports, charts, etc.

d. Graphics display capability.

6. BETTER PERSONAL COMMUNICATIONS:

a. Electronic telephone with LED display.

b. Ability to dial conference calls and add on third parties to existing calls.

c. Electronic mailbox, message sending, and voicegram facilities.

d. Telephone and screen communication with othr corporate locations, with interactive alphanumeric use of screen.

e. Still-frame graphics communication capability.

g. Speech-and-video communication (possibly moving video within the building and freeze-frame video to other locations).

h. Teleconferencing (possibly freeze-frame).

i. Video tape for education.

j. Video tape for communication.

14.20 General Recommendations

The problem to which this thesis has been directed toward, is the objective of BSP in supporting Information Systems at the strategy level; and, how it interfaces with the data dictionary, Management Information Systems, and Distributed Information Systems -- with special emphasis on "computer security safeguards" and the "office of the future (Business Office Systems Planning)." Therefore, the following general recommendations will incorporate the concepts derived

from this study in a meaningful way, thus capturing the full interpretation of the previous (specific) recommendations:

1. Based upon the findings of this study, it is recommended that a Formal Business System Planning methodology be implemented (or incorporated) over any other "strategic planning" methodology. The BSP methodology, offers much more flexibility in incorporating unknown variables into a business environment to solve problems, than any other strategic planning methodology to date. Furthermore, it financially outperformed all other methodologies.

2. It is rather redundant at this point to rehash all of the responses to the questionnaire. Furthermore, it is quite obvious from the questionnaire responses that not all of the surveyed corporations used a formal BSP methodology as their business plan. Therefore, the general recommendation would be to follow the BSP methodology like a "cook book" (although the results may be limited to identifying a set of application projects to work on, establishing increased management involvement in data processing planning, and facilitating communications with the users). However, it is recommended that any radical deviation from the BSP "recipe" could open the door to an unwelcome array of unknown variables which could seriously harm the study effort.

3. The common practice among many corporations is not to have a business plan, but to put out "brush fires" on a day to day basis without implementing preventive measures, so that the same problem will not occur over and over again. Again, it is quite obvious that a corporation must have a business plan if it is to survive. Sooner or later the "brush fires" could grow into a "firestorm," and no one will

be able to put them out. It is recommended that all corporations attack the failure of an ongoing project by implementing a business plan (preferably BSP) at that particular time, and avoid implementing the "brush fire" solution. Remember, it will eventually come back to haunt you.

4. It is recommended that all managers address the problem of planning for a business, by first allocating their human resources in the most effective and efficient way; and second, by allocating the Information System resource investment opportunities that hold the greatest relative potential benefit for the corporation as a whole.

5. Business-level dependancies will have to be identified and protected by the corporations to provide for systems and data integration.

6. Limited Information Systems resources will have to be effectively allocated by management.

7. Short-term and long-term tradeoffs will have to be made in determining the Information System resource investment strategies of the corporation.

8. Holistic models of the business will be required to support the management of planning and controlling the apparatus of the corporation.

9. The generic structure of the business will have to be described.

10. Theoretical definitions should be established for such items as business processes, data classes, objectives, measurements, critical success factors etc. etc.

11. Logical boundaries and interfaces or relationships between the various elements of the business should be identified.

12. Structural aspects of BSP should be theoretically substantiated.

13. With good theoretically substantiated structures, automatic code generation and automated data base design should be implemented.

14. It is recommended, that a data dictionary be used as a tool to support the Business Systems Planning studies. Without it, BSP will be impossible to implement.

15. It is further recommended that a vast array of computer security safeguards be implemented to protect the corporations from the internal and external misuse of their computer system to perpetuate fraud. Failure to do this, will result in catastrophic consequences for the corporation (especially in the area of upgrading their internal audit staffs).

16. The Business Office Systems Planning methodology should be implemented to help automate office administrative functions and provide new types of office services for the future as part of the corporation's design and strategy for distributed processing.

17. Finally, it is recommended for distributive processing, that central management set up corporate standards and provide the networking capability, so that diverse machines can be interconnected; and that within this framework, local management should be responsible for the facilities they procure and how they are used.

BIBLIOGRAPHY

BIBLIOGRAPHY

A. BOOKS

1. Atre, S. Data Base: Structured Techniques for Design, Performance, and Management. John Wiley & Sons, 1980.

2. Alter, Steven L. Decision Support Systems: Current Practice and Continuing Challenges. Addison-Wesley Publishing Company, 1980.

3. Booth, Grayce M. The Distributed System Environment: Some Practical Approaches. Mc Graw-Hill Book Company, 1981.

4. Gessford, John E. Modern Information Systems. Addison-Wesley Publishing Company, 1980.

5. Hubbard, George W. Computer-Assisted Data Base Design. Van Nostrand Reinhold Company, 1981.

6. Kapp, Dan. IMS Programming Techniques: A Guide to Using DL/1. Van Nostrand Reinhold Company, 1978.

7. Lucas, Henry C., Jr. Why Information Systems Fail. Columbia University Press, 1975.

8. Lucas, Henry C., Jr. A Casebook for Management Information Systems. Mc Graw-Hill Book Company, 1976.

9. Martin, James, An End User's Guide To Data Base. Prentice Hall, 1981.

10. Putnam, Arnold O. Management Information Systems: Planning, Developing, Managing. Herman Publishing, Inc., 1977.

11. Shelly, Gary B. Business Systems Analysis and Design. Anaheim Publishing Co., 1978.

B. PERIODICALS

12. _____. "Computer Crime: The Spreading Danger to Business," Business Week, (April 20, 1981), 86.

13. Hellman, Martin E. "The Mathematics of Public-Key Cryptography", Scientific American, Vol. 24(August, 1979), 146-157.

14. Holland, Robert H. "Data Base Planning Entails Return to Basics," Computerworld, (October 27, 1980), 1-4.

15. Holland, Robert H. "Data Base Stability," ICP Interface Data Processing Management, (Spring, 1981), 1-6.

16. Holland, Robert H. "DBMS: Developing User Views," Datamation, (February, 1980), 141-44.

17. Holland, Robert H. "DBMS Yet to Live Up to Expectations," Computerworld, (March 10, 1980), 1,27,30,45,48.

18. Holland, Robert H. "Software In the 1980's," IBP Interface Data Processing Management, (Summer, 1980), 1.

19. King, W. R. "Strategic Planning for MIS," MIS Quarterly, (March, 1978).

20. Zani, William. "Blueprint for MIS", Harvard Business Review, Vol. 48(November/December, 1970), 95.

C. UNPUBLISHED MATERIAL

21. _____. "Guide 51: Proceedings." Vol. I & II, Guide International Corporation, Houston, Texas, May 18-23, 1980.

22. _____. "Guide 52: Proceedings." Vol. I & II, Guide International Corporation, Atlanta, Georgia, May, 1981.

23. _____. "Guide 53: Proceedings." Vol. I & II, Guide International Corporation, Dallas, Texas, November 813, 1981.

24. _____. "Managing the Information Agent - How Effective Are We?": A Study of Major U.S. Corporations." Unpublished Research, A. T. Kearney: Management Consultants, 1981.

25. Cassidy, A. H. "DB/DC Data Dictionary at Canadian Tire: Organization and Usage." Unpublished Research, Canadian Tire Corporation, Limited, Guide 50 - Houston, 1980.

26. Estep, Cherlyl. "DB/DC Data Dictionary: A Business System Planning Model." Unpublished Research, Standard Oil Company of California, Guide 52 - Atlanta Georgia Session No. SD-33, 1981.

27. Sakamato, J. G. "Use of DB/DC Data Dictionary to Support Business Systems Planning Studies: An Approach." Unpublished Research, IBM Los Angeles Service Center, No. G320-2705, 1980.

D. OTHER SOURCES

28. AICPA. Codification of Statements on Auditing Standards, 1977.

29. Anthony, R. N. Planning and Control Systems: A Framework for Analysis, Harvard Business School, Division of Research, 1965.

30. Arnold Bernhard & Co. The Value Line Investment Survey, 1982.

31. Dun & Bradstreet. Million Dollar Directory, 1981-82.

32. IBM Corporation. A Management System for the Information Business, 1981.

33. IBM Corporation. Business Systems Planning at Associated Grocers of Colorado, Inc., 1981.

34. IBM Corporation. Business Systems Planning at City of Los Angeles, 1981.

35. IBM Corporation. Business Systems Planning at the American Medical Association, 1981.

36. IBM Corporation. Business Systems Planning: Executive Overview, 1978.

37. IBM Corporation. Business Systems Planning: Grocery Executive Overview, 1980.

38. IBM Corporation. Business Systems Planning-Information Systems Planning Guide, 1978.

39. IBM Corporation. Business Systems Planning - Information Systems Planning Guide, 1981.

40. IBM Corporation. Business Systems Planning - Planning For Distributed Information Systems, 1980.

41. IBM Corporation. Data Dictionary Aids System Development at Liquid Carbonic, 1981.

42. IBM Corporation. Data Dictionary Interactive Usage Guidelines, 1981.

43. IBM Corporation. DB/DC Data Dictionary - Administration and Customization Guide, 1979.

44. IBM Corporation. DB/DC Data Dictionary - Application Guide, 1979.

45. IBM Corporation. DB/DC Data Dictionary - Dictionary Installation Guide, 1979.

46. IBM Corporation. DB/DC Data Dictionary - General Information Manual, 1978.

47. IBM Corporation. DB/DC Data Dictionary - Release 3 - Implementation Primer, 1979.

48. IBM Corporation. DB/DC Data Dictionary - Terminal User's Guide And Command Reference, 1979.

49. IBM Corporation. Information Systems Planning in the Securities Industry, 1979.

50. IBM Corporation. Management Planning in Jackson County Missouri, 1981.

51. IBM Corporation. Mecca International Suits Corporation Business Systems Planning Report, 1980.

52. Moodys. Manuals, 1981.

53. News Front/Business Trends, Corporate Analysis. 50,000 Leading U.S. Corporations, 1980.

54. NOVA. Computer, Spies, and Private Lives, PBS Program by the WGBH Educational Foundation, 1981.

55. Office of Technology Assessment: Congress of the United States. A Preliminary Assessment of the National Crime Information Center and the Computerized Criminal System, 1978.

56. SAS Institute. Statistical Analysis Systems: SAS/Graph User's Guide, 1981.

57. U. S. Department of Commerce. A Computer Data Base System for Indexing Research Papers, 1980.

58. U. S. Department of Commerce. A Data Base Management Approach to Privacy Act Compliance, 1977.

59. U. S. Department of Commerce. An Analysis of Computer Security Safeguards for Detecting and Preventing Intentional Computer Misuse, 1978.

60. U. S. Department of Commerce. Data Abstractions, Databases, and Conceptual Modeling: An Annotated Bibliography, 1980.

61. U. S. Department of Commerce. Data Administration: Concepts, Tools, Experiences, and Problems, 1978.

62. U. S. Department of Commerce. Data Base Directions - The Conversion Problem, 1980.

63. U. S. Department of Commerce. Data Base Directions - The Next Steps, 1976.

64. U. S. Department of Commerce. Data Base Reorginization -- Principles and Practice, 1979.

65. U. S. Department of Commerce. Recommendations for Data Base Management System Standards, 1979.

66. U. S. Department of Commerce. Sizing Distributed Systems: Overview and Recommendations, 1980.

APPENDIXES

APPENDIX A

LETTER AND QUESTIONAIRE

3810 N.W. 37th St. Terr.
Topeka, Kansas 66618
November 27, 1981

Mr. Dean Holm
Director of MIS
Abbott Laboratories
Abbott Park
North Chicago, Illinois 60064

Dear Mr. Holm:

You and your corporation could be of some assistance. I am currently writing my thesis for a masters degree in Computer Science from Kansas State University, Manhattan, Kansas. The problem that I am interested in concerns new methods as well as existing ones in the implementation of IBM's "Business Systems Planning" concept in various corporations.

Enclosed you will find a questionnaire which is being sent to other major corporations across the continental United States, that are presently or will implement the "Business Systems Planning" concept. Please fill out the questionnaire in a very accurate and concise manner.

An addressed stamped envelope is provided for return mailing. Tabulation of the results is scheduled for Monday, February 15, 1982. If you desire a copy of the analysis of this survey, please include your name and address. In addition, please include the name and address of any other corporations that may have or will implement the "Business Systems Planning" concept. An early return will be appreciated.

If you have any further questions, I can be reached at (913) 235-0041, ex. 4543. Your cooperation will be appreciated.

Sincerely yours,

John R. Vacca
Data Base Technician
Graduate Student

Enclosures (2)

BUSINESS SYSTEMS PLANNING:
AN IMPLEMENTATION APPROACH

(To The Information Systems Department)

Name of Corporation_____
City_____ State_____

1. Indicate by a check mark in the space provided below the type of industry of which your corporation would fall into:

____ Aircraft, Missiles	____ Nonferrous Metals
____ Airlines	____ Oil Equipment, Services
____ Banks	____ Paper
____ Building Materials	____ Personal Care
____ Chemicals	____ Petroleum
____ Computers, Office Equipment	____ Printing, Publishing
____ Drugs	____ Railroads
____ Education	____ Restaurants, Lodging
____ Electric Utilities	____ Retail Food Stores
____ Electrical Equipment	____ Rubber
____ Food, Beverages	____ Steel
____ Gas Utilities	____ Telephones
____ Health care, Medical Supplies	____ Textiles, Apparel
____ Insurance	____ Tobacco
____ Motor Vehicles, Parts	____ TV, Radio Broadcasting
____ Nonelectrical Machinery	____ Other(s) Specify_____

2. Was the commitment to start the BSP study made by a top executive of the corporation?

Yes_____ No_____ If no, explain further:_____
_____
_____

3. Following the commitment by top management, was a team leader selected to coordinate the study team's activities?

Yes_____ No_____ If no, explain further:_____
_____
_____
_____
_____

4. Was there a problem in obtaining access to executive management to explain the objectives and expected results of the BSP study?

Yes_____ No_____ If no, explain further:_____
_____
_____
_____
_____

5. Place a check mark in front of the appropriate action(s) taken, in the event that there was a problem in obtaining access to executive management:

____ Arranged an executive visit to another business that has successfully completed a BSP study.
____ Conducted an executive briefing session specifically for your executives.
____ Conducted an executive planning session.
____ Invited the executive to an executive information session.
____ Other(s) Specify_____

6. Indicate by placing a check mark in front of the study objectives that were defined or satisfied by the study team:

____ Provided a formal, objective method for management to establish information systems priorities without regard for provincial interests.
____ Provided for the development of information systems that have a long life, protecting the systems investment.
____ Provided that the data processing resources are managed for the most efficient and effective support of the business goals.
____ Improved relationship between the information systems department and the users by providing systems responsive to the users' requirements and priorities.
____ Identified data as a corporate resource that should be planned, managed, and controlled, in order to be used effectively by everyone.
____ Other(s) Specify_____

7. Check if any of the following factors were an obstacle to doing a BSP study:

____ Major reorganization or transformation of control taking place.
____ Geographical diversity, necessitating significant travel time.
____ Well over 20 executives who must be interviewed.
____ Multiple independent sub-organizations with autonomous decision making processes and with unique lines of product/services serving diverse markets.
____ Other(s) Specify_____

8. The selection of study team members is very important. Check if the people chosen met any of the following conditions:

____ Had several years' experience within the organization, a sound knowledge of their own area, and an appreciation of the rest of the business.
____ Were able to understand and deal analytically with problems.
____ Were willing to commit to conclusions and recommendations that would have a far-reaching effect on the organization.
____ Were perceived by other management within the organization as competent and responsible businessmen whose opinions carried considerable weight.
____ Other(s) Specify_____

9. Check if any of the following fundamental responsibilities were assigned to the following study team:

A. EXECUTIVE SPONSOR:

____ Visibly endorsed and supported the study effort.
____ Reviewed progress and findings during the study.
____ Received the final report and made the approval decision.
____ Other(s) Specify_____

B. TEAM LEADER:

____ Saw to it that the study was successfully completed.
____ Provided overall direction, made key business judgements, and acted as liaison with other executives of the organization.
____ Directed the study effort on a day-to-day basis and organized all necessary administration for the team.
____ Other(s) Specify_____

C. TEAM MEMBERS:

____ Participated in at least some if not all, interviews.
____ Analyzed the data collected and executive perspectives expressed during the study.
____ Drew conclusions and performed report writing tasks.
____ Other(s) Specify_____

10. Before your corporation embarked on a part-time study, were the following assurances made? Check if any:

____ The team was very well managed.
____ Momentum was not lost as a result of inactivity during the study.
____ Astute use was made of the administrative support available to effectively utilize the time when the team was not in session to prepare and type drafts, update charts, etc.

11. If the study team was full time, did the following resources fall within the following limits (check if any):

____ Number of team members: 4 - 7.
____ Number of weeks: 6 - 8.
____ Other(s) Specify_____

12. Check if any of the activities of the team leader included:

____ Conducting the study team orientation session.
____ Conducting a kickoff meeting for team members at the outset of the formal activities of the BSP study.
____ Setting and confirming executive session schedules.
____ Managing the logistics of the study, including day-to-day administration.
____ Providing guidance and business perspective.
____ Providing resource material.
____ Maintaining the schedule.
____ Presenting the study report to management at the completion of the study.
____ Other(s) Specify_____

13. The team leader should compose a study announcement letter to be signed by the chief executive officer. Check if the letter included the following:

____ Objectives of the program.
____ Potential value to the organization.
____ Need for functional executives to be involved.
____ Need for candor and cooperation of executives.
____ Other(s) Specify_____

14. Check if preparation for the study involved the following:

____ Early selection of interviewees.
____ Establishment of a control room.
____ Establishment of a study control book.
____ Other(s) Specify_____

15. Check if the following output was contained in your corporation's study control book?

____ Study work plan.
____ Interview schedule.
____ Schedule of checkpoint reviews with the sponsor.
____ Outline of the final report from the BSP study.
____ Business and information systems data, analyzed, charted, and
____ ready for the initial meeting.
____ A review by the BSP study sponsor.
____ Other(s) Specify_____

16. The team leader should prepare the preparation plan. Check if any of the following major tasks included:

____ Briefing the study team.
____ Gathering data on the business and information systems.
____ Educating team members.
____ Developing the study work plan.
____ Defining the study report and ancillary output.
____ Creating an executive interview list and schedule.
____ Briefing participating executives.
____ Obtaining a suitable control room.
____ Arranging for administrative support.
____ Reviewing with executive sponsor.
____ Other(s) Specify_____

17. The team leader should hold a half-to full day orientation session to brief the study team. Check if the following topics were covered:

____ Overview of BSP.
____ Review of activities to date.
____ Study preparation plan and schedule.
____ Other(s) Specify_____

18. To provide a basis of information the team should establish a reference library of both BUSINESS and INFORMATION SYSTEMS documentation. Check if any of the following data under General Business or Information Systems pertained to your corporation:

A. GENERAL BUSINESS:

____ Environment: external - economic, customers, technology, competition, government, suppliers.
____ Industry position and industry trends.
____ Planning process and calendar.
____ Business plan - goals, objectives, strategy, resources, schedules, financial.
____ Organization charts - position, names, number of people, and expected changes.
____ Key decision makers.
____ Major business measurements and control.
____ Major studies, task forces, committees during the previous three years.
____ Major problem areas.
____ Products and markets.
____ Geographical distribution.
____ Financial statistics.
____ Sizing statistics (vendors, employees, orders, customers, shipment, purchase orders, etc.)
____ Project initiation and funding process.
____ Other(s) Specify_____

B. INFORMATION SYSTEMS:

____ I/S plan goals, objectives, strategies, resources, schedules, finances.
____ Policies and practices.
____ Organization charts.
____ Planning process.
____ Major studies, task forces, committees during previous three years.
____ Geographical distribution (equipment, terminals, communication facilities).
____ Software environment.
____ Project initiation and funding process.
____ Systems justification requirements.
____ Standards/Guidelines.
____ History of major projects started in the last two years.
____ Present and planned systems and data bases.
____ Major information systems problems.
____ Sizing statistics (number of programs, job per period, users, files, data elements, and turnover).
____ Other(s) Specify_____

19. Has the team leader established an education plan for the team?

Yes_____ No_____ If no, explain further:_____
_____

20. Did the team working under the guidance of the team leader develop a study work plan in keeping with the scope and objectives previously established?

Yes_____ No_____ If no, explain further:_____
_____

21. The control file should be established to contain all material pertaining to the study. Check if any of the following contents are included in the control file:

____ Key correspondence.
____ Statements of objectives and scope.
____ Project plan.
____ Schedules.
____ Data gathered during preparation.
____ Documentation of completed analyses.
____ Executive interview notes.
____ Executive interview summaries.
____ Project control review meeting notes.
____ Recommendations.
____ Report and presentation.
____ Other(s) Specify_____

22. Check if any of the following topics are contained in the study report:

____ Executive summary.
____ Purpose, scope and objectives.
____ Method of study.
____ Business perspective.
____ I/S perspective.
____ Findings and conclusions.
____ Recommendations.
____ Action plan for follow-on projects.
____ Appendices as required.
____ Other(s) Specify_____

23. In the event that an invitation letter was sent prior to the interview, check if any of the following topics were included:

____ Responsibilities.
____ Objectives and plans to achieve required results.
____ Business problems and value of solving them.
____ Opportunities for improvement.
____ Major measurements and controls.
____ Identification of the key business areas.
____ Anticipated changes (products, organization, etc.).
____ Evaluation of current I/S support.
____ Requirements for future I/S support.
____ Value of the required I/S support.
____ Other(s) Specify_____

24. Selected executives should attend a briefing session prior to the commencement of the executive perspective segment of the BSP study. Check if any of the following topics were included in the briefing:

____ Executive level overview of BSP.
____ Study scope.
____ Objectives of the study.
____ Business reasons for conducting the study.
____ Review of expected output.
____ Executive involvement -- why, and what is expected of the executive.
____ Schedule for executive interviews.
____ Other(s) Specify_____

25. Any issues that may have arisen during the preparation should have been resolved by this time. Check if any of the following items were reviewed with the executive sponsor:

____ General results of the preparation.
____ Study work plan.
____ Definition of the study output.
____ Approval process.
____ Executive selection and discussion schedule.
____ Letter of invitation to be sent to selected executives.
____ Other(s) Specify_____

26. Check if the following presentations were contained in the first meeting?

____ The executive sponsor reiterated objectives, outputs and study perspectives.

A. TEAM LEADER DISCUSSIONS ON SUCH SUBJECTS AS:

____ Politics.
____ Sensitive issues.
____ Changes planned and in process.
____ Decision process.
____ Organization functions.
____ Key people.
____ Major problems.
____ User's view of DP support.
____ DP department image.

____ Information systems director's view of the similiarity of data processing to what was actually presented for the business.
____ The coverage of project status and control.
____ History of major data processing projects started in the last two years.
____ Major current activities.
____ Planned changes.
____ Major problems.
____ Other(s) Specify_____

27. Was the kickoff meeting attended by all study team members?

Yes_____ No_____ If no, explain further:_____

28. Check if the study work plan was used as a point of departure for discussing and finalizing any of the following topics:

____ Major events, major outputs, and schedules.
____ Individual assignments.
____ Project control.
____ Other(s) Specify_____

29. Was the team leader prepared to present, in summary form, the business related information gathered during the study preparation phase?

Yes_____ No_____ If no, explain further:_____
_____
_____
_____

30. Check if any of the following were included in an outline for the presentation of the I/S function:

____ Mission and objectives.
____ History and background of data processing.
____ Organizations.
____ Overview of major application systems installed and planned.
____ Relationship with users.
____ Project approval process.
____ Key problems and challenges.
____ Other(s) Specify_____

31. Has your corporation defined the business processes?

Yes_____ No_____ If no, explain further:_____
_____

32. After the business processes were defined, check if the results eventually led to any of the following:

____ Information systems with a large degree of independence from organization changes.
____ A comprehensive understanding of how the business accomplishes its overall missions and objectives.
____ A basis for separating the strategic planning and management control processes from operational control processes.
____ A basis for defining required information architecture, determining its scope, defining it so as to make it modular, and setting priorities for its development.
____ A basis for defining "key" data requirements.
____ Other(s) Specify_____

33. Prior to defining the processes, check if any of the following prerequisites were met:

____ All members were present and participated throughout the exercise, and there was general agreement on the expected outputs before the exercise began.
____ Note-takers were designated right from the beginning (so that decisions and definitions of processes would not be forgotten or misunderstood later).
____ Information gathered before the start of the BSP described and sized the products and resources, and clearly stated or provided a flow diagram of the strategic planning and management control procedures and schedules.
____ The team had a clear understanding of the concept of resources and their life cycle.
____ Other(s) Specify_____

34. Was a life cycle of the products/service and each of the supporting resources used to logically identify and group the processes? If so, check if any of the following were used:

____ Requirements, planning, measurement and control.
____ Acquisition or implementation.
____ Stewardship.
____ Retirement or disposition.
____ Other(s) Specify_____

35. Were the processes of strategic planning and management control defined? If so, check if any of the following planning and control processes were included:

A. STRATEGIC PLANNING:

____ Economic forecasting.
____ Organization planning.
____ Policy development.
____ Divesture/acquisition.
____ Analysis.
____ Assumptions management.
____ Goals development.
____ Product line modeling.
____ Other(s) Specify_____

B. MANAGEMENT CONTROL:

____ Market/product forecasting.
____ Working capital planning.
____ Staff level planning.
____ Operational planning.
____ Budgeting.
____ Measurement and review.
____ Other(s) Specify_____

36. Was the product/service of the organization identified?

Yes_____ No_____ If no, explain further:_____
_____

37. Were the processes in the life cycle of the product/service identified?

Yes_____ No_____ If no, explain further:_____
_____

38. Was a general flowchart of the product/service processes made? If so, check if it helped to serve any of the following purposes:

____ It helped to provide that all the processes had been identified.
____ It helped to determine that the team really understood the business processes associated with the product/service.
____ It served as a model for the subsequent definition of the information architecture.
____ It helped identify the processes involved in managing the supporting resources.
____ Other(s) Specify_____

(Please include a copy of the flowchart if possible when returning the questionnaire.)

39. Was a team member taking notes on the decisions and activities associated with each of the processes as they were defined by the group?

Yes_____ No_____ If no, explain further:_____
_____
_____
_____

40. Check if any of the resources described below are those which your business consumes or uses in meeting its goals:

____ Materials.
____ Money.
____ Facilities.
____ Personnel.
____ Other(s) Specify_____

41. Were the processes in the life cycle of each of the resources identified?

Yes_____ No_____ If no, explain further:_____
_____
_____
_____

42. The processes are usually identified from three sources: strategic planning and management control; major product/service; and supporting resources. Check if any were grouped along the following lines:

____ Reduced inconsistencies in source level.
____ Combined the processes where commonalties occurred.
____ Other(s) Specify_____

43. Was each process group and its processes listed on a chart and displayed for the whole team to view?

Yes_____ No_____ If no, explain further:_____

_____

_____

_____

44. Once the business processes are agreed upon and described, they can be related to the organizational structure of the business to help the study team identify any additional people that should be interviewed and to further clarify their understanding of the business processes. Did the study team complete a matrix before completing the process descriptions? If so, please complete the matrix in 'Appendix "A"' of this questionnaire, or send your own copy.

Yes_____ No_____ If no, explain further:_____

_____

_____

_____

45. Was the processes key to business success identified:

Yes_____ No_____ If no, explain further:_____

_____

_____

_____

46. Check if any of the output expected from defining the business processes consisted of:

____ A list of process groups and their processes.
____ A typed description of each of the processes.
____ A list of processes key to the success of the business or designated as such on the charts of process groups and processes.
____ Product/services flowchart.
____ Team understanding of how the whole business operates and is managed and controlled.
____ Other(s) Specify_____

47. If various divisions or parts of the company or the product/services are too diversified to have common processes, were they grouped before process identification was begun?

Yes_____ No_____ If no, explain further:_____

_____

_____

_____

48. Was outside assistance needed to fill any void that was not covered by the study team?

Yes_____ No_____ If no, explain further:_____

49. Were predefined checklists of processes used for the business being studied?

Yes_____ No_____ If no, explain further:_____

50. Was a model used that could be expanded to fit the business in identifying business processes?

Yes_____ No_____ If no, explain further:_____

51. Have the data classes been defined, and grouped into logically related categories?

Yes_____ No_____ If no, explain further:_____

52. If the data classes have been defined, and grouped into logically related categories, were they identified in the two approaches listed below? If so, check the following approach:

____ Business entity.
____ Business process.
____ Other(s) Specify_____

53. Business entities are simply things an organization or enterprise is concerned about and therefore keeps information about, such as customers, products, materials, personnel, etc. In order to identify the data classes related to those entities, was a matrix developed by the study team, similar to the example in 'Appendix "B"'? If so, please include a copy of the matrix when the questionnaire is returned. (See example in back of this questionnaire)

Yes_____ No_____ If no, explain further:_____

54. If the business process approach was used, was a series of input-process-output diagrams constructed, one for each of the 20 to 60 processes identified in the business process definition?

Yes_____ No_____ If no, explain further:_____

55. By cross-analyzing 'Appendix "B"' and the "input-process-output diagrams" and regrouping on the basis of commonalties or inconsistencies in level, it is possible to compile a manageable list of 30 to 60 data classes. In the event that this was done, did the study team place the data classes on a matrix opposite the business processes? If so, please complete the matrix in 'Appendix "C"' or send your own copy.

Yes_____ No_____ If no, explain further:_____

56. Did your corporation use the matrix as its main analysis tool to prepare the study team for discussion with executives, and determine requirements for information support?

Yes_____ No_____ If no, explain further:_____

57. In the event that the corporation used the matrix as its main analysis tool, did the matrices provide an overview of the current and planned data processing support of business?

Yes_____ No_____ If no, explain further:_____

58. In order to obtain a business-wide picture of existing and planned data processing support, did the study team opt to annotate the organization/ process matrix with current systems support? If so, please include a copy of the matrix as shown in 'Appendix "D"' of this questionnaire.

    Furthermore, in the event that this was done, check if the study was able to identify any of the following:

    ____ Processes receiving no current systems support.
    ____ Processes receiving systems support in some organizational units, but not all.
    ____ Possible redundant systems.
    ____ Other(s) Specify_____

59. In order to create the notations, the team assigns a number to each of the current systems, then posts this number to the appropriate intersection on the organization/process matrix (Appendix "A"). Therefore, prior to creating the notations, did the study team create a system/organization matrix (Appendix "E" in back of questionnaire) or a system/process matrix (Appendix "F"). If so, please complete 'Appendix "E"' and 'Appendix "F"' or send your own copies.

    Yes_____ No_____ If no, explain further:_____
    _____
    _____
    _____
    _____
    _____

60. The study team needs to understand what data is currently automated and where, that is, which systems utilize which portions of the data. Therefore, did the study team develop the system/data file matrix (Appendix "G") to provide this understanding? If so, please complete 'Appendix "G"' or send your own copy.

    Yes_____ No_____ If no, explain further:_____
    _____
    _____
    _____
    _____
    _____

61. Determining the executive perspective as part of the top-down approach. Check if the following output consisted of:

    ____ Notes from the interview.
    ____ An update of the control room charts.
    ____ A new or improved rapport between the executive and the BSP study team.
    ____ Other(s) Specify_____

62. The interviews are not intended to gather data on the specific details and exact form of the information required by the interviewees. Check if the study team was able to meet any of the following objectives of the interview:

____ Validated the data gathered, analyzed, and documented in matrices and charts.
____ Determined the information needed by individual executives as well as their problems and priorities.
____ Gained executive rapport and involvement.
____ Determined management values and quantified benefits that were derived by modifying or adding applications.
____ Other(s) Specify_____

63. Check if any of the following tasks were accomplished in order to conduct the interview:

____ Confirmed the list of executives to be interviewed that was developed during study preparations.
____ Reviewed the interview schedule to be certain it is practical, and confirmed it with the interviewees.
____ Organized wall charts in the control room.
____ Reviewed the questions that apply to all interviewees, and developed individualized questions for certain executives, as appropriate.
____ Determined the role of study team members for each interview and the characteristics of individual interviewees.
____ Conducted the interview itself.
____ Prepared a summary of each interview to be approved by the interviewee.
____ Other(s) Specify_____

64. During the BSP study preparation, did the team identify the executives that should be interviewed?

Yes_____ No_____ If no, explain further:_____
_____
_____
_____
_____

65. When the list of executives to be interviewed had been updated and confirmed, did the study team confirm the interview schedule?

Yes_____ No_____ If no, explain further:_____
_____
_____
_____
_____

66. Check if any of the following questions were asked while conducting the executive interview:

____ Briefly, what is your area of responsibility?
____ What are its basic objectives?
____ What are the three greatest problems you have met in achieving these objectives within the last year?
____ What has presented your solving them?
____ What value (in man-hours saved, dollars saved, or programs enhanced) would better information have in these areas?
____ In what other areas of your responsibility could the greatest improvements be realized, given the needed information support?
____ What would be the value of these improvements in man-hours saved, dollars saved, or programs enhanced?
____ How would you rate your information support with respect to adequacy, validity, timeliness, consistency, cost, and volume?
____ What is the most useful information you received?
____ How are you measured?
____ How do you measure your subordinates?
____ What other kinds of measurements are you expected to make.
____ What kinds of decisions are you expected to make?
____ What major changes are anticipated in your area in the next year? Three years?
____ What do you expect from this study? What does it mean to you and to the business?
____ Do you have any additional thoughts or comments?
____ Other(s) Specify_____

67. Check if any of the following roles were played by the team members while conducting the executive interview:

____ An individual to present the study objectives and approach to the interviewee.
____ The interviewer himself.
____ A backup interviewer was used to listen carefully to the proceedings to make sure that all questions were asked and that all answers were understood.
____ Someone to take notes during the interview and have them organized, typed, and presented to the interviewee afterwards for approval.
____ A supplementary note-taker if the situation required.
____ Other(s) Specify_____

68. Check if any of the following sequence of activities transpired after the interviewee arrived and had been introduced to the interview team?

____ The interviewee was walked through the wall charts by the interviewer and asked to validate the data on the charts.
____ The interviewee was seated so that he could see the wall charts during the interview.
____ All the general questions and specific questions previously formulated were asked.
____ Other(s) Specify_____

69. Did the study team keep current with the documentation of the interviews?

Yes_____ No_____ If no, explain further:_____

_____

_____

_____

70. Were the business problems divided between those which were information systems support problems and those which were non I/S problems?

Yes_____ No_____ If no, explain further:_____

_____

_____

_____

71. Check if any of the following were selected out of each set of interview notes (Please enclose a copy of your "Interview Analysis and Data Reduction Worksheet" as shown in Appendix "H" of this questionnaire):

____ Problems.
____ Solutions (if given).
____ Value Statements - tangible or intangible - if given.
____ Impacted processes.
____ Processes causing the problems.
____ Other(s) Specify_____

72. Using the interview notes and worksheets, did the team examine each line entry and establish whether it was in the category of: (a) I/S problems/ solutions and values (existing systems, (b) I/S needs and values (no system exists), and (c) Non I/S Problems?

Yes_____ No_____ If no, explain further:_____

_____

_____

_____

73. Did the study team group the interview data by the use of matrices? If so, please complete the matrix in Appendix "I", or enclose a copy of your own.

Yes_____ No_____ If no, explain further:_____

_____

_____

_____

74. Has the information architecture been defined?

Yes_____ No_____ If no, explain further:_____

_____

_____

_____

75. If the information architecture has been defined, was a diagram used to show the relationship of data to systems and the processes supported by each?

Yes_____ No_____ If no, explain further:_____

_____

_____

_____

76. In developing the information architecture, did the study team begin with the "process/data class matrix" where the process axis is in life cycle sequence based upon the key resource? If so, please complete Appendix "J", or enclose your own copy.

Yes_____ No_____ If no, explain further:_____

_____

_____

_____

77. Next, (a) did the study team arrange the data axis by taking all data classes created by the first process and grouping them to the left, or origin matrix? If so, (b) then did the team group all the data classes created by the second process next to those created by the first process and continue this grouping until all data classes were covered? So, if the above groups were completed, please fill in the matrix in Appendix "K", or enclose your own copy.

A. Yes_____ No_____ If no, explain further:_____

_____

_____

_____

B. Yes_____ No_____ If no, explain further:_____

_____

_____

_____

78. The data creation and use can be indicated by boxes and arrows, and the C's and U's may be eliminated and names applied to the major systems areas representing the completed information architecture. Therefore, did the team prepare a final rearrangement of axes and use of two-way arrows, allowing preparations of a simplified graphic architecture? If so, please enclose your own copy of the example in Appendix "L" of this questionnaire.

Yes_____ No_____ If no, explain further:_____

_____

_____

_____

79. Have all the subsystems been identified by the study team?

Yes_____ No_____ If no, explain further:_____

_____

_____

_____

80. If all the subsystems were identified by the study team, was a prerequisite analysis made to determine which subsystems must be in place before others can be created?

Yes_____ No_____ If no, explain further:_____

_____

_____

_____

81. Place a check mark if the information systems functions examined during the BSP study identified the following:

____ Changes made immediately to enhance success in the follow-on projects.
____ Changes that properly managed and implemented the high-priority information architecture projects.
____ Major activities that became projects in the follow-on to the BSP study.
____ Other(s) Specify_____

82. The team should select and recommend to management a portion of the information architecture to be implemented first. Check if any of the following tasks were performed in selecting first subsystems:

____ Determined the selection criteria and the documentation technique to be used.
____ Applied criteria to the subsystems.
____ Listed subsystems in priority sequence.
____ Listed dependencies or projects that were prerequisite to the first subsystems.
____ Documented or described the recommended subsystems.
____ Other(s) Specify_____

83. Check if any of the following major criteria in determining logical priorities was grouped by the study team in the four categories below:

A. POTENTIAL BENEFITS:

____ Tangibles.
____ Intangibles.
____ Return on investments.
____ Other(s) Specify_____

B. IMPACT:

____ Number of organizations and people affected.
____ Qualitative effect.
____ Effect on accomplishing overall objectives.
____ Other(s) Specify_____

C. SUCCESS:

____ Degree of business acceptance.
____ Probability of implementation.
____ Prerequisites.
____ Length of implementation.
____ Risk.
____ Resources available.
____ Other(s) Specify_____

D. DEMAND:

____ Value of existing systems.
____ Relationship with other systems.
____ Political overtones.
____ Need.
____ Other(s) Specify_____

84. Did the team analyze (for the categories above) the major systems comprising the architecture as potential first-subsystems candidates and ranked them on a scale of 1 to 10? If so, please enclose a copy of a "Subsystem Ranking" as shown in the example in Appendix "M" of this questionnaire.

Yes_____ No_____ If no, explain further:_____
_____
_____
_____

85. If the first system has been identified, did the team review the matrix that identified system prerequisites?

Yes_____ No_____ If no, explain further:_____
_____
_____
_____

86. Finally, did the study team further document the recommended first subsystem?

Yes_____ No_____ If no, explain further:_____
_____
_____
_____

87. Has the team established priorities for the development of the systems and data bases?

Yes_____ No_____ If no, explain further:_____
_____
_____
_____

88. Was the information systems management analysis made at the level of your information systems top management, and did it include only the planning and control aspects of the major I/S processes?

Yes_____ No_____ If no, explain further:_____
_____
_____
_____

89. Was it the purpose of your corporation's "Information Systems Management" to manage the I/S resources in the most efficient and effective way, for the support of business (as part of the Business Planning Study)?

Yes_____ No_____ If no, explain further:_____
_____
_____
_____

90. Check if any of the following were objectives of the information systems management module as it pertained to your corporation's Business Systems Planning study:

____ Studied the facts relating to "ISM" produced in other modules of the BSP study.
____ Understood the findings and conclusions on I/S support of the business in relation to ISM.
____ Further specified I/S objectives.
____ Ensured that the first subsystems selected would be supported by the current or planned ISM function.
____ Identified those ISM projects that had high priority and were follow-on.
____ Other(s) Specify_____

91. Check if any of the following actions in other study actions in other study modules were prerequisites to performing the ISM activities in the BSP study:

A. FROM STUDY PREPARATION:

____ I/S mission and objectives.
____ I/s plans and strategies.
____ I/S measurements.
____ I/S organization.
____ I/S budgets.
____ I/S trends (resources, expenses).
____ I/S inventory and location (equipment, software, systems, personnel).
____ Other(s) Specify_____

B. FROM DETERMINING BUSINESS REQUIREMENTS:

____ Description of business objectives.
____ I/S support problems (from executive interviews).
____ Major ISM problems/requirements (from DP Director's I/S review).
____ Other(s) Specify_____

C. FROM DETERMINING ARCHITECTURAL PRIORITIES:

____ New technologies and skills required to support the development of the first subsystem(s).
____ Other(s) Specify_____

92. Indicate by a check mark if any of the following activities were required in your ISM module:

____ I/S objectives.
____ Information architecture.

A. PROBLEM ANALYSIS:

____ I/S problems.
____ ISM problems.
____ Other(s) Specify_____

93. If any of the following I/S objectives were "modified", "added, or "defined", indicate by placing an "M", "A". or "D" in the appropriate space:

A. I/S PERSONNEL:

____ Organization.
____ Skill mix.
____ Other(s) Specify_____

B. I/S FINANCE:

____ Appropriations.
____ Expense budget.
____ User budget for I/S.
____ Other(s) Specify_____

C. USER:

____ Capability.
____ Responsibility:
____ Development.
____ Data Management.
____ Other(s) Specify_____

D. I/S FACILITIES:

____ Processing sites.
____ Equipment.
____ Software.
____ Communications network.
____ Other(s) Specify_____

E. ____ APPLICATIONS:

____ Other(s) Specify_____

F. ____ DATA:

____ Other(s) Specify_____

94. Does your corporation ensure that ISM supports architectural priorities?

Yes_____ No_____ If no, explain further:_____
_____
_____
_____

95. Were I/S support problems rearranged by type?

Yes_____ No_____ If no, explain further:_____
_____
_____
_____

96. Were ISM problems extracted from I/S review?

Yes_____ No_____ If no, explain further:_____
_____
_____
_____

97. Were all of the implied ISM changes consolidated?

Yes_____ No_____ If no, explain further:_____

_____

_____

_____

98. Check if the following list summarizes any of the outputs that resulted from the ISM portion of the BSP study:

A. FINDINGS AND CONCLUSIONS:

____ Major ISM problem analysis.
____ ISM problems deduced from the I/S support.
____ Other(s) Specify_____

B. ____ I/S OBJECTIVES:
____ Other(s) Specify_____

C. DEFINITION OF HIGH-PRIORITY ISM PROJECTS:

____ First systems support requirements.
____ Projects addressing major ISM problems.
____ Immediate actions recommended.
____ Other(s) Specify_____

D. ____ ACTION PLAN FOR FOLLOW-UP PROJECTS:

____ Other(s) Specify_____

99. Did your corporation develop recommendations and an action plan to assist management in its decisions regarding the recommended follow-up projects?

Yes_____ No_____ If no, explain further:_____

_____

_____

_____

100. Check if specific BSP study recommendations centered on any of the following areas:

A. INFORMATION ARCHITECTURE:

____ Detailing the subsystems of the information network.
____ Interim improvements to current systems.
____ Other(s) Specify_____

B. INFORMATION SYSTEMS MANAGEMENT INCLUDING:

____ Data management to control the data resource of the organization.
____ Information systems planning process to ensure that the information architecture remains responsive to changing conditions.
____ Measurement and control to provide a system of procedures, controls and structure for future implementations.
____ Other(s) Specify_____

C. ____ ARCHITECTURE PRIORITIES - DEVELOPMENT OF THE FIRST SYSTEM TO BE IMPLEMENTED:

____ Other(s) Specify_____

101. Check if the action plan included any of the following:

____ Scope of the project.
____ Deliverables.
____ Schedule
____ Potential benefits.
____ People and skills.
____ Tools and techniques.
____ Training.
____ Communications.
____ Logistics.
____ Controls.
____ Other(s) Specify_____

102. Indicate by a check mark if the final report included the following:

____ An executive summary.
____ Supporting detail in the appendices, such as descriptions of the business processes.
____ The extraction of highly confidential or sensitive material, and still leaving the balance of the report to be used by all people participating in the follow-on activities.
____ Other(s) Specify_____

103. Check if the following activities were performed in preparing the study report and executive presentation:

____ Report outline was prepared.
____ Report was written.
____ Executive presentation medium was determined.
____ Executive presentation was prepared and delivered.
____ Other(s) Specify_____

104. During the initial steps of preparing for the study and developing a work plan for conducting the study, did the team prepare a preliminary report outline?

Yes_____ No_____ If no, explain further:_____

105. Was the primary writing responsibility for each of the sections of the report assigned during the study preparation?

Yes_____ No_____ If no, explain further:_____

106. Did the study team consult with the executive sponsor early in the study to obtain his advise on how to present the report?

Yes_____ No_____ If no, explain further:_____

107. Check if the presentation took on the form of any of the following subjects:

A. INTRODUCTION:

____ Background and overview.
____ Objectives.
____ Scope
____ Study team.
____ Other(s) Specify_____

B. STUDY APPROACH:

____ Business and I/S review.
____ Business processes.
____ Business/Information systems relationships
____ Other(s) Specify_____

C. ____ Major problems identified.
____ Other(s) Specify_____

D. CONCLUSIONS AND RECOMMENDATIONS:

____ Information architecture and priorities.
____ I/S management requirements.
____ Other(s) Specify_____

E. ACTION PLAN FOR FOLLOW-ON PROJECT ACTIVITIES:

____ Description(s).
____ Deliverables.
____ Resource Requirements.
____ Schedules.
____ Other(s) Specify_____

108. How long did it take your corporation to conduct the BSP study?

____ 0 - 2 months.
____ 2 months.
____ 6 months.
____ One year.
____ 18 months.
____ Two years.
____ Longer than two years. Specify_____

In addition, is there a permanent on-going BSP study group?

Yes_____ No_____ If no, explain further:_____
_____
_____
_____

109. After the BSP study ended, check if your organization was able to conduct the following follow-on activities:

____ Related the follow-on activities to the BSP study.
____ Showed how to capitalize on the results of the BSP study.
____ Further explained the major follow-on projects.
____ Other(s) Specify_____

110. Was at least one person on the BSP study team chosen from the data processing function, with the idea that he would remain for the follow on activities?

Yes_____ No_____ If no, explain further:_____
_____
_____
_____

111. In preparing for the follow-on activities, check if any of the following activities were conducted:

____ ISM functions were changed or added to provide a controlled environment for the development and implementation of the information architecture identified in the BSP study.
____ A detailed information systems plan was developed that reflected the planned changes.
____ The information architecture was further defined and data bases identified.
____ A first system was chosen for development and implementation.
____ Other(s) Specify_____

112. Check if any of the following were topics for project team orientation:

____ Introduction by the sponsor.
____ Objectives of the orientation.
____ Information systems concepts and perspectives.
____ Data base concepts.
____ Overview of BSP study methodology.

A. DETAILED DISCUSSION OF THE BSP STUDY:

____ Business environment.
____ Objectives.
____ Major processes identified.
____ Major problems.
____ Current I/S support for the business.
____ Interviews.
____ Information structure.
____ Major findings and conclusions.
____ Recommendations.
____ Other(s) Specify_____

B. INTRODUCTION TO FOLLOW-ON ACTIVITIES:

____ Relation to the BSP study.
____ Relation to the BSP study deliverables.
____ Other(s) Specify_____

____ Discussions of deliverables from follow-on activities.
____ Explanation of follow-on projects.
____ Introduction of tools and techniques.

C. INTRODUCTION OF PREPARATION ACTIVITIES:

____ Activities already performed.
____ Activities to be performed by team members.
____ Other(s) Specify_____

____ Interviewing strategies and selection of interviewees.
____ Use of matrices.
____ Pilots of forms, tools, techniques and interviews.
____ Introduction to "Hipo" (Hierarchy Plus Input-Process-Output) and its use in the follow-on projects.
____ Assignment of responsibilities.
____ Development of task descriptions by team members.
____ Explanation of project control systems.
____ Other(s) Specify_____

113. Continual emphasis on ISM is very important. Check if any of the following activities are projected goals of your corporation:

____ Development of the information architecture over a period of years.
____ Changes to business strategies and plans as well as I/S technology continued during the development of the information architecture.
____ The processes of managing I/S are being refined and changed continuously to properly plan, measure, and control required I/S resources.
____ Continual I/S planning following the BSP study to fully capitalize on the results.
____ Other(s) Specify_____

114. Putting ISM in perspective, check if any of the following recommendations included:

____ Emphasis information systems planning and control and on data administration.
____ Close-in projects, such as the establishment of a steering committee and refinements to project control.
____ Capacity planning, to examine the data processing capacity and determine whether changes are required to accommodate the architectural priorities, or solve some of the I/S support problems.
____ The major project(s) of ISM, in establishing an action plan to move to distributed data processing.
____ Other(s) Specify_____

115. In addition to the activities that have been discussed for performing a BSP study in the I/S function, were the following also performed? Check if any:

A. DEFINING ISM PROCESSES:

____ Programs and systems.
____ Functional modules.
____ Data Bases.
____ Hardware/software/communication facilities.
____ User facilities (terminals, languages, data bases, etc.).
____ Physical facilities.
____ Finance.
____ People.
____ Other(s) Specify_____

____ Analyzing relationships of organization, processes, information systems, and data.
____ Interviewing.
____ Other(s) Specify_____

116. In addition to the activities that have been included in the information architecture project, were the following also included? Check if any:

____ Examination of current data processing systems to determine how they can evolve into the new systems architecture.
____ Establishment of a continuing link between the architecture and the business plan to ensure that the I/S plan will be based upon a viable information architecture.
____ Documentation of alternative architectures that were tried or investigated and rejected, with the reasons for rejection.
____ Evaluation of the technical implications of the information architecture, including control systems, DB/DC requirements, and potential distribution of both information and systems.
____ Other(s) Specify_____

117. Using the information architecture defined in the BSP study, was a description of each subsystem prepared?

Yes_____ No_____ If no, explain further:_____
_____
_____
_____

118. For data processing systems currently in use or under development, was a careful examination conducted to determine how each one relates to the subsystems described in the information architecture?

Yes_____ No_____ If no, explain further:_____
_____
_____
_____

119. Were related data classes logically grouped to yield a set of data bases that supported the architecture implementation?

Yes_____ No_____ If no, explain further:_____
_____
_____
_____

120. Was a process/data matrix for each location prepared with additional parameters on the axis to include data use, security, auditability, date occurrence, activity volumes, response required, and criticality? If so, please complete the matrix in Appendix "N", or enclose your own copy.

Yes_____ No_____ If no, explain further:_____
_____
_____
_____

121. The first development and implementation must support the business processes. Check if any of the following were developed and implemented first:

____ Fit properly into and interfaced with other systems of the overall architecture described in the BSP study.
____ Provided for proper implementation of the appropriate data base(s).
____ Other(s) Specify_____

122. Was the "data dictionary" used as a tool to support the Business Systems Planning (BSP) studies in your organization?

Yes_____ No_____ If no, explain further:_____

123. Prior to the preparation phase of the BSP study, was the dictionary ready with the BSP data model (BSP subject categories, relationships and attributes) installed and necessary report programs written, debugged and installed in the dictionary?

Yes_____ No_____ If no, explain further:_____

124. Did the use of the "data dictionary" improve the quality of the BSP study and/or reduce the duration of the study by allowing the study team to concentrate on the analysis of problems?

Yes_____ No_____ If no, explain further:_____

125. Did the dictionary help to maintain the consistency of analysis data and reduce possible redundancy and errors?

Yes_____ No_____ If no, explain further:_____

126. Was the BSP data base able to identify implementable systems, support the system design and data modeling activities and generate test plans to help ensure that the systems that were developed satisfied the requirements (in association with the data dictionary)?

Yes_____ No_____ If no, explain further:_____

127. As the business situations and associated information requirements changed, was the data base able to be updated with only the incremental changes (in association with the data dictionary)?

Yes_____ No_____ If no, explain further:_____

_____

_____

_____

128. Check if the data dictionary was able to meet any of the following minimum requirements:

____ A facility for describing various information-related enterprise phenomena, such as relationships between organizational units, business functions and information being created and used; and storing them in a data base in a computer processible form.
____ A facility for adding, deleting and changing such descriptive data in the data base.
____ A facility for inquiry and analysis of study data in the data bases.
____ Other(s) Specify_____

129. Check if the data dictionary was able to offer any of the following capabilities:

____ Supported an integrated approach to data resources management.
____ Supported the activities in the entire spectrum from the BSP study.
____ Supported data base administration.
____ Supported development.
____ Supported maintenance.
____ Other(s) Specify_____

130. Check if any of the following facilities of the dictionary were used as a tool to support the BSP study's:

____ Extensibility facility.
____ Program access facility.
____ Other(s) Specify_____

131. The extensibility facility allows the creation of new subject categories. Check if any of the following BSP data was defined through the creation of the new subject categories:

____ Organizational units.
____ Business functions.
____ Data classes being created and used.
____ Current I/S support.
____ Informational problems being experienced.
____ Other(s) Specify_____

132. (A) Was the program access facility (PAF) able to gain access to the BSP data in computer processible forms? (B) If so, were programs written to manipulate data, produce reports in the desired format (as described in Question #82) of the "Process/data" matrix, and identify the information architecture?

A. Yes_____ No_____ If no, explain further:_____

_____

_____

_____

B. Yes_____ No_____ If no, explain further:_____

_____

_____

_____

133. (A) Was the BSP data identified and defined in terms of the dictionary subject categories, attributes *and* relationships? (B) If so, was a BSP data model developed as a "starter" model to encourage each study team to add, delete or modify certain subject categories, relationships and attributes to best reflect their purpose and emphasis of the study?

A. Yes_____ No_____ If no, explain further:_____

_____

_____

_____

B. Yes_____ No_____ If no, explain further:_____

_____

_____

_____

134. Please refer to the example of a BSP data model in Appendix "O". Check if any of the following subject categories were included in your BSP data model:

____ Objective.
____ Organization.
____ Process.
____ Data class.
____ Problem.
____ Solution.
____ Computer system.
____ Major systems area.
____ Data file.
____ Memo.
____ Other(s) Specify_____

(PLEASE INCLUDE A COPY OF YOUR BSP DATA MODEL)

135. The objective subject category is used to describe the goals and objectives of the business and its organizational units. Were the goals and objectives documented and related to the organizational units and the business processes?

Yes_____ No_____ If no, explain further:_____
_____
_____
_____

136. The organization subject category is used to describe the various organizational units of the business. Was the "organization/ process" matrix (Appendix "A") generated from this category? (See Question #55 for further information)

Yes_____ No_____ If no, explain further:_____
_____
_____
_____

137. The process category describes the business processes discussed in Questions 42 to 61. Was the "system/process" matrix (Appendix "F") generated from this category? (See Questions #64 and #82 for further information)

Yes_____ No_____ If no, explain further:_____
_____
_____
_____

138. The data class subject category describes those data classes identified by the activities discussed in Questions 62 to 66. Was this category very helpful in data modeling activities?

Yes_____ No_____ If no, explain further:_____
_____
_____
_____

139. The problem category describes the problems being discovered in the course of the interviews. Were these problems informational in nature?

Yes_____ No_____ If no, explain further:_____
_____
_____
_____

140. The solutions subject category describes all the possible solutions for the problems. Were the solutions as informal as the interviewee's opinions and suggestions or formal proposals made by the BSP study team?

Yes_____ No_____ If no, explain further:_____

141. The systems category is used to describe the computer systems for the automated support of the business processes. Did this category help to generate the "organization/process" matrix in Appendix "D"? (See Question #68 for further information).

Yes_____ No_____ If no, explain further:_____

142. The major systems area subject category describes the major systems areas of the "information architecture". Please send a copy of "information architecture" matrix as discussed in Question #82.

143. The datafile category describes the "containers" of data. Check if any of the following "containers" of data pertain to your datafile category:

____ Automated as data bases.
____ Manually maintained file drawers.
____ Various documents.
____ Other(s) Specify_____

144. The memo category is used as notes or reminders for the BSP study team members. Did the memo category allow flexibility in recording such things as "impressions" formed by the interviewers or problems, or potential problems, though not explicitly stated?

Yes_____ No_____ If no, explain further:_____

145. Was the installation of the BSP data model in the dictionary performed by a data base administrator (DBA), or a systems programmer with a working knowledge of the dictionary?

Yes_____ No_____ If no, explain further:_____

146. Having decided on the BSP data model, in terms of the subject categories, their attributes and relationships, was the BSP model defined to the dictionary using the extensibility facility?

Yes_____ No_____ If no, explain further:_____

_____

_____

_____

147. Was the BSP data that is stored in the dictionary data base retrieved, analyzed, manipulated and presented in forms most convenient for the BSP study team members?

Yes_____ No_____ If no, explain further:_____

_____

_____

_____

148. Indicate by a check mark if any of the following outputs were used by the BSP study team members:

____ Descriptive reports.
____ Analysis reports.
____ Ad hoc query output (for the case at hand apart from other applications).
____ Other(s) Specify_____

149. Indicate by a check mark if any of the following reports were used by the BSP study team members:

A. DESCRIPTIVE REPORTS:

____ Process vs. Data Class Matrix Report (Process vs. Data class (See Appendix "C" and Question #66)).
____ Data class vs. Data File Matrix Report (Data class vs. Datafile).
____ Organization vs. Process Matrix Report (Orgnzin. vs. Process (See Appendix "D" and Question #68)).
____ Organization vs. Data Class Matrix Report (Orgnzin. vs. Data class)
____ Problem vs. Data Class Matrix Report (Problem vs. Data class).
____ System vs. Organization Matrix Report (Systems vs. Organization (See Appendix "E" and Question #6A)).
____ System vs. Process Matrix Report (Systems vs. Process (See Appendix "F" and Question #6A)).
____ System vs. Data File Matrix Report (Systems vs. Datafile (See Appendix "G" and Question #69)).
____ List of problems (problem) and associated organizations (Orgnzin.), processes (process), data classes (dataclass), systems (systems) and solutions (solutions). See Appendix "H" and Question #77.
____ List of memos associated with certain subject categories.
____ Other(s) Specify_____

B. ANALYSIS REPORTS:

____ Data flow analysis report.
____ Information architecture report.
____ Problem vs. Process Matrix (Problem vs. Process), showing the number of times the problems were stated (See Appendix "G" and Question #79).
____ Other(s) Specify_____

150. Having established a BSP data base with the initial BSP study, was it updated with follow-on "mini" studies when appropriate, and run with "program access facility" (PAF) programs to obtain various reports for analysis and planning purposes?

Yes_____ No_____ If no, explain further:_____
_____
_____
_____

151. Due to the explosive growth in computer technology, the computer age is also creating a new menace: A vastly expanded potential for computer crime and the inadvertent destruction of data files. Has your corporation, in their long-range I/S (BSP) plan, developed a facilities plan to incorporate EDP (electronic data processing) accounting control procedures into the system to prevent access by unauthorized individuals? (See Question #121 and Appendix "N" for further information).

Yes_____ No_____ If no, explain further:_____
_____
_____
_____

152. Indicate by a check mark if any of the following general controls are incorporated in your distributed system:

____ The plan of organization and operation of the EDP activity.
____ Procedures for documenting, reviewing, testing, and approving systems or programs and changes thereto.
____ Controls built into the equipment by the manufacturer (hardware controls).
____ Controls over access to equipment and data files.
____ Other(s) Specify_____

153. Indicate by a check mark if any of the following application controls have been incorporated into your distributed system:

____ Input controls.
____ Processing controls.
____ Output controls.
____ Other(s) Specify_____

154. Input controls include controls that relate to rejection, correction, and resubmission of data that was initially incorrect. Check if any of the following input controls were designed to provide reasonable assurance that:

____ Data received for processing by EDP had been properly authorized, converted into machine sensible form and identified.
____ Data (including data transmitted over communication lines) had not been lost, suppressed, added, duplicated, or otherwise improperly changed.
____ Other(s) Specify_____

155. Check if any of the following processing controls designed for your distributed system provided reasonable assurance that:

____ Electronic data processing had been performed as intended for the particular application.
____ All transactions were processed as authorized.
____ No authorized transactions were omitted.
____ No unauthorized transactions were added.
____ Other(s) Specify_____

156. Were the output controls designed to assure the accuracy of the processing result (such as account listings or displays, reports, magnetic files, invoices, or disbursement checks) and to assure that only authorized personnel received the output?

Yes_____ No_____ If no, explain further:_____
_____
_____
_____

157. The rapidly increasing move by business to distributed processing -- where computing power is scattered throughout an organization -- compounds the problem of having remote access to the computer. Has your corporation set up sophisticated computer security controls to offset the threat of on-line data bases by remote access terminals?

Yes_____ No_____ If no, explain further:_____
_____
_____
_____

158. If the answer to Question #157 was "yes", check any of the following techniques that your company may have used to achieve computer security:

____ Risk analysis: Studies a computer system to assess the magnitude and risk of computer fraud. Estimates cost of security measures that will close computer loopholes.
____ Security software: Restricts computer users -- individually identified by passwords and codes -- to only those files and computer functions for which they are authorized. Keeps a record of who accessed the computer and when.
____ Audit software: Allows auditors not trained in data processing to use the computer to produce sophisticated audit reports by entering simple instruction codes into the computer.
____ Encryption: Hardware or software that encrypts or scrambles data during transmission from one computer or terminal to another. Only a computer with a matching device can decipher the incoming message.
____ Emergency recovery: Backup computer facilities that can be leased in case a catastrophic event cripples a company's own computer operations.
____ Other(s) Specify_____

159. One major limitation of access-control software, however, is that it does not protect a company against the most troublesome of computer frauds, those that are committed by employees while they perform their assigned tasks. Are programmers in your company denied all access to files and programs that they have written once the software is put into operation?

Yes_____ No_____ If no, explain further:_____
_____
_____
_____

160. Even honest programmers often write programs that expose a company to fraud. Do all of your programmers have audit controls that allow the computer to isolate frauds automatically?

Yes_____ No_____ If no, explain further:_____
_____
_____
_____

161. A recent survey of major companies has disclosed that they lack well trained EDP auditors to plug up employee fraud, because, auditors failed to keep pace with computer technology, thus being considered ineffective in making a strong case for computer controls. Do the internal auditors in your corporation possess the skills that are needed to set up computer controls and conduct computer audits?

Yes_____ No_____ If no, explain further:_____

_____

_____

_____

162. Internal auditors often start an investigation on the hunch that something is wrong. However, when it comes to computer operations, they usually don't have the expertise to dig deeper without audit software. If your corporation is in such a precarious condition, have steps been taken to acquire audit software packages that will allow the internal auditors to try to audit through the computer, not around it?

Yes_____ No_____ If no, explain further:_____

_____

_____

_____

163. If internal auditors do not get up to speed with computer technology, they will be of no value to their firms by the end of the 1980s. The day of the manual auditor is gone. In view of the above statements, check if any of the following internal control steps are currently being performed by your internal audit staff:

____ The internal auditor's review of a firm's system of accounting control encompassed all significant and relevant manual, mechanical, and EDP activities and the interrelationship between EDP and user departments.

____ The preliminary phase of an auditor's review was designed to provide an understanding of the flow of transactions through the accounting system, the extent to which EDP is used in each significant accounting application, and the basic structure of accounting control.

____ After completion of the preliminary phase, the internal auditor was in a position to assess the significance of accounting control within EDP in relation to the entire system of accounting control and therefore to determine the extent of his review of EDP accounting control.

____ The internal auditor conducted the "tests of compliance" to provide reasonable assurance that the necessary procedures were performed, how they were performed, and by whom they were performed.

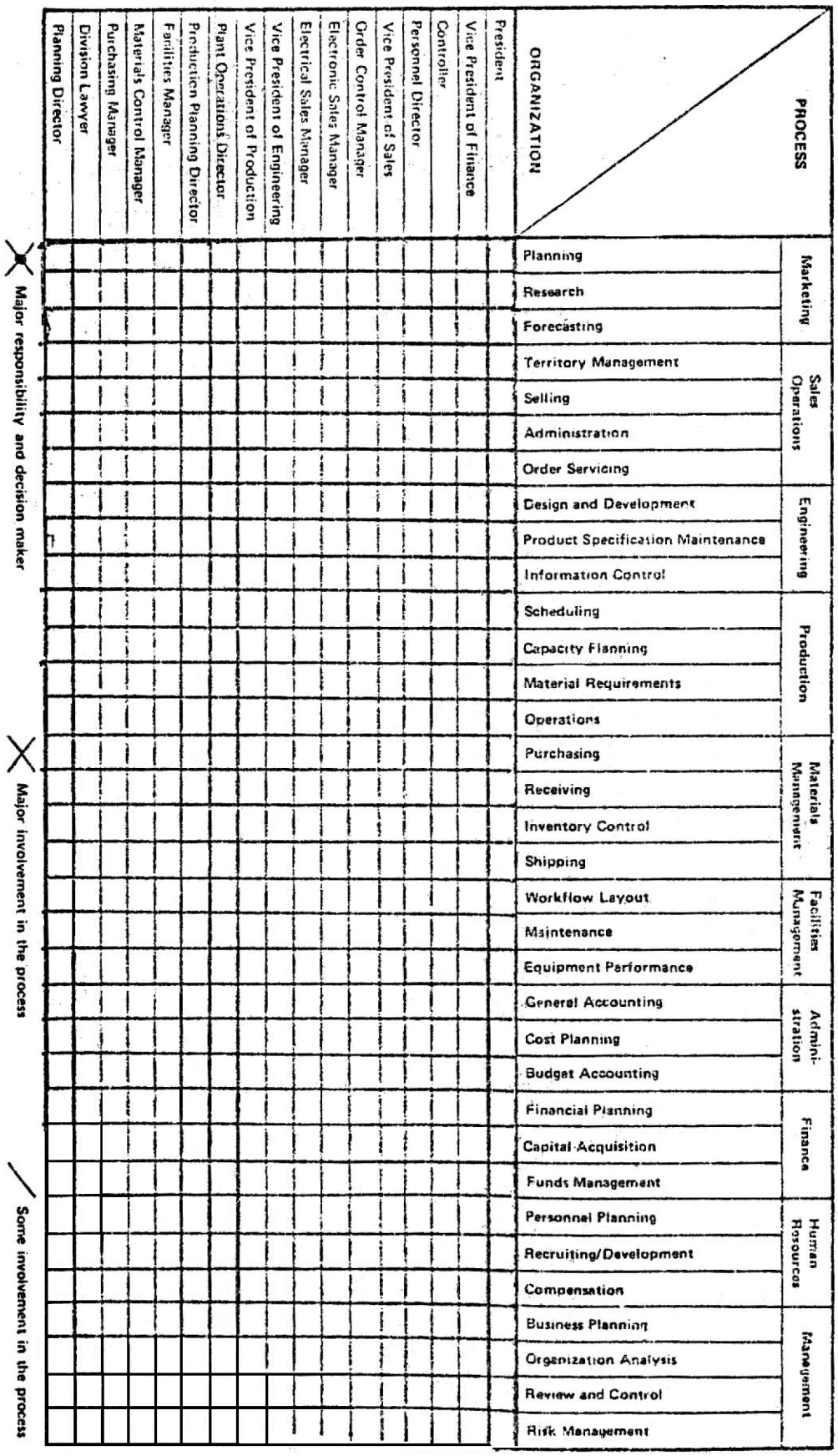
____ Other(s) Specify_____

164. If its not confidential, please include the total number of personnel that are in your information systems department; and a breakdown of expenditures between software and hardware resources. However, if it is confidential, please send a copy of your annual report.

165. Finally, please include a complete address list of all corporations of which you might have knowledge of, that have or are currently implementing the "Business Systems Planning" concept. Thank you.

* NOTE: All names and addresses were obtained from the Guide International Corporation Conference Manual [9,10,11].

APPENDIX A
ORGANIZATION/PROCESS MATRIX



Organization/process matrix

APPENDIX B
DATA CLASS/BUSINESS ENTITY MATRIX

BUSINESS ENTITIES / DATA CLASS TYPES	Product	Customer	Facilities	Material	Vendor	Cash	Personnel
Plans/ Models	Product plans	Sales territory	Facility plans	Material requirements		Budget	Personnel plans
		Market plans	Capacity plans	Production schedule			
Statistical/ Summary	Product demand	Sales history	Work in process	Open requirements	Vendor performance	Financial statistics	Productivity
			Equipment utilization				Benefit history
Inventory	Product	Customer	Facilities	Raw Material	Vendor	Financial	Employee
	Finished goods		Machine load	Cost		General ledger accounting	Payroll
	Parts master		Routings	Bills of material			Skills
Transaction	Order	Shipment		Purchase order	Material receipt	Recipts Payments	

Data class/business entity matrix

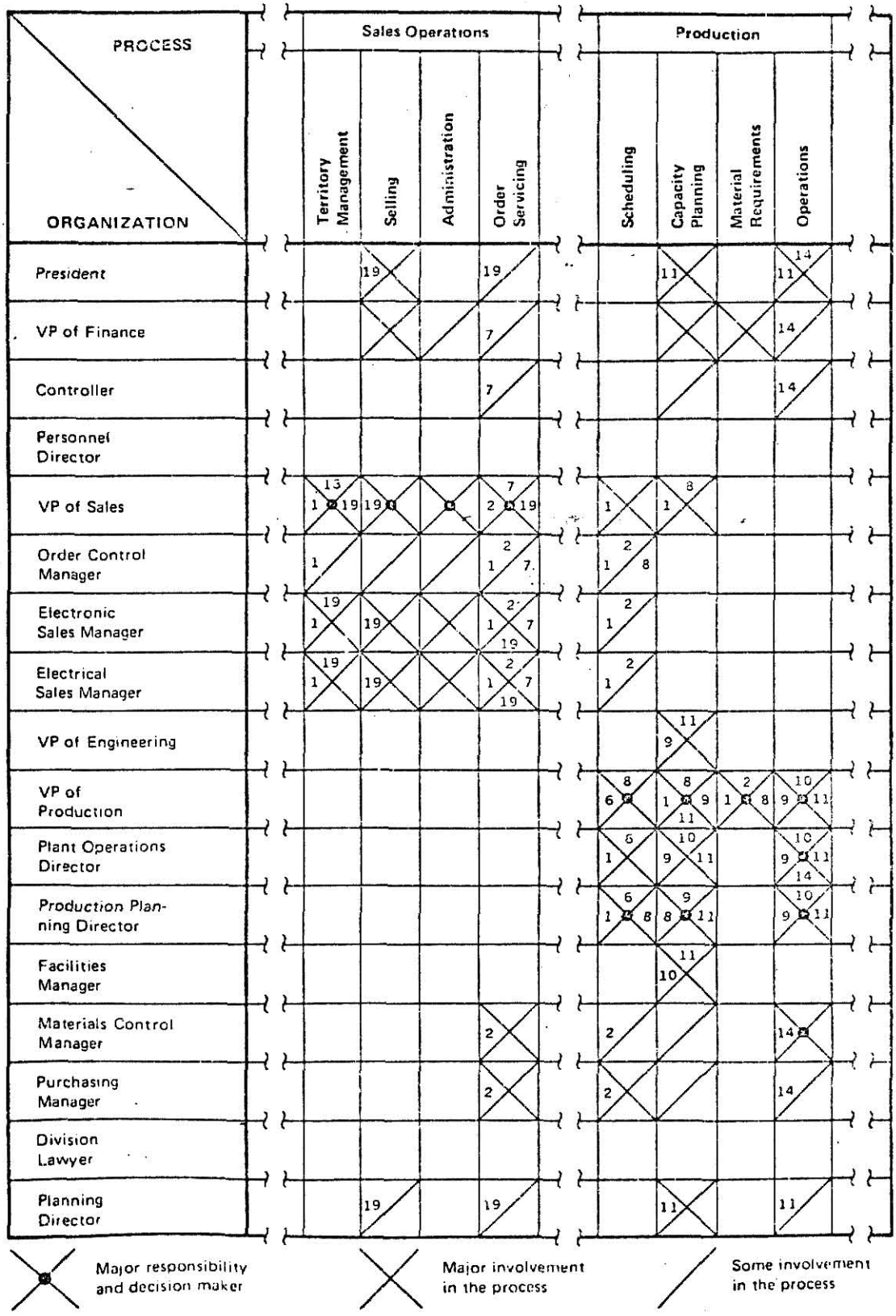
APPENDIX C
DATA CLASS BY PROCESS

PROCESS \ DATA CLASS	Customer	Order	Vendor	Product	Routings	Bill of material	Cost	Parts master	Raw material inventory	Fin. goods inventory	Employee	Sales territory	Financial	Planning	Work in process	Facilities	Open requirements	Machine load
Business planning																		
Organization analysis																		
Review and control																		
Financial planning																		
Capital acquisition																		
Research																		
Forecasting																		
Design and development																		
Product specification maintenance																		
Purchasing																		
Receiving																		
Inventory control																		
Workflow layout																		
Scheduling																		
Capacity planning																		
Material requirements																		
Operations																		
Territory management																		
Selling																		
Sales Administration																		
Order servicing																		
Shipping																		
General accounting																		
Cost planning																		
Budget accounting																		
Personnel planning																		
Recruiting/development																		
Compensation																		

Data class by process, showing data creation and usage

C-Creation/U-Usage

APPENDIX D
ORGANIZATION/PROCESS MATRIX, WITH CURRENT SYSTEMS SUPPORT



Organization/process matrix, with current systems support shown

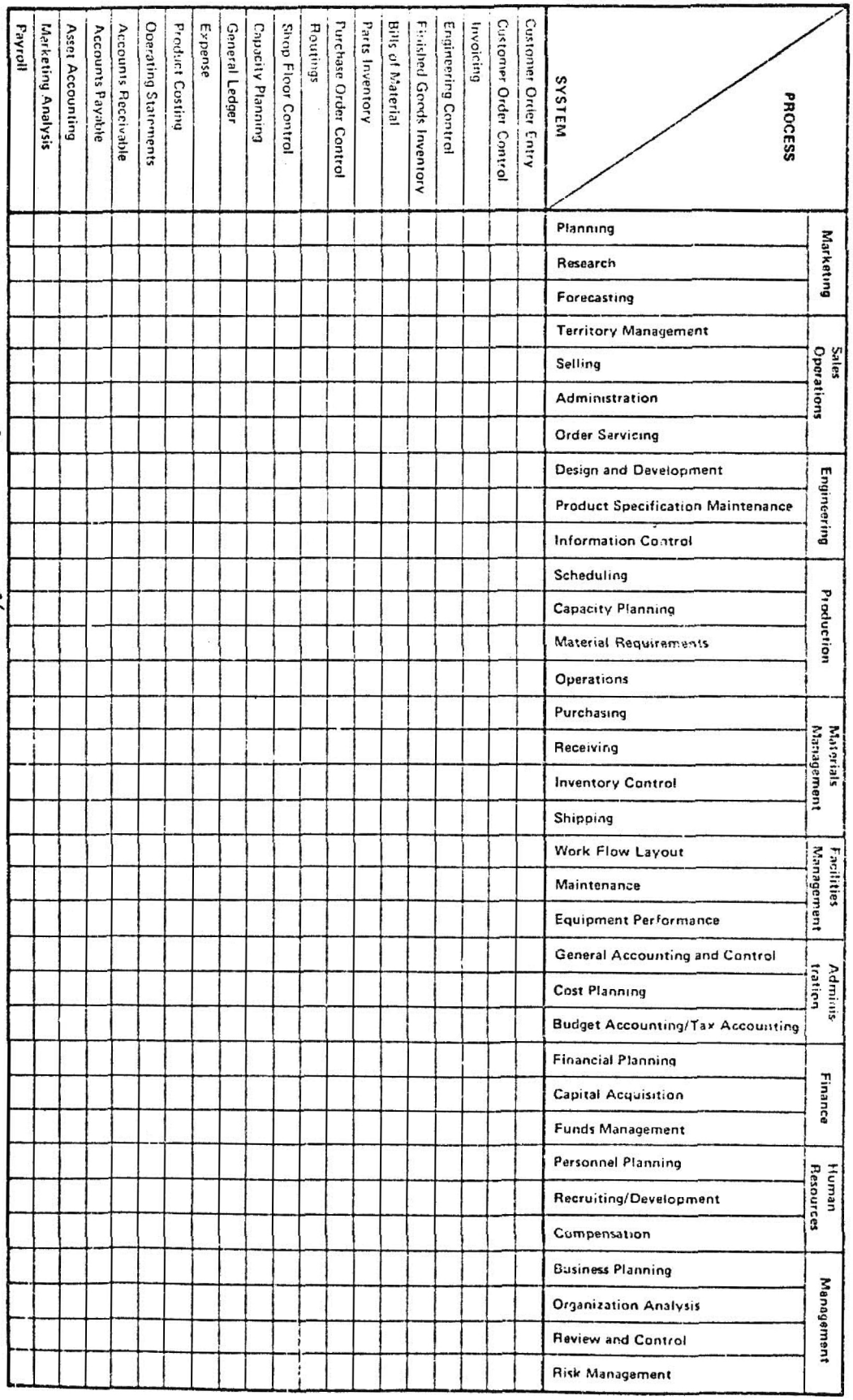
APPENDIX E
SYSTEM/ORGANIZATION MATRIX

ORGANIZATION / SYSTEM	President	Vice President of Finance	Controller	Personnel Director	Vice President of Sales	Order Control Manager	Electronic Sales Manager	Electrical Sales Manager	Vice President of Engineering	Vice President of Production	Plant Operations Director	Production Planning Director	Facilities Manager	Materials Control Manager	Purchasing Manager	Division Lawyer	Planning Director
Customer Order Entry																	
Customer Order Control																	
Invoicing																	
Engineering Control																	
Finished Goods Inventory																	
Bills of Material																	
Parts Inventory																	
Purchase Order Control																	
Routings																	
Shop Floor Control																	
Capacity Planning																	
General Ledger																	
Expense																	
Product Costing																	
Operating Statements																	
Accounts Receivable																	
Accounts Payable																	
Asset Accounting																	
Marketing Analysis																	
Payroll																	

C Current P Planned C/P Current and Planned

System/organization matrix

APPENDIX F
SYSTEM/PROCESS MATRIX



System/process matrix

APPENDIX G
SYSTEM/DATA FILE MATRIX

SYSTEM \ DATA FILE	Customer	Order	Vendor	Product	Routings	Bills of Material	Cost	Parts Master	Raw Material Inventory	Finished Goods Inventory	Employee	Sales Territory	Financial	Planning	Work in Process	Facilities	Open Requirements	Machine Load
Customer Order Entry																		
Customer Order Control																		
Invoicing																		
Engineering Control																		
Finished Goods Inventory																		
Bills of Material																		
Parts Inventory																		
Purchase Order Control																		
Routings																		
Shop Floor Control																		
Capacity Planning																		
General Ledger																		
Expense																		
Product Costing																		
Operating Statements																		
Accounts Receivable																		
Accounts Payable																		
Asset Accounting																		
Marketing Analysis																		
Payroll																		

System/data file matrix

Indicate by placing an "X" in box.

APPENDIX H
INTERVIEW ANALYSIS/DATA REDUCTION WORKSHEET

Interviewee: _____

Team Member: _____

Major Problem	Problem Solution	Value Statement	Information System Needs	Process/Group Impacted	Process/Group Causing
Lack of effective production planning impairs profitability	Mechanized production planning	Improve profit; improve customer relations; improve service of supply	Production planning	Production	Production
Increasing accountability of board of directors; demand for financial and management auditing	Better information	Increase value from outside directors	Cost system	Finance	Finance
Lack of "what if" capability on cost sheets	Mechanized online cost sheet capability	Improve profit; better customer relations	Cost system	Finance	Administration
Inability to look at enough alternatives in business planning	Financial modeling ("what if" capability)	Raise profit; curtail losses; improve growth	Planning simulation	Finance/management	Management
Lack of ability to identify and promote qualified people	Better information on personnel resources	Retain good people; improve morale	Skills inventory system	Human Resources	Human Resources
Lack of expertise in marketing impairs growth and profits	More marketing awareness and more people with marketing expertise	Satisfy customers		Marketing	Human Resources
Loss of ability to effectively transfer people; low productivity. Long training	Description of work to be done in each area	Manage people properly; improve quality of work; increase productivity	Order status	Human Resources	Sales Operations
Poor customer relations; loss of profit; excessive inventory	Better sales analysis and productive planning; better buyer reports	Improve customer relations	Order status	Marketing	Sales Operations
Poor customer relations; loss of profit; excessive inventory	Better sales analysis and productive planning; better buyer reports	Improve customer relations	Production planning	Marketing	Production
Poor customer relations; loss of profit; excessive inventory	Better sales analysis and productive planning; better buyer reports	Improve customer relations	Sales analysis	Marketing	Marketing
Smaller, more frequent orders; lead times too critical; higher cost of handling orders	Order trend analysis/costs	Control cost better	Territory analysis	Sales Operations	Sales Operations

Interview analysis and data reduction worksheet

APPENDIX I
PROBLEM/PROCESS MATRIX

PROCESS GROUP / PROBLEM	Marketing	Sales operations	Engineering	Production	Materials management	Facilities	Administration	Finance	Human resources	Management
Market/Customer Selectivity										
Quality of Forecasting										
Order Entry Log										
Product Line Profitability										
Market Share Deterioration										
Product Development Support										
External Reporting Requirements										
Control of Orders										
Facility Planning										
Inventory Level Consistency										
Purchasing Control										
Control of Production Costs										
Labor and Machine Utilization										
Plant Performance Measurements										
Shop Manpower Utilization										
Asset Performance										
Variance Analysis										
Working Capital Management										
Manpower Development										
Job Descriptions										
Total										

Problem/process matrix, showing the number of times the problems were stated

Indicate numerically, the number of times the problems were stated, and total.

APPENDIX J
DATA CLASS BY PROCESS SHOWING DATA CREATION AND USAGE

PROCESS \ DATA CLASS	Customer	Order	Vendor	Product	Routings	Bill of material	Cost	Parts master	Raw material inventory	Fin. goods inventory	Employee	Sales territory	Financial	Planning	Work in process	Facilities	Open requirements	Machine load
Business planning																		
Organization analysis																		
Review and control																		
Financial planning																		
Capital acquisition				C			C				C							
Research																		
Forecasting																		
Design and development																		
Product specification maintenance																		
Purchasing																		
Receiving																		
Inventory control																		
Workflow layout																		
Scheduling																		
Capacity planning																		
Material requirements																		
Operations																		
Territory management																		
Selling																		
Sales Administration																		
Order servicing																		
Shipping																		
General accounting																		
Cost planning																		
Budget accounting																		
Personnel planning																		
Recruiting/development																		
Compensation																		

Data class by process, showing data creation and usage

C-Creation/U-Usage

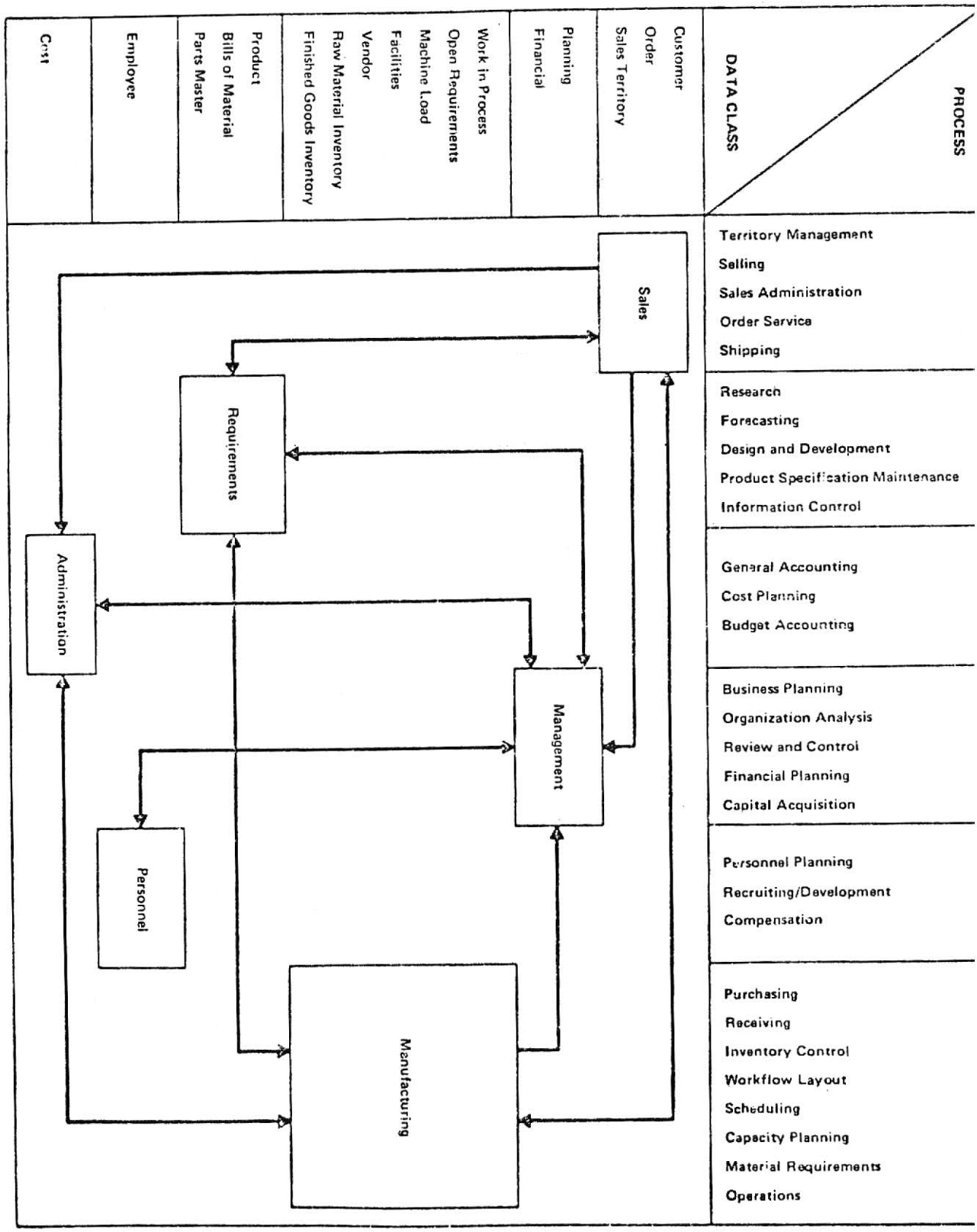
APPENDIX K
DATA CLASSES ARRANGED BY CREATING PROCESS

PROCESS \ DATA CLASS	Planning	Financial	Product	Parts master	Bill of material	Vendor	Raw material inventory	Fin. goods inventory	Facilities	Work in process	Machine load	Open requirements	Routings	Customer	Sales territory	Order	Cost	Employee
Business planning																		
Organization analysis																		
Review and control																		
Financial planning																		
Capital acquisition																		
Research																		
Forecasting																		
Design and development																		
Product specification maintenance																		
Purchasing																		
Receiving																		
Inventory control																		
Workflow layout																		
Scheduling																		
Capacity planning																		
Material requirements																		
Operations																		
Territory management																		
Selling																		
Sales administration																		
Order servicing																		
Shipping																		
General accounting																		
Cost planning																		
Budget accounting																		
Personnel planning																		
Recruiting/development																		
Compensation																		

Data classes arranged by creating process

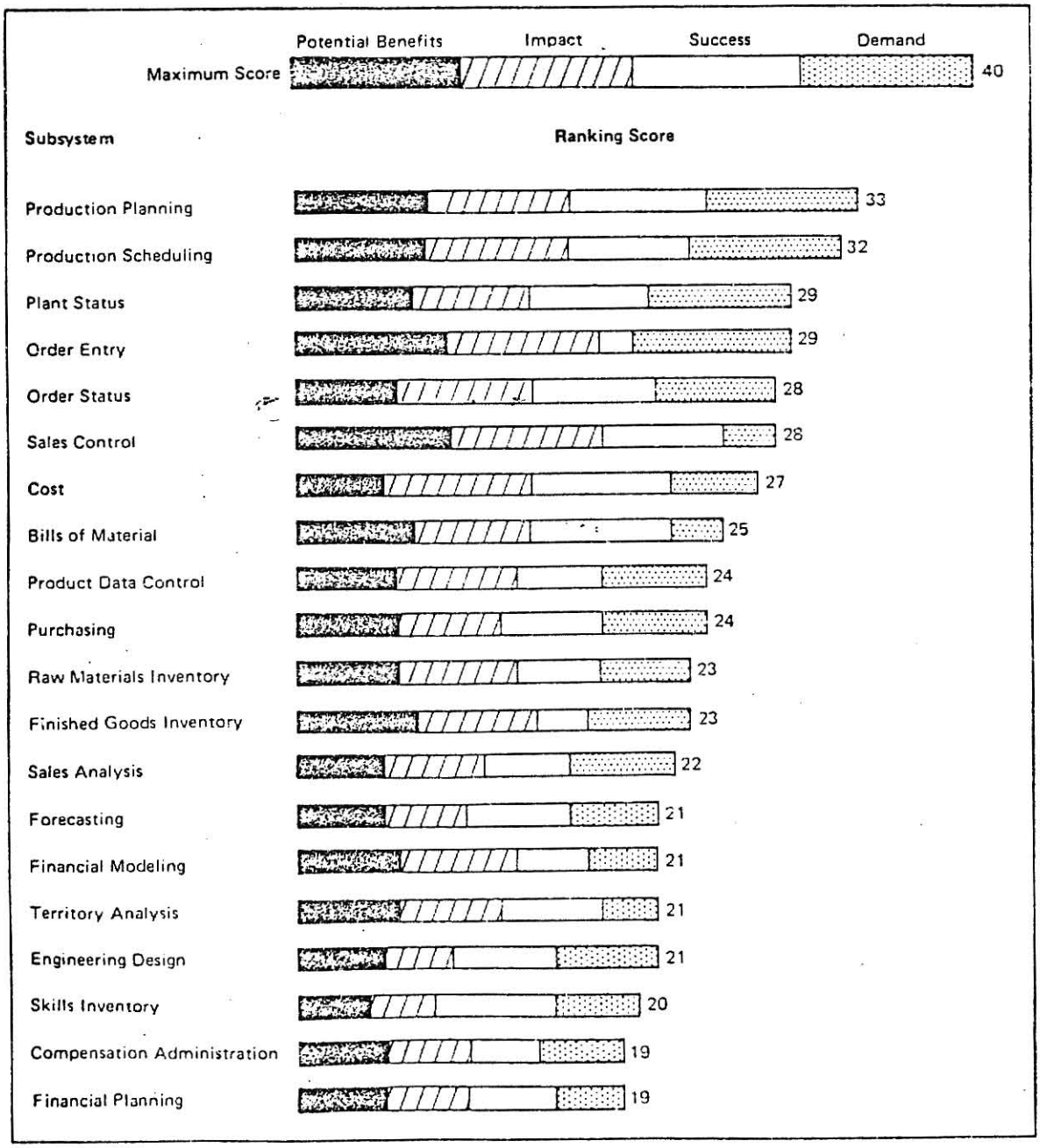
C-Creation/U-Usage

APPENDIX L
GRAPHIC REARRANGEMENT OF INFORMATION ARCHITECTURE



Graphic rearrangement of information architecture

APPENDIX M
SAMPLE SUBSYSTEM RANKING



Sample subsystem ranking

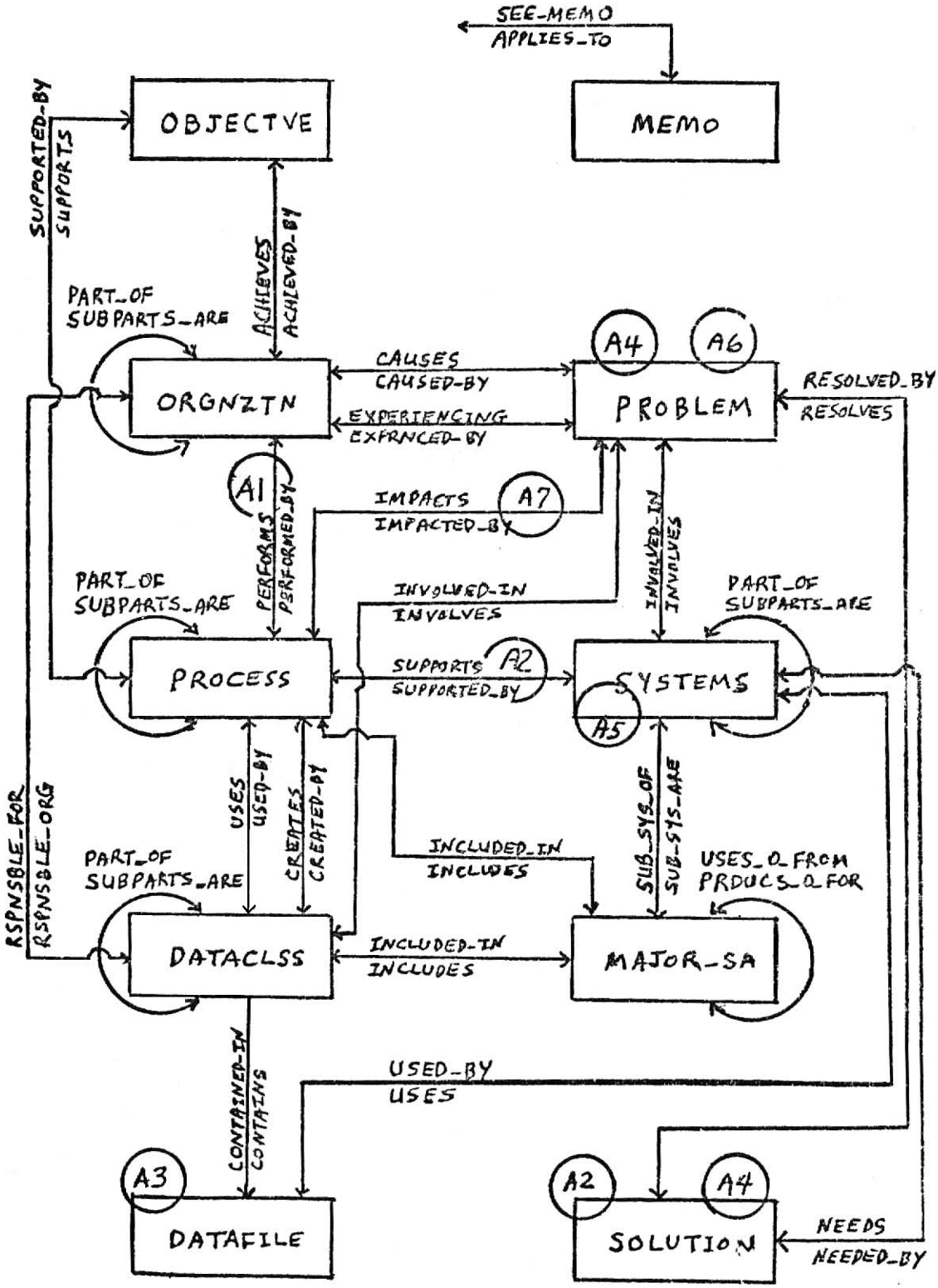
APPENDIX N
DISTRIBUTED INFORMATION REQUIREMENTS ANALYSIS

Location: Plant Site DATA CLASS / PROCESS	Product	Bill of Material	Parts Master	Routings	Planning	Facilities	Employee	Vendor	Raw Material Inventory	Finished Goods Inventory	Work in Process	Machine Load	Open Requirements	Customer	Sales Territory	Order	Financial	Cost		Security	Auditability	Volume	Responsiveness
Design and Develop.																							
Product Spec. Maint.																							
Information Control																							
Planning																							
Research																							
Forecasting																							
Financial Planning																							
Capital Acquisition																							
Funds Management																							
Workflow Layout																							
Maintenance																							
Equip. Performance																							
Personnel Planning																							
Recruiting-Development																							
Compensation																							
Purchasing																							
Receiving																							
Inventory Control																							
Shipping																							
Scheduling																							
Capacity Planning																							
Material Reqmts.																							
Operations																							
Territory Mgmt.																							
Selling																							
Sales Administration																							
Order Servicing																							
General Accounting																							
Cost Planning																							
Budget Accounting																							
Business Planning																							
Organization Analysis																							
Review and Control																							
Risk Management																							
Use																							
Security																							
Auditability																							
Data Occurrence																							
Currency																							

Use and Audit: A = Access only C = Access and Change
Security: A = Unauthorized Access protection
C = Unauthorized Change protection
Occurrence: T = Total record needed
P = Partial record needed
Currency: I = Immediate; S = Same day
O = Overnight; L = Longer
Volume/Response: H = High/quick; M = Medium; L = Low/slow

Distributed information requirements analysis

APPENDIX O
BSP DATA MODEL

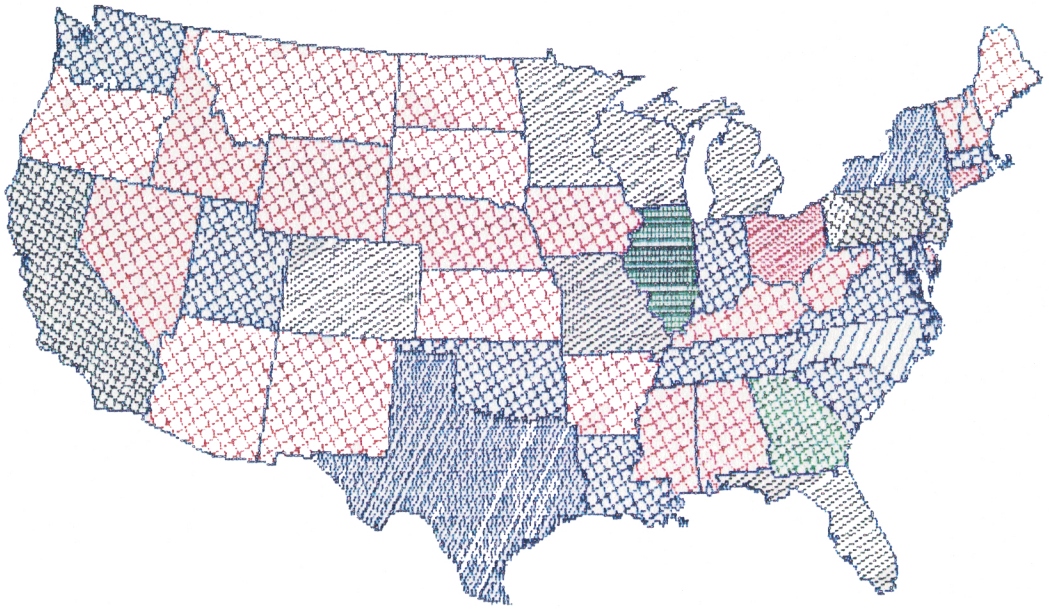


APPENDIX B

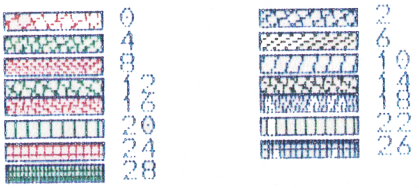
LIST OF TWO-HUNDRED AND TWELVE U.S. CORPORATIONS BY GEOGRAPHICAL DISTRICT

PLATE B.1

TWO-HUNDRED AND TWELVE U.S. CORPORATIONS
THAT RESPONDED TO THE SURVEY BY STATE



LEGEND: RESPONSE



LIST OF TWO-HUNDRED AND TWELVE U.S. CORPORATIONS BY GEOGRAPHICAL DISTRICT

Sixty-eight Midwest Corporations

Abbott Laboratories
North Chicago, Illinois

Aid Association for Lutherns
Appleton, Wisconsin

Allstate Insurance Co.
Northbrook, Illinois

American Medical Association
Chicago, Illinois

American Republic Ins.
Des Moines, Iowa

Beloit Corporation
Beliot, Wisconsin

Burlington Northern
St. Paul, Minnesota

Caterpillar Tractor Co.
East Peoria, Illinois

Cincinnati Gas & Electric Co.
Cincinnati, Ohio

Clark Equipment Co.
Chicago, Illinois

CNA Insurance Co.
Chicago, Illinois

Consumers Powers Co.
Jackson, Michigan

Country Mutual Insurance Co.
Bloomington, Illinois

Deere and Company
Moline, Illinois

Eaton Corporation
East Lake, Ohio

First National Bank of Chicago
Chicago, Illinois

First Wisconsin National Bank of Milwaukee
Milwaukee, Wisconsin

Ford Motor Company
Dearborn, Michigan

General Dynamics
St. Louis, Missouri

Gould Inc.
Rolling Meadows, Illinois

Hallmark Cards Inc.
Kansas City, Missouri

Harris Bank
Chicago, Illinois

Hennipin County Data Processing
Minneapolis, Minnesota

Hobart Corp.
Troy, Ohio

Indiana Blue Cross
Indianapolis, Indiana

Indiana University
Bloomington, Indiana

International Harvester Co.
Chicago, Illinois

Jackson County Courthouse
Kansas City, Missouri

Kemper Insurance
Long Grove, Illinois

League Insurance Companies
Southfield, Minnesota

Lincoln Electric
Cleveland, Ohio

Liquid Carbonic Corporation
Chicago, Illinois

McDonnell Douglas Corporation
St. Louis, Missouri

Meijer
Grand Rapids, Michigan

Midwest Stock Exchange
Chicago, Illinois

Minnesota Mining & Mfg. Co.
St. Paul, Minnesota

Monarch Marketing Systems
Dayton, Ohio

Morton Norwich, Inc.
Chicago, Illinois

Motor Wheel Corp.
Lansing, Michigan

Motorola, Inc.
Schaumburg, Illinois

National Car Rental Systems
Minneapolis, Minnesota

National City Bank
Cleveland, Ohio

Northern Trust Co.
Chicago, Illinois

Northwest Computer Services, Inc.
Minneapolis, Minnesota

Northwestern Mutual Life Ins. Co.
Milwaukee, Wisconsin

Official Airlines Guides
Oakbrook, Illinois

Ohio University
Athens, Ohio

Peat Marwick, Mitchell & Co.
Detroit, Michigan

Pott Industries
St. Louis, Missouri

Procter & Gamble
Cincinnati, Ohio

Ralston Purina
St. Louis, Missouri

Rust-Oleum Corp.
Vernon Hills, Illinois

Sentry Insurance Company
Stevens Point, Wisconsin

Signode Corporation
Glenview, Illinois

Southern Illinois University
Carbondale, Illinois

Standard Oil of Indiana
Chicago, Illinois

State of Kansas
Topeka, Kansas

State Farm Insurance
Bloomington, Illinois

Time, Inc.
Chicago, Illinois

Trailer Train Company
Chicago, Illinois

Trans Union Credit Information Co.
Chicago, Illinois

Trans World Airlines
Kansas City, Missouri

TRW Inc.
Cleveland, Ohio

Union Pacific Railroad
Omaha, Nebraska

University of Illinois
Urbana, Illinois

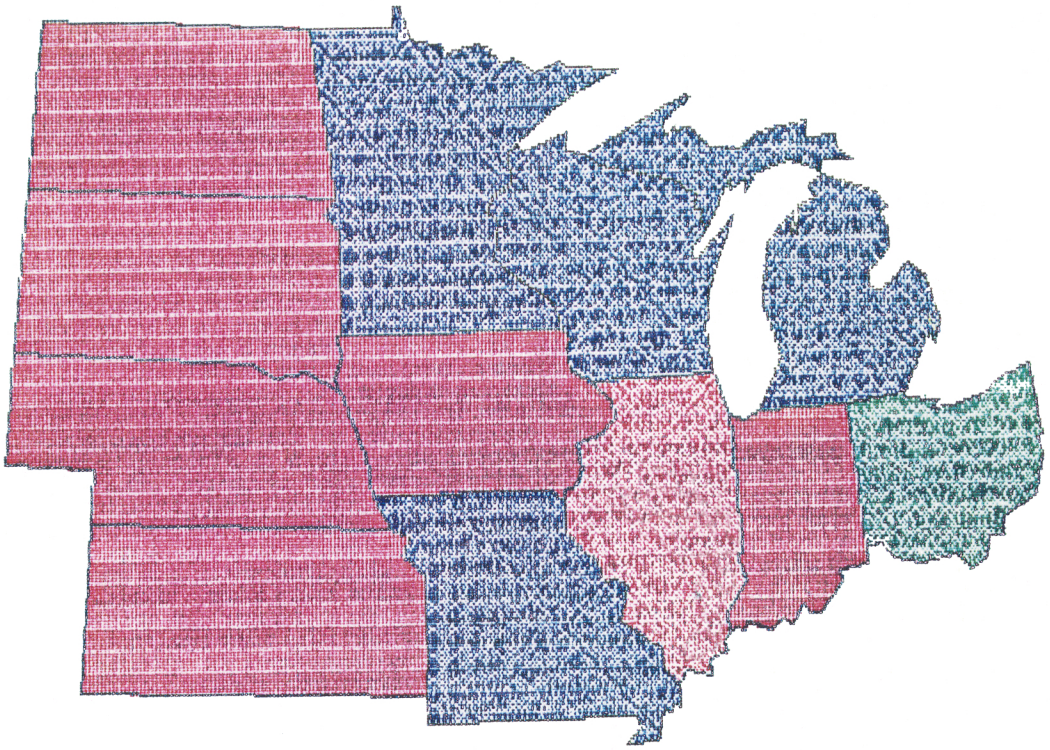
Upjohn Corp.
Kalamazoo, Michigan

Wisconsin Public Service Corp.
Green Bay, Wisconsin

Wisconsin Telephone Co.
Milwaukee, Wisconsin

PLATE B.2

SIXTY-EIGHT MIDWEST U.S. CORPORATIONS
THAT RESPONDED TO THE SURVEY
BY STATE AND REGION
REGION=MIDWEST



LEGEND: RESPONSE



Fifty-eight Eastern Corporations

Airco Inc.
Murray Hill, New Jersey

Alcoa
Pittsburgh, Pennsylvania

American Cyanamid
Clifton, New Jersey

American Express
Great Neck, New York

Armstrong World Industries, Inc.
Lancaster, Pennsylvania

AT&T Long Lines
Morristown, New Jersey

Bethleham Steel Corp.
Bethleham, Pennsylvania

Blue Cross of Massachusetts
Boston, Massachusetts

Borg-Warner Corporation-York Division
York, Pennsylvania

Carpenter Technology Corporation
Reading, Pennsylvania

Catalytic Engineering Corporation
Philadelphia, Pennsylvania

CBS
New York, New York

Chemical Bank
New York, New York

Ciba-Geigh
Ardsley, New York

Citizens Utility Co.
Stamford, Connecticut

Commodities Corporation
Princeton, New Jersey

Con Edison
New York, New York

Continental Insurance Co.
Neptune, New Jersey

Depository Trust Co.
New York, New York

Eastman Kodak-Kodak Office
Rochester, New York

Educational Testing Service
Princeton, New Jersey

E. I. Dupont De Nemours & Co.
Wilmington, Delaware

Equitable Life Assurance Society
New York, New York

Exxon Research and Engineering
Florham Park, New Jersey

First Pennsylvania Bank
Philadelphia, Pennsylvania

F. W. Woolworth Co.
New York, New York

GE
Bridgeport, Connecticut

Insurance Company of North America
Voorhees, New Jersey

ITT Corporation
Stratfort, Connecticut

Johnson & Johnson
New Brunswick, New Jersey

Marine Midland Bank
Buffalo, New York

Massachusetts Mutual Life
Springfield, Massachusetts

Metropolitan Life Insurance Company
New York, New York

Mobay Chemical
Pittsburgh, Pennsylvania

Mobil Oil Corp.
New York, New York

Nabisco Brands
East Hanover, New Jersey

New York Telephone
New York, New York

North American Philips Co. (Baker, Knapp, & Tubbs Inc.)
New York, New York

Northeast Utilities Service Co.
Berlin, Connecticut

Northern Telecom, Inc. - Spectron Division
Suffern, New York

Pennsylvania Power and Light
Allentown, Pennsylvania

Pittsburgh National Bank
Pittsburgh, Pennsylvania

Pratt & Whitney Aircraft
E. Hartford, Connecticut

Provident National Bank
Philadelphia, Pennsylvania

Prudential Insurance Company of America
Newark, New Jersey

Public Service Electric and Gas
Newark, New Jersey

Public Service of New Hampshire
Manchester, New Hampshire

Shared Medical
King of Prussia, Pennsylvania

Shering-Plough Corporation
Chatham, New Jersey

Sakandia Insurance
New York, New York

Smithkline and French Laboratories
Philadelphia, Pennsylvania

Southern NE Telephone Co.
New Haven, Connecticut

Teachers Insurance
New York, New York

Travelers Insurance Companies
Hartford, Connecticut

Union Camp Corporation
Wayne, New Jersey

United Illuminating Co.
New Haven, Connecticut

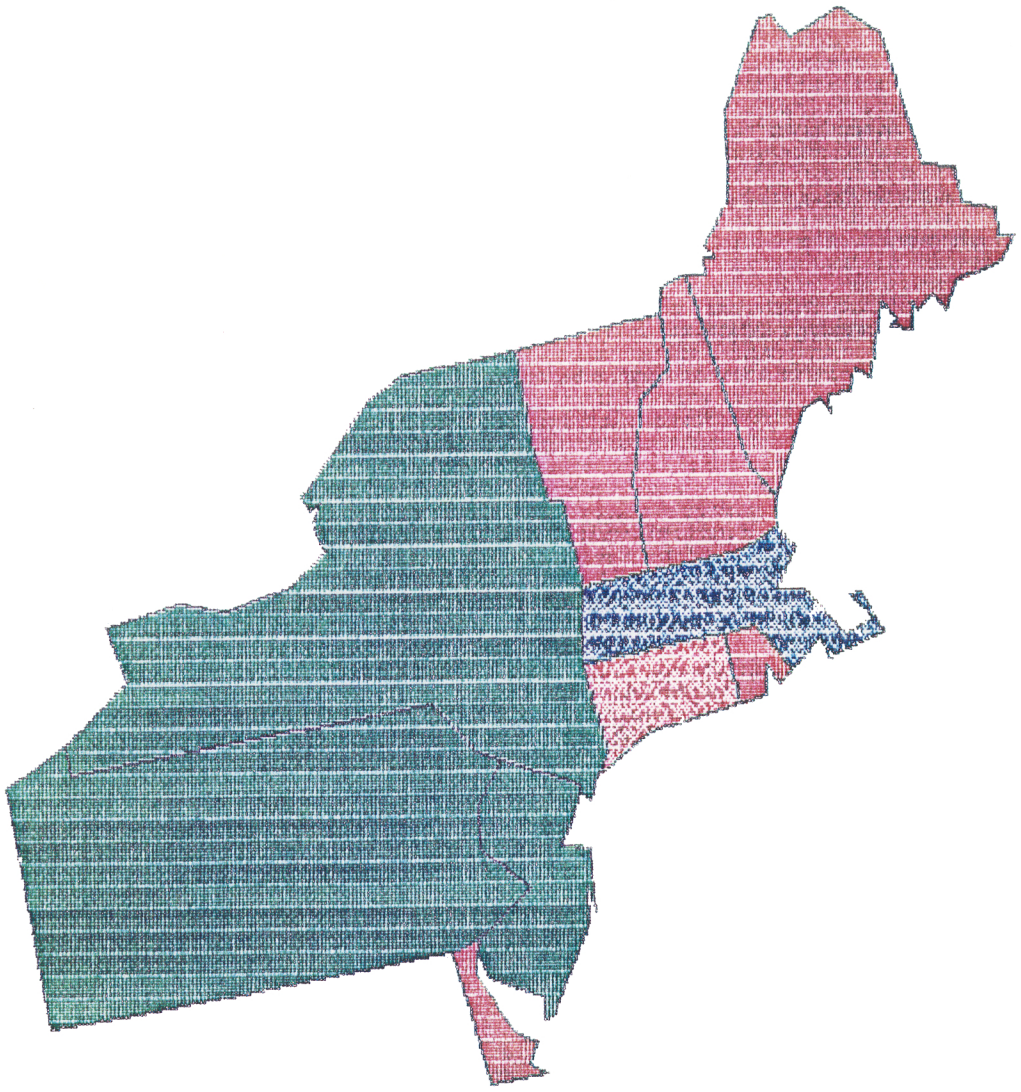
Westinghouse Electric Corp.
Pittsburgh, Pennsylvania

Xerox Corporation
Rochester, New York

PLATE B.3

FIFTY-EIGHT EASTERN U.S. CORPORATIONS
THAT RESPONDED TO THE SURVEY
BY STATE AND REGION

REGION=EASTERN



LEGEND: RESPONSE



Twenty-seven Western Corporations

Amdahl Corporation
Sunnyvale, California

Associated Grocers of Colorado, Inc.
Denver, Colorado

Bank of America
San Francisco, California

Boeing Computer Services Co.
Seattle, Washington

Carter-Hawley Hale Stores
Annaheim, California

City of Los Angeles
Los Angeles, California

City of Tacoma
Tacoma, Washington

Computer Services
San Francisco, California

Denny's Inc.
LaMirada, California

Federal Express Corp.
Colorado Springs, Colorado

Fireman's Fund Insurance Co.
San Rafeal, California

First Interstate Services Co.
Portland, Oregon

Johns-Manville Corporation
Denver, Colorado

Lockheed Missile and Space Co.
Sunnyvale, California

Lucky Stores, Inc.
Dublin, California

Mountain Fuel Supply
Salt Lake City, Utah

Northwest Pipeline Corp.
Salt Lake City, Utah

Petro-Lewis Corporation
Denver, Colorado

Public Services Co. of Colorado
Golden, Colorado

Rand Information Systems
San Francisco, California

Rockwell International Corp.
Seal Beach, California

Seattle First National Bank
Seattle, Washington

Security Pacific National Bank
Glendale, California

Standard Oil of California
San Francisco, California

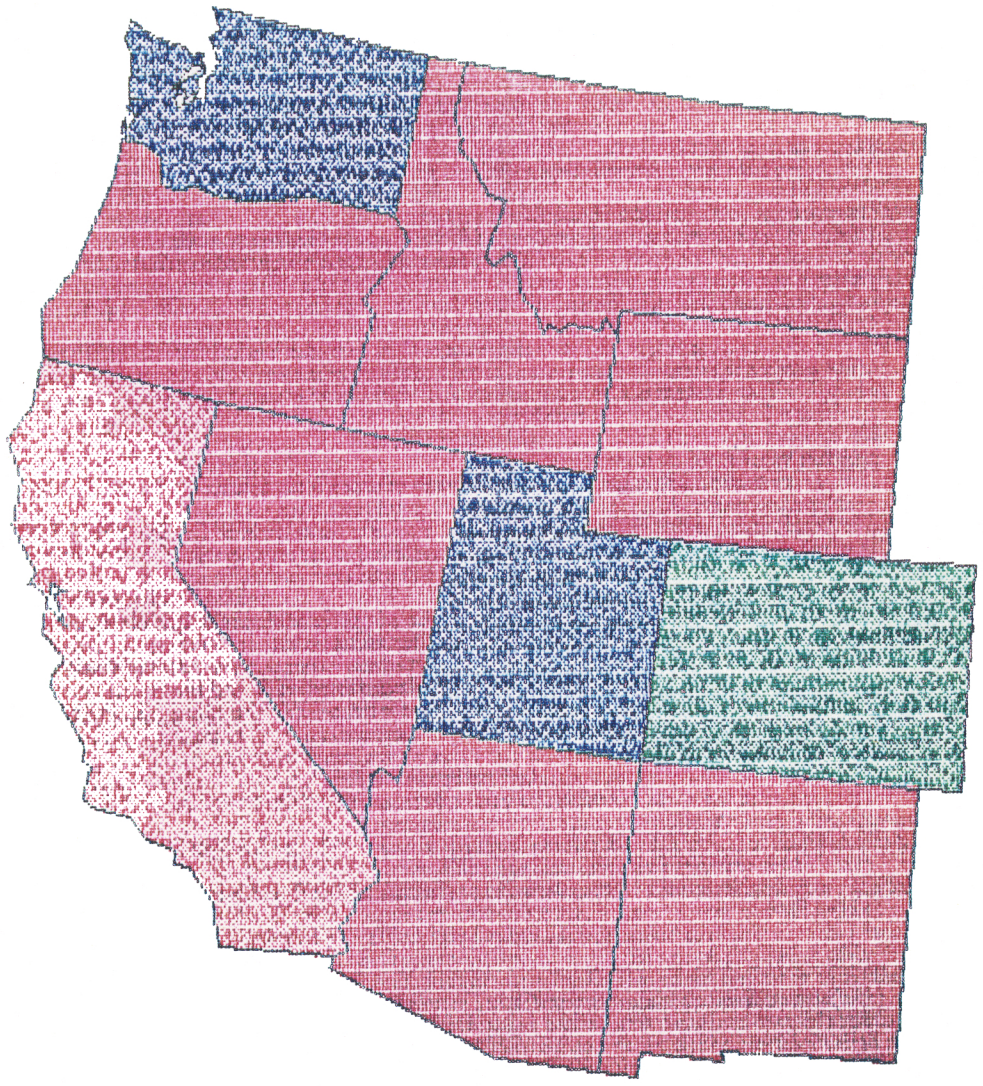
The McConnell Group
Palos Verdes Peninsula, California

Total Petroleum Corp.
Denver, Colorado

Twentieth Century Fox
Los Angeles, California

PLATE B.4

TWENTY-SEVEN WESTERN U.S. CORPORATIONS
THAT RESPONDED TO THE SURVEY
BY STATE AND REGION
REGION=WESTERN



Fifty-nine Southern Corporations

American Bankers Insurance Group (Davidson Timber)
Miami, Florida

American Management Systems, Inc.
Arlington, Virginia

Arco Oil and Gas
Dallas, Texas

Aristar Management, Inc.
Miami, Florida

Arkla Gas
Shreveport, Louisiana

Association of American Railroads
Washington, D.C.

BDM Corp.
McLean, Virginia

Brown & Root Company
Houston, Texas

BSI
Bethesda, Maryland

Burlington Industries, Inc.
Greensboro, North Carolina

Burroughs - Welcome Co.
Research Triangle Park, North Carolina

Carolina Power and Light
Raleigh, North Carolina

Carolina Steel
Greensboro, North Carolina

Celanese Corp.
Charlotte, North Carolina

Cities Service Co.
Tulsa, Oklahoma

Dept. of Education
Baton Rouge, Louisiana

Eastern Airlines
Miami, Florida

Electronic Data Systems
Dallas, Texas

El Paso Natural Gas
El Paso, Texas

Equitable Trust Co.
Baltimore, Maryland

First City Bankcorporation of Texas Inc.
Houston, Texas

First Computer Service of Charlotte
Charlotte, North Carolina

First National Bank of Atlanta
Atlanta, Georgia

Florida Power Corporation
St. Petersburg, Florida

Friederich Air Conditioning Co.
San Antonio, Texas

Group Hospitalization, Inc.
Washington, D. C.

GTE Data Services
Tampa, Florida

Gulf Oil Corporation
Houston, Texas

Hardee's Foods Systems Inc.
Rocky Mount, North Carolina

Holiday Inns
Memphis, Tennessee

Imco Services
Houston, Texas

Integon Corp.
Winston-Salem, North Carolina

J. C. Penny Life Insurance Co.
Dallas, Texas

KFC Inc.
Louisville, Kentucky

Memorial Medical Center
Savannah, Georgia

Midwest Stock Exchange
New Orleans, Louisiana

Mills Olan Inc. of (Tn)
Chattanooga, Tennessee

National Bank of Georgia
Atlanta, Georgia

NCH Corp. (Chemsearch)
Irving, Texas

North Carolina National Bank
Charlotte, North Carolina

Philips Petroleum
Bartlesville, Oklahoma

Ryder Truck Rental Inc.
Miami, Florida

Santee Cooper
Moncks Corner, South Carolina

Shell Oil Co.
Houston, Texas

South Carolina National Bank
Columbia, South Carolina

Southern Co. Service, Inc.
Atlanta, Georgia

Southern Life Insurance
Greensboro, North Carolina

Southern Railway Co.
Atlanta, Georgia

Southwestern Life Insurance
Dallas, Texas

State of Texas Comptroller's Office
Austin, Texas

Superior Oil
Houston, Texas

Texas Commerce Bank - Houston
Houston, Texas

Union Bankers Insurance Co.
Dallas, Texas

Union Carbide Corporation
Charleston, West Virginia

University Computing Company
Dallas, Texas

Virginia Tech
Blacksburg, Virginia

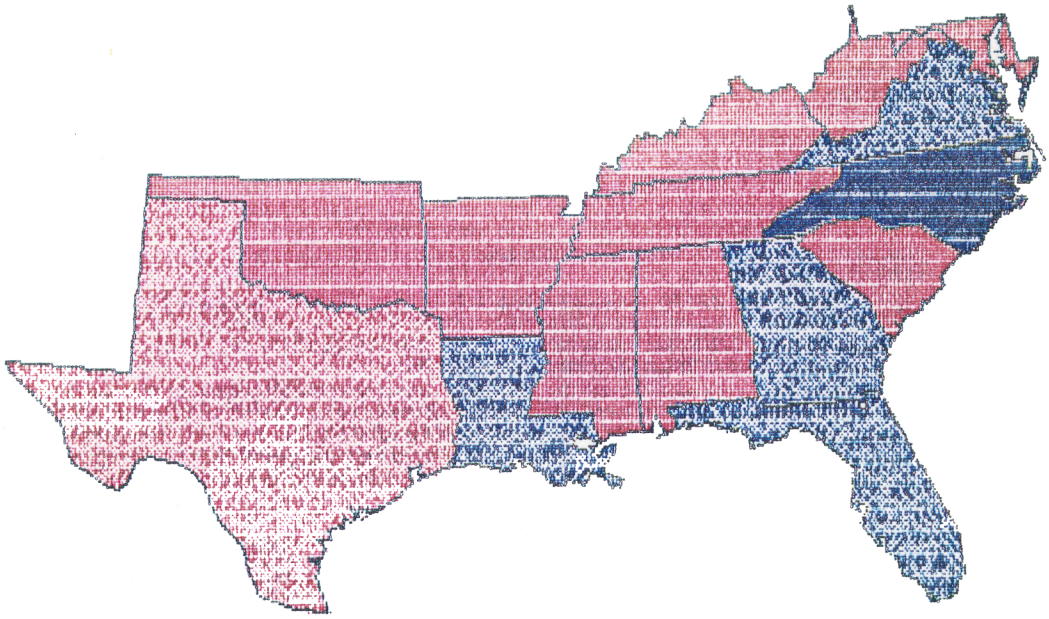
Western Electric Co. Inc.
Greensboro, North Carolina

Western North America Corporation
Greensboro, North Carolina

Zale Corp.
Dallas, Texas

PLATE B.5

FIFTY-NINE SOUTHERN U.S. CORPORATIONS
THAT RESPONDED TO THE SURVEY
BY STATE AND REGION
REGION=SOUTHERN



LEGEND: RESPONSE



APPENDIX C

LIST OF TWO-HUNDRED AND TWELVE U.S. CORPORATIONS BY SIZE ACCORDING TO ANNUAL SALES

LIST OF TWO-HUNDRED AND TWELVE U.S. CORPORATIONS
BY SIZE ACCORDING TO ANNUAL SALES

Fourteen Small Corporations

Brown & Root Company

BSI

CNA Insurance Co.

First Interstate Services Co.

Indiana University

Liquid Carbonic Corporation

Midwest Stock Exchange - Chicago

Midwest Stock Exchange - New Orleans

Ohio University

Peat Marwick, Mitchell & Co.

Pratt & Whitney Aircraft

Rand Information Systems

Southern Illinois University

University of Illinois

Twenty-eight Medium Corporations

Alcoa

American Management Systems, Inc.

American Medical Association

American Republic Insurance

Aristar Management, Inc.

Beloit Corporation

Commodities Corporation

Depository Trust Co.

First Computer Services of Charlotte

Friederich A.C. Co.

GTE Data Services

Imco Services

Jackson County Courthouse

J. C. Penney Life Insurance Co.

League Insurance Companies

Memorial Medical Center

Mills Olan Inc., of (Tn)

Northeast Utilities Service Co.

Official Airlines Guides

Petro-Lewis Corporation

Pott Industries

Rust-oleum Corp.

Shared Medical

The McConnell Group

Union Bankers Insurance Co.

University Computing Company

Western North America Corporation

One-hundred and Seventy Large Corporations

Abbott Laboratories

Airco Inc.

Allstate Insurance Co.

Amdahl Corporation

American Bankers Insurance Group (Davidson Timber)

American Cyanamid

American Express

Arco Oil and Gas

Arkla Gas

Armstrong World Industries, Inc.

Associated Grocers of Colorado, Inc.

Association of American Railroads

A T & T Long Lines

Bank of America

Bethleham Steel Corp.

Blue Cross of Massachusetts

Boeing Computer Services Co.

Borg-Warner Corporation - York Division

Burlington Industries Inc.

Burlington Northern

Burroughs - Wellcome Co.

Carolina Power and Light

Carolina Steel

Carpenter Technology Corporation

Carter-Hawley Hale Stores

Catalytic Engineering Corporation

Caterpillar Tractor Co.

Celanese Corp.

Chemical Bank

Ciba-Geigy

Cincinnati Gas & Electric Co.

Cities Service Co.

Citizens Utility Co.

City of Los Angeles

City of Tacoma

Clark Equipment Co.

Con Edison

Consumer Powers Co.

Continental Ins. Co.

Country Mutual Insurance Co.

Crown Zellerbach Corp.

Deere and Company

Denney's Inc.

Dept. of Education

Eastern Airlines

Eastman Kodak-Kodak Office

Eaton Corporation - TCC

Educational Testing Service

E. I. DuPont De Nemours & Co.

Electronic Data Systems

El Paso Natural Gas

Equitable Life Assurance Society

Equitable Trust Co.

Federal Express Corp.

Fireman's Fund Insurance Co.

First City Bancorporation of Texas Inc.

First National Bank of Atlanta

First National Bank of Chicago

First Pennsylvania Bank

First Wisconsin National Bank of Milwaukee

Florida Power Corp.

Ford Motor Company

F. W. Woolworth Co.

General Dynamics

GE

Gould Inc.

Group Hospitalization, Inc.

Gulf Oil Corporation

Hallmark Cards Inc.

Hardee's Foods Systems Inc.

Harris Bank

Hennepin County Data Processing

Hobart Corp.

Holiday Inns

Indiana Blue Cross

Insurance Company of North America

Integon Corp.

International Harvester Co.

ITT Corporation

Johnson & Johnson

Kemper Insurance

KFC Inc.

Lincoln Electric

Lockheed Missile and Space Co.

Lucky Stores Inc.

Marine Midland Bank

Massachusetts Mutual Life

McDonnell Douglas Corporation

Meijer

Metropolitan Life Insurance Company

Minnesota Mining & Mfg. Co.

Mobay Chemical

Mobil Oil Corp.

Monarch Marketing Systems

Morton Norwich, Inc.

Motor Wheel Corp.

Motorola, Inc.

Mountain Fuel Supply

Nabisco Brands

National Bank of Georgia

National Car Rental Systems

National City Bank

NCH Corp. (Chemsearch)

New York Telephone

North American Phillips Co. (Baker, Knapp, & Tubbs Inc.)

Northern Telecom, Inc. - Spectron Division

Northern Trust Co.

Northwest Computer Services, Inc.

Northwest Pipeline Corp.

Northwestern Mutual Life Ins. Co.

Pennsylvania Power and Light

Philips Petroleum

Pittsburgh National Bank

Procter & Gamble

Provident National Bank

Prudential Insurance Company of America

Public Service Electric and Gas

Public Services Co. of Colorado

Public Service of New Hampshire

Ralston Purina

Rockwell International Corp.

Ryder Truck Rental Inc.

Santee Cooper

Schering-Plough Corporation

Seattle 1st National Bank

Security Pacific National Bank

Sentry Insurance Company

Shell Oil Co.

Signode Corporation

Skandia Insurance (Reinsurance)

Smithkline and French Laboratories

South Carolina National Bank

Southern Co. Service Inc.

Southern Life Insurance

Southern NE Telephone Co.

Southern Railway Co.

Southwestern Life Ins.

Standard Oil of California

Standard Oil of Indiana

State of Kansas

State of Texas Comptroller's Office

State Farm Insurance

Superior Oil

Teachers Insurance

Texas Commerce Bank -- Houston

Time, Inc.

Total Petroleum Corp.

Trailer Train Co.

Trans Union Credit Information Co.

Trans World Airlines

Travelers Insurance Companies

TRW, Inc.

Twentieth Century Fox

Union Camp Corporation

Union Carbide Corporation

Union Pacific Railroad

United Illuminating Co.

Upjohn Corp.

Virginia Tech

Western Electric Co. Inc.

Westinghouse Electric Corp.

Wisconsin Public Service Corp.

Wisconsin Telephone Co.

Xerox Corporation

Zale Corp.

APPENDIX D

LIST OF EIGHTY-EIGHT COMPUTER SECURITY SAFEGUARDS AND VULUNERABILITY CATEGORY ABBREVIATIONS WITH ASSOCIATED MEANINGS FOR DETECTING AND PREVENTING INTENTIONAL COMPUTER MISUSE

NAME:	Adjustment/Correction Reporting
CATEGORY:	General Management 1
DESCRIPTION:	Policy, procedures, and software to provide reports of adjustment/correction transactions covering the sphere of influence for each manager. For example, any modification, updates, deletions, or other changes to the payroll master file should be reported regularly to the manager of payroll systems for his information and action.
PURPOSE:	To detect unauthorized modification of data.
APPLICABLE VULNERABILITY CATEGORIES:	DMI, DME
COMMENTS:	Retrofit

NAME:	Job Rotation
CATEGORY:	General Management 2
DESCRIPTION:	Policy and procedures to periodically rotate those positions that have a great deal of authority among individuals in the data handling process. For example, the position responsible for address changes should be assumed by new persons periodically and without notice. The new person's first responsibility would be to verify the integrity of the file.
PURPOSE:	To detect unauthorized modification of data.
APPLICABLE VULNERABILITY CATEGORIES:	DME
COMMENTS:	Retrofit

NAME: Disaster Avoidance

CATEGORY: General Management 3

DESCRIPTION: Policy that facilities, both central and remote, are to be designed and constructed (or modified) so as to provide maximum protection against natural disasters and against persons intent on destroying physical or intellectual property. Documents, such as Guidelines for Automatic Data Processing Physical Security and Risk Management, FIPS PUB 31, can be used to assess the vulnerability to natural disasters.

PURPOSE: To prevent unauthorized destruction of data, programs, system equipment, or supplies.

APPLICABLE VULNERABILITY CATEGORIES: DDeE, PDeE, CE&SDe

COMMENTS: Although this safeguard is important even after facilities have been constructed and occupied, it is of greater value when planning new facilities.

NAME: Employee Termination Policy

CATEGORY: Personnel 1

DESCRIPTION: Policy and procedures to effect immediate restriction of terminated employee's access to sensitive material and areas. The intent of this safeguard is to ensure that disgruntled terminated employees are not in the position to destroy or disclose facilities or information.

PURPOSE: To prevent destruction (or denial) of data, programs, equipment, or services and unauthorized disclosure of data and programs.

APPLICABLE VULNERABILITY CATEGORIES: DDiI, PDeI, PDiI, DDeE, DDiE, DDeI, PDeE, PDiE, CS&EDe, SSD

COMMENTS: Retrofit; There were numerous cases in the file in which disgruntled employees destroyed data, programs, or equipment after their termination notice but before their actual departure.

NAME:	Mailing List Check
CATEGORY:	Operations Division 1
DESCRIPTION:	Policy and procedures to insert dummy names with known addresses into mailing lists. Receipt of mail at these addresses will indicate that the mailing list is being misused. This will detect unauthorized disclosure of sensitive internal lists.
PURPOSE:	To detect unauthorized disclosure and usage of sensitive internal use only mailing lists.
APPLICABLE VULNERABILITY CATEGORIES:	DDiI, DDiE
COMMENTS:	Retrofit

NAME:	External Data Responsibility Separation
CATEGORY:	Operations Division 2
DESCRIPTION:	Policy and procedure to ensure that functions at critical points in the data-handling process are carried out by different individuals. For example, the same person should not handle address changes and establishment of new accounts.
PURPOSE:	To prevent unauthorized modification of data.
APPLICABLE VULNERABILITY CATEGORIES:	DME
COMMENTS:	Retrofit

NAME:	Personal Record Access Check
CATEGORY:	Application Program Development 1 (Operations Division)
DESCRIPTION:	Procedures and software to monitor and log access of users to their own records. For example, software can be added to the application program that maintains a list of authorized users with personal records in the file. Each time one of these persons accesses the file, a record is sent to the log and reviewed by appropriate personnel. For files such as payroll, the program will have to ascertain whether or not the person has access to his or her data; if so, additional programming may be required.
PURPOSE:	To detect unauthorized modification of data.
APPLICABLE VULNERABILITY CATEGORIES:	DMI, DME
COMMENTS:	Retrofit

NAME:	Record Volume Control
CATEGORY:	Application Program Development 2 (Operations Division)
DESCRIPTION:	Procedures and software to require specification and checking of I/O record volume by programs. For example, application systems should have control points where input/output record counts are reconciled before the next job step is initiated.
PURPOSE:	To prevent unauthorized modification of data.
APPLICABLE VULNERABILITY CATEGORIES:	DMI, DME
COMMENTS:	Retrofit

NAME:	Terminal Log-off
CATEGORY:	Application Program Development 3 (Operations Division)
DESCRIPTION:	Software to provide automatic log-off of a terminal that has been idle for a specified time interval. The length of time will vary with the type of system and terminal access controls in use.
PURPOSE:	To prevent unauthorized modification, destruction, or disclosure of intellectual property or denial or theft of service or process.
APPLICABLE VULNERABILITY CATEGORIES:	DMI, DDeI, DDiI, PMI, PDeI, PDiI, SST, SSD
COMMENTS:	Retrofit

NAME:	I/O Volume Count Comparison
CATEGORY:	Data Handling 1 (Operations Division)
DESCRIPTION:	Procedures and software to ensure that users compare I/O volume against predicted requirements. For example, the person responsible for making modifications to the payroll file should be required to predict the number of records to be changed and verify that exactly this number was changed.
PURPOSE:	To detect unauthorized destruction, disclosure (or theft) of data or programs.
APPLICABLE VULNERABILITY CATEGORIES:	DDeI, DDiI, PDeI, PDiI
COMMENTS:	Retrofit

NAME:	I/O Data Control
CATEGORY:	Data Handling 2 (Operations Division) Operations 2 (Data Processing)
DESCRIPTION:	Procedures to ensure that specific control points exist for data movement throughout the user area. The intent is to provide for traceability and accountability.
PURPOSE:	To prevent unauthorized modification or disclosure of data or programs.
APPLICABLE VULNERABILITY CATEGORIES:	DME, DDiE, PME, PDiE
COMMENTS:	Retrofit; The most numerous incidents of misuse identified are in the data-handling areas outside the computer system. Each organization has to develop specific control points that are meaningful within the context of its environment.

NAME:	I/O Data Storage
CATEGORY:	Data Handling 3 (Operations Division) Operations 3 (Data Processing)
DESCRIPTION:	Procedures and facilities to provide lockable storage for sensitive data, programs, and reports. This safeguard is not directed at government classified material.
PURPOSE:	To prevent unauthorized modification, destruction, or disclosure of data or programs.
APPLICABLE VULNERABILITY CATEGORIES:	DME, DDeE, DDiE, PME, PDeE, PDiE
COMMENTS:	Retrofit; In a large number of cases, had safes or other lockable storage been used, not only would much of the data disclosure problem been solved, but much of the data and program destruction problem would have been reduced.

NAME:	I/O Data Movement Control
CATEGORY:	Data Handling 4 (Operations Division)
DESCRIPTION:	Procedures to use transmittal slips to effect positive controls (such as traceability) over data being moved between user areas and the computer center.
PURPOSE:	To prevent unauthorized modification or disclosure of data or programs.
APPLICABLE VULNERABILITY CATEGORIES:	DME, DDiE, PME, PDiE
COMMENTS:	Retrofit

NAME:	External Sensitive Area Access Control
CATEGORY:	Data Handling 5 (Operations Division) Operations 5 (Data Processing)
DESCRIPTION:	Procedures and facilities to deny or control unauthorized personnel access to sensitive user work areas. The intent of this safeguard is to ensure that a minimum number of people have access to user work areas where they might be able to change records that are in a format they understand.
PURPOSE:	To prevent unauthorized modification, destruction or disclosure of data or programs.
APPLICABLE VULNERABILITY CATEGORIES:	DME, DDeE, DDiE, PME, PDeE, PDiE
COMMENTS:	Retrofit

NAME:	I/O Data Movement Security
CATEGORY:	Data Handling 6 (Operations Division)
DESCRIPTION:	Procedures and facilities to provide lockable containers for moving data and output between user areas and the computer center or remote entry stations.
PURPOSE:	To prevent unauthorized modification or disclosure of data.
APPLICABLE VULNERABILITY CATEGORIES:	DME, DDiE
COMMENTS:	Retrofit

NAME:	Address Change Control
CATEGORY:	Data Handling 7 (Operations Division)
DESCRIPTION:	Procedures to provide special controls over receipt and validation of address change data. Of specific interest are addresses to which checks or other sensitive documents are sent. A large number of cases involved the establishment of ficticious companies and changing the accounts payable system to send checks to that company. Usually the system was not actually modified, but rather false entries were introduced by authorized users.
PURPOSE:	To prevent unauthorized modification of data.
APPLICABLE VULNERABILITY CATEGORIES:	DME
COMMENTS:	Retrofit

NAME:	X-Ray Surveillance
CATEGORY:	Security 7
DESCRIPTION:	Procedures and facilities to allow for X-ray of all packages, brief cases, tool boxes, and other such items leaving areas in which sensitive material is stored.
PURPOSE:	To prevent disclosure of data or programs and theft of system equipment.
APPLICABLE VULNERABILITY CATEGORIES:	DDiE, PDiE, CE&ST
COMMENTS:	Retrofit

NAME:	Package Control
CATEGORY:	Security 8
DESCRIPTION:	Procedures and facilities to provide for outgoing package control leaving areas in which sensitive material is stored, such as the tape and disk pack storage area. (This safeguard may be used in place of an X-ray machine.)
PURPOSE:	To prevent unauthorized disclosure (or theft) of data, programs, computer equipment, or supplies.
APPLICABLE VULNERABILITY CATEGORIES:	DDiE, PDiE, CE&ST
COMMENTS:	Retrofit

NAME: Audit by Parallel Simulation

CATEGORY: Audit 2

DESCRIPTION: Procedures and software to process production transactions with programs that simulate critical aspects of application system logic and to verify selected processing functions by comparing simulation results to production processing results. For example, a bank simulates savings interest calculations for all of its passbook savings customers. Since the simulation program verifies only the interest accrual calculations, it is much less complex than the passbook update application system.

PURPOSE: To detect unauthorized modification of programs.

APPLICABLE VULNERABILITY CATEGORIES: PMI, PME

COMMENTS: Retrofit

NAME: Code Comparison Audit

CATEGORY: Audit 3

DESCRIPTION: Procedures and software to compare two source programs, one of which is a control program, and identify differences. After this comparison, the auditor verifies that differences have been authorized by appropriate personnel and are properly documented.

PURPOSE: To detect unauthorized modification of programs.

APPLICABLE VULNERABILITY CATEGORIES: PMI, PME

COMMENTS: Retrofit

NAME:	Selected Transaction Audit
CATEGORY:	Audit 4
DESCRIPTION:	Procedures and software to allow audit subroutines to execute with, but independent of, application systems to screen and select for later review any transactions of interest. The kinds of transactions to be selected are determined by a set of input parameters at the time the audit subroutines are exercised.
PURPOSE:	To detect unauthorized modification of data.
APPLICABLE VULNERABILITY CATEGORIES:	DMI, DME
COMMENTS:	Difficult to retrofit into existing application systems; many of the misuses associated with financial systems would have been detected in the early stages had this safeguard been in use and used regularly.

NAME:	Data Handling Audit
CATEGORY:	Audit 5
DESCRIPTION:	Procedures to conduct a periodic audit of the data preparation process. The audit verifies conformance to controls dictated by policies, standards, and procedures.
PURPOSE:	To detect unauthorized modification, destruction, or disclosure of data or nonconformance to standards.
APPLICABLE VULNERABILITY CATEGORIES:	DME, DDeE, DDiE
COMMENTS:	Retrofit; Since the data handling area offers the most potential for misuse, it requires special audits of conformance to standard operating procedures.

NAME:	Selected Area Audit
CATEGORY:	Audit 6
DESCRIPTION:	Procedures and software to collect and evaluate selected operating statistics to identify unexpected variations, such as a high level of uncollected receivables. Actual values collected are compared with predicted values.
PURPOSE:	To detect unauthorized modification of data.
APPLICABLE VULNERABILITY CATEGORIES:	DMI, DME
COMMENTS:	Retrofit

NAME:	Audit with Test Data
CATEGORY:	Audit 7
DESCRIPTION:	Procedures and software to execute application systems, such as payroll or accounts payable, using test data sets to verify accuracy of systems by comparing actual processing results with predetermined test results. This safeguard is used mostly with batch systems.
PURPOSE:	To detect unauthorized modification of programs.
APPLICABLE VULNERABILITY CATEGORIES:	PMI, PME
COMMENTS:	Retrofit

NAME:	Computer Resource Usage Audit
CATEGORY:	Audit 8
DESCRIPTION:	Procedures and software to select, extract, and analyze computer resource usage information and compare it against projected usage budget. Analysis is performed at the organization, organizational subdivision, and user levels. For example, a specific project may be budgeted for 2-3 hours of terminal usage during any week. If one week the project uses 7-10 hours, a check should be made to ensure that there is a valid reason for the extra usage.
PURPOSE:	To detect unauthorized disclosure (or theft) of data, programs or services.
APPLICABLE VULNERABILITY CATEGORIES:	DDiI, PDiI, SST
COMMENTS:	Retrofit

NAME:	Crash Log Audit
CATEGORY:	Audit 9
DESCRIPTION:	Procedures and software to collect and analyze system crash information for trends and evidence of intentional crashing. The intent is to ensure that a program exists for verifying that all system outages are explainable.
PURPOSE:	To detect denial of system service.
APPLICABLE VULNERABILITY CATEGORIES:	SSD
COMMENTS:	Retrofit

NAME: Audit by Computer-Aided Flowcharting

CATEGORY: Audit 10

DESCRIPTION: Procedures and software to process application systems to automatically identify and present logic paths and control points. The flowcharts produced are then compared with those provided by the programmer to identify inconsistencies.

PURPOSE: To detect unauthorized modification of programs.

APPLICABLE VULNERABILITY CATEGORIES: PMI, PME

COMMENTS: Retrofit

NAME: Generalized Audit Software

CATEGORY: Audit 11

DESCRIPTION: Procedures and software to access, extract, manipulate, and present data and test results in a format appropriate to internal audit objectives. A number of generalized audit software packages are commercially available that offer various degrees of sophistication.

PURPOSE: To detect unauthorized modification of data.

APPLICABLE VULNERABILITY CATEGORIES: DMI, DME

COMMENTS: Retrofit

NAME:	Snapshot Audit
CATEGORY:	Audit 12
DESCRIPTION:	Procedures and software to be embedded in application systems that allow for recording the contents of main memory at critical decision points within the application process. The intent of this safeguard is to allow the auditor an opportunity to examine logic paths during execution of the program.
PURPOSE:	To detect unauthorized modification of programs.
APPLICABLE VULNERABILITY CATEGORIES:	PMI, PME
COMMENTS:	Retrofit

NAME:	Audit from Terminal
CATEGORY:	Audit 13
DESCRIPTION:	Procedures and software to allow the ADP auditor to access, extract, manipulate, and display on-line data base information using a remote terminal. This type of safeguard is essentially the generalized audit software safeguard (Audit 11) for use in auditing on-line systems.
PURPOSE:	To detect unauthorized modification of data.
APPLICABLE VULNERABILITY CATEGORIES:	DMI, DME
COMMENTS:	Retrofit

NAME: Library Usage Audit

CATEGORY: Audit 14

DESCRIPTION: Procedures and software to record and review the number of references to sensitive library modules by each application system or user and to verify the reasonableness of these entries. For example, if a user requests a specific tape more often than usual during a given time span, the auditor should verify that the requests were in accord with the user's work requirements.

PURPOSE: To detect unauthorized modification or disclosure of data or programs.

APPLICABLE VULNERABILITY CATEGORIES: DMI, DDiI, PMI, PDiI, DME, DDiE, PME, PDiE

COMMENTS: Retrofit

NAME: Late Processing Audit

CATEGORY: Audit 15

DESCRIPTION: Procedures and software to collect additional information on all jobs that are completed after their due dates and times. The intent of the audit is to ensure that control guidelines are not compromised as a consequence of the late processing.

PURPOSE: To detect unauthorized modification of data or programs.

APPLICABLE VULNERABILITY CATEGORIES: DMI, PMI, DME, PME

COMMENTS: Retrofit

NAME:	Application System Design Verification
CATEGORY:	Audit 16
DESCRIPTION:	Procedures, software, and guidelines to ensure that ADP auditors verify the quantity and quality of internal controls specified by the user departments for inclusion in all new application systems. The verification should take place both before and after installation.
PURPOSE:	To prevent all defined misuses.
APPLICABLE VULNERABILITY CATEGORIES:	All
COMMENTS:	Retrofit; This safeguard is the highest ranking prevention tool because it is believed that a very large number of misuses would have been prevented had organizations designed controls into the application system and taken steps to ensure that the controls were adequate and working before the system was declared operational.

NAME:	Operations Area Surveillance
CATEGORY:	Security 1
DESCRIPTION:	Procedures and facilities to effect continuous surveillance of terminal and computer center at all times and of terminal areas during off-hours. Closed circuit TV (CCTV) can be used either manned or with video tape recording.
PURPOSE:	To detect unauthorized modification, destruction, and disclosure (or theft) of data, programs, system equipment, or supplies.
APPLICABLE VULNERABILITY CATEGORIES:	DME, DDeE, DDiE, PME, PDeE, PDiE, CE&SM, CE&SDe, CE&ST
COMMENTS:	Retrofit; This safeguard was the highest ranking detection tool because of the large number of incidents in which an employee or perpetrator destroyed facilities, data or programs left in unmonitored areas.

NAME:	Area Alarm System
CATEGORY:	Security 2
DESCRIPTION:	Software and facilities that provide for an alarm system to detect and record access to all critical areas, such as terminal room, supply room and computer center. Commercially available mini-computer-based systems provide an example.
PURPOSE:	To detect unauthorized modification of data, programs, or system equipment; destruction of data, programs, system equipment, or supplies; and disclosure (or theft) of data, programs, system equipment, or supplies.
APPLICABLE VULNERABILITY CATEGORIES:	DME, DDeE, DDiE, PME, PDeE, PDiE, CS&EM, CS&EDe, CS&ET
COMMENTS:	Retrofit; Many cases exist in which perpetrators were allowed access to areas where they should not have been, but no one had the ability to detect their presence.

NAME: Data Center Access Control

CATEGORY: Security 3

DESCRIPTION: Procedures to restrict and control access to the data center including an authorized access list and a log for all entering and leaving the data center. Aspects of this safeguard may be automated using devices such as man-traps or badge readers.

PURPOSE: To prevent unauthorized modification, destruction, or theft of system equipment or supplies and denial of system service.

APPLICABLE VULNERABILITY CATEGORIES: CE&SM, CE&SDe, CE&ST, SSD

COMMENTS: Retrofit; In many cases, equipment was destroyed by demonstrators who were able to easily gain access to computer facilities or by persons who should not have been allowed in the center, even though they were employees of the company.

NAME: Fire Detection and Extinquishment

CATEGORY: Security 4

DESCRIPTION: Procedures and facilities to provide fire detection and extinquishment protection for all computer and user areas.

PURPOSE: To prevent destruction of data, programs, computer equipment, supplies and services.

APPLICABLE VULNERABILITY CATEGORIES: DDeE, PDeE, CE&SDe, SSD

COMMENTS: Retrofit is possible, albeit with some difficulty; A number of fire bombings during the late 1960's caused extensive fire damage to unprotected centers.

NAME:	Internal Tampering Alarms
CATEGORY:	Security 5
DESCRIPTION:	Facilities to provide terminals and other remote devices with internal tampering alarms, including alarms against unplugging. This safeguard is an extension of safeguard Security 2, Area Alarm System.
PURPOSE:	To prevent unauthorized modification or theft of terminals and other such equipment.
APPLICABLE VULNERABILITY CATEGORIES:	CE&SM, CE&ST
COMMENTS:	Difficult safeguard to apply without replacing terminals.

NAME:	Metal Detector
CATEGORY:	Security 6
DESCRIPTION:	Procedures and facilities to provide for metal detection at the entrance to the computer center and remote computing facilities.
PURPOSE:	To prevent destruction or theft of system equipment or supplies.
APPLICABLE VULNERABILITY CATEGORIES:	CE&SDe, CE&ST
COMMENTS:	Retrofit

NAME:	X-Ray Surveillance
CATEGORY:	Security 7
DESCRIPTION:	Procedures and facilities to allow for X-ray of all packages, brief cases, tool boxes, and other such items leaving areas in which sensitive material is stored.
PURPOSE:	To prevent disclosure of data or programs and theft of system equipment.
APPLICABLE VULNERABILITY CATEGORIES:	DDiE, PDiE, CE&ST
COMMENTS:	Retrofit

NAME:	Package Control
CATEGORY:	Security 8
DESCRIPTION:	Procedures and facilities to provide for outgoing package control leaving areas in which sensitive material is stored, such as the tape and disk pack storage area. (This safeguard may be used in place of an X-ray machine.)
PURPOSE:	To prevent unauthorized disclosure (or theft) of data, programs, computer equipment, or supplies.
APPLICABLE VULNERABILITY CATEGORIES:	DDiE, PDiE, CE&ST
COMMENTS:	Retrofit

NAME:	Off-site Storage
CATEGORY:	Security 9
DESCRIPTION:	Procedures and facilities to effect secure off-site storage for copies of critical data files, programs, and documentation.
PURPOSE:	To prevent denial of system service.
APPLICABLE VULNERABILITY CATEGORIES:	SSD
COMMENTS:	Retrofit

NAME:	Computer Inventory Control
CATEGORY:	Data Processing 1
DESCRIPTION:	Procedures and software to effect inventory control of computer equipment, hardware replacement parts, unused media, and supplies, at all locations from arrival to end of useful life. The intent is to ensure a complete and consistent inventory control program that provides the auditor with sufficient information to verify the status of all inventory.
PURPOSE:	To detect modification or theft of system equipment and supplies.
APPLICABLE VULNERABILITY CATEGORIES:	CE&SM, CE&ST
COMMENTS:	Retrofit

NAME:	Bill Back System
CATEGORY:	Data Processing 2
DESCRIPTION:	Policy, procedures, and software to provide an accounting system for billing back all usage to the user organization. Costs should be broken out by department, project and person. To the extent possible, costs should be compared with budget projections.
PURPOSE:	To detect unauthorized use of system services.
APPLICABLE VULNERABILITY CATEGORIES:	SST
COMMENTS:	Retrofit

NAME:	Password Protection System
CATEGORY:	Data Processing 3
DESCRIPTION:	Policy, procedures, software, and facilities to provide a comprehensive password protection system to include compartmented initiation, disbursement, storage, and change of passwords. This information should be secured using safes, encryption, and other such means.
PURPOSE:	To prevent unauthorized modification of data or programs; destruction (or disruption) of data, programs, or services; and disclosure (or theft) of data, programs, or services.
APPLICABLE VULNERABILITY CATEGORIES:	DMI, DDeI, DDiI, PMI, PDeI, PDiI, SST, SSD
COMMENTS:	Can be retrofit but with the degree of difficulty dependent on the organization size and usage of computers; While password systems were used in most organizations, they were used very poorly, i.e., passwords were never changed or were stored in clear text formats making it easy for a person to obtain the password.

NAME:	Program Change Control Log
CATEGORY:	Data Processing 4
DESCRIPTION:	Procedures and software to effect complete control over program changes. Included are change logs and documentation as well as formal approval procedures.
PURPOSE:	To prevent unauthorized modification of programs.
APPLICABLE VULNERABILITY CATEGORIES:	PMI, PME
COMMENTS:	Retrofit

NAME:	Utility Control
CATEGORY:	Data Processing 5
DESCRIPTION:	Policy, procedures, and software to identify and control the use of specific system utilities that can bypass system integrity controls.
PURPOSE:	To prevent unauthorized modification of data or programs and denial of system services.
APPLICABLE VULNERABILITY CATEGORIES:	DMI, DDeI, DDiI, PMI, PDeI, PDiI, SSD
COMMENTS:	Retrofit

NAME:	Application System Test
CATEGORY:	Application Interface 1 (Data Processing/System Control)
DESCRIPTION:	Procedures, software, and guidelines to ensure thorough testing of application systems before operational status is acquired. Test items include internal controls, programming standard conventions, errors of omission and commission as well as recovery capability.
PURPOSE:	To prevent application system failure.
APPLICABLE VULNERABILITY CATEGORIES:	DMI, DDeI, DDiI, PMI, PDeI, PDiI, SSD, SST
COMMENTS:	Retrofit; A number of misuses identified were a result of improperly tested systems. This was especially true in the university environment where students found ways to crash the system.

NAME:	Program Standards
CATEGORY:	Application Interface 2 (Data Processing/System Control)
DESCRIPTION:	Procedures and software to ensure that all programs use accepted agency programming standards that might include items such as register conventions, standard parameter conventions and such.
PURPOSE:	To prevent unauthorized modification or disclosure of data or programs.
APPLICABLE VULNERABILITY CATEGORIES:	DMI, DDeI, DDiI, PMI, PDeI, PDiI, SST, SSD
COMMENTS:	Retrofit

NAME: Test Isolation Control

CATEGORY: Application Interface 3
(Data Processing/System Control)

DESCRIPTION: Procedures, software, and hardware to isolate test systems from production systems, test data from live data, at all times. This isolation is accomplished by using hardware and software configuration controls.

PURPOSE: To prevent unauthorized modification or disclosure of data.

APPLICABLE VULNERABILITY CATEGORIES: DMI, DDiI

COMMENTS: Retrofit

NAME: Internal Standard Label Control

CATEGORY: Application Interface 4
(Data Processing/System Control)

DESCRIPTION: Procedures and software to ensure that application systems use standard labels for tapes, disks, and other removable media, to avoid bypassing system controls.

PURPOSE: To prevent unauthorized modification or disclosure of data or programs.

APPLICABLE VULNERABILITY CATEGORIES: DMI, DDiI, PMI, PDiI

COMMENTS: Retrofit

NAME:	Documentation Control
CATEGORY:	Application Interface 5 (Data Processing/System Control)
DESCRIPTION:	Procedures, software, and facilities to control access to system and application documentation, stored in any format or medium.
PURPOSE:	To prevent denial or theft of system service.
APPLICABLE VULNERABILITY CATEGORIES:	SST, SSD
COMMENTS:	Retrofit

NAME:	User Command Log
CATEGORY:	Internal Control 1 (Data Processing/System Control)
DESCRIPTION:	Procedures and software to enable logging of user commands. The organization should establish application system standards that would require a selective logging capability for user commands.
PURPOSE:	To detect unauthorized actions and monitor command activity by users.
APPLICABLE VULNERABILITY CATEGORIES:	DMI, DDeI, DDiI, PMI, PDeI, PDiI, SSD , SST
COMMENTS:	Retrofit; Users should be restricted to the fewest number of commands necessary to accomplish their task. In addition, application systems should have the capability to identify what commands were executed by each user at any time.

NAME:	Data Transformation
CATEGORY:	Internal Control 2 (Data Processing/System Control)
DESCRIPTION:	Procedures and software that allow for storage of critical data elements in a slightly transformed format reversing the transformation before the data are used by application systems.
PURPOSE:	To detect unauthorized disclosure of data.
APPLICABLE VULNERABILITY CATEGORIES:	DDiI, DDiE
COMMENTS:	Retrofit; This safeguard ranked so high because it worked very well against a few specific cases in a vulnerability category with few cases.

NAME:	Sensitive File Access Log
CATEGORY:	Internal Control 3 (Data Processing/System Control)
DESCRIPTION:	Procedures and software to log all accesses, either by system programs or application programs, to files designated "sensitive" by the security administrator. The intent is to ensure an extra level of protection for "sensitive" files.
PURPOSE:	To detect unauthorized accesses to sensitive files and generally monitor file access activity.
APPLICABLE VULNERABILITY CATEGORIES:	DMI, DDeI, DDiI, PMI, PDeI, PDiI, SSD, SST
COMMENTS:	Retrofit; In many of the cases reviewed, "sensitive" files were protected in the same manner as "nonsensitive" files.

NAME:	Operator Console Log
CATEGORY:	Internal Control 4 (Data Processing/System Control)
DESCRIPTION:	Procedures and software to log specified commands issued at the operator console. For example, all privileged commands that allow modification of programs and/or data in main memory should be monitored.
PURPOSE:	To detect unauthorized actions and to monitor command activity at the operator console.
APPLICABLE VULNERABILITY CATEGORIES:	DMI, DDeI, DDiI, PMI, PDeI, PDiI, SSD, SST
COMMENTS:	Retrofit

NAME:	IPL Check
CATEGORY:	Internal Control 5 (Data Processing/System Control)
DESCRIPTION:	Procedures and software for use at initial program load (IPL) time to compare current system libraries against verified baseline system. Checksum programs that perform a special algorithm on each module are an example.
PURPOSE:	To detect unauthorized modification of programs.
APPLICABLE VULNERABILITY CATEGORIES:	PMI, PME
COMMENTS:	Retrofit

NAME:	Improper Log-on Control
CATEGORY:	Internal Control 6 (Data Processing/System Control)
DESCRIPTION:	Procedures and software to detect repeated attempts to log-on. For example, after three or four unsuccessful log-on attempts, a message might be sent to the console operator or to the security administrator's console for appropriate action.
PURPOSE:	To detect unauthorized modification of data or programs; destruction (or disruption) of data, programs, or services; and disclosure (or theft) of data, programs, or services.
APPLICABLE VULNERABILITY CATEGORIES:	DMI, DDeI, DDiI, PMI, PDeI, PDiI, SST, SSD
COMMENTS:	Retrofit

NAME:	Nonpassword Terminal User Verification
CATEGORY:	Internal Control 7 (Data Processing/System Control)
DESCRIPTION:	Procedures, software, and hardware to effect positive system verification of users at all terminals. Possible approaches include the use of ID cards and readers, handprint identifiers, or voice print identifiers.
PURPOSE:	To prevent unauthorized modification, destruction, or disclosure of intellectual property or denial or theft of service or process.
APPLICABLE VULNERABILITY CATEGORIES:	DMI, DDeI, DDiI, PMI, PDeI, PDiI, SST, SSD
COMMENTS:	Difficult safeguard to apply without replacing or upgrading terminals.

NAME:	Store and Fetch Protection
CATEGORY:	Internal Control 8 (Data Processing/System Control)
DESCRIPTION:	Software and hardware to effect store and fetch protection for both main and secondary storage. The intent of this safeguard is to confine the application system to its authorized storage areas.
PURPOSE:	To prevent unauthorized modification or disclosure of data or programs; or theft or denial of service or process.
APPLICABLE VULNERABILITY CATEGORIES:	DMI, DDeI, DDiI, PMI, PDeI, PDiI, SSD, SST
COMMENTS:	Difficult to retrofit unless hardware capability is already present.

NAME:	Least Privilege Principle
CATEGORY:	Internal Control 9 (Data Processing/System Control)
DESCRIPTION:	Procedures and software to check privileged commands to ensure that privilege requested is authorized for that individual or process. This check might be accomplished through use of a special system authorization table.
PURPOSE:	To prevent unauthorized modification or disclosure of data or programs.
APPLICABLE VULNERABILITY CATEGORIES:	DMI, DDiI, PMI, PDiI
COMMENTS:	Retrofit

NAME:	Privileged Use Controls
CATEGORY:	Internal Control 10 (Data Processing/System Control)
DESCRIPTION:	Procedures and software to ensure that a special password system exists for privileged users, such as operators or system programmers. For example, this system may allow for daily change of privileged use passwords.
PURPOSE:	To prevent unauthorized modification of data or programs; destruction (or disruption) of data, programs, or services; and disclosure (or theft) of data, programs, or services.
APPLICABLE VULNERABILITY CATEGORIES:	DMI, DDeI, DDiI, PMI, PDeI, PDiI, SST, SSD
COMMENTS:	Retrofit

NAME:	Secondary Storage Passwords
CATEGORY:	Internal Control 11 (Data Processing/System Control)
DESCRIPTION:	Procedures and software to enable password protection for programs and sensitive data maintained on secondary storage. The intent of this safeguard is to add a second level of password protection.
PURPOSE:	To prevent unauthorized modification, destruction, or disclosure of data or programs.
APPLICABLE VULNERABILITY CATEGORIES:	DMI, DDeI, DDiI, PMI, PDeI, PDiI
COMMENTS:	Retrofit

NAME: Device ID

CATEGORY: Internal Control 12
(Data Processing/System Control)

DESCRIPTION: Software and hardware to make serial number ID of various equipment components accessible to programs. This is of special utility in providing positive identification of terminals and devices interacting with an application system.

PURPOSE: To prevent unauthorized modification or disclosure of data or programs.

APPLICABLE VULNERABILITY CATEGORIES: DMI, DDiI, PMI, PDiI

COMMENTS: Difficult to retrofit unless hardware capability is already present.

NAME: Off-hour Terminal Disconnect

CATEGORY: Internal Control 13
(Data Processing/System Control)

DESCRIPTION: Procedures or software to disconnect unneeded communication lines from system during off hours.

PURPOSE: To prevent unauthorized modification, destruction, or disclosure of intellectual property or denial or theft of service or process.

APPLICABLE VULNERABILITY CATEGORIES: DMI, DDeI, DDiI, PMI, PDeI, PDiI, SST, SSD

COMMENTS: Retrofit

NAME:	Password Generation
CATEGORY:	Internal Control 14 (Data Processing/System Control)
DESCRIPTION:	Procedures and software to ensure generation of passwords that are difficult to guess or determine programatically.
PURPOSE:	To prevent unauthorized modification of data or programs; destruction (or disruption) of data, programs, or services; and disclosure (or theft) of data, programs, or services.
APPLICABLE VULNERABILITY CATEGORIES:	DMI, DDeI, DDiI, PMI, PDeI, PDiI, SST, SSD
COMMENTS:	Retrofit

NAME:	Password Print Suppress
CATEGORY:	Internal Control 15 (Data Processing/System Control)
DESCRIPTION:	Procedures, software, and hardware to inhibit the display of passwords entered at a terminal by the user. In some cases, an underprint facility may be satisfactory.
PURPOSE:	To prevent unauthorized modification, destruction, or disclosure of intellectual property or denial or theft of service or process.
APPLICABLE VULNERABILITY CATEGORIES:	DMI, DDeI, DDiI, PMI, PDeI, PDiI, SST, SSD
COMMENTS:	Retrofit

NAME:	System Masquerade Control
CATEGORY:	Internal Control 16 (Data Processing/System Control)
DESCRIPTION:	Software and hardware to prevent a user from issuing system-like prompts to a terminal. The intent is to ensure that users are not able to obtain sensitive identification information from other users by masquerading as the system.
PURPOSE:	To prevent unauthorized modification, destruction, or disclosure of intellectual property or denial or theft of service or process.
APPLICABLE VULNERABILITY CATEGORIES:	DMI, DDeI, DDiI, PMI, PDeI, PDiI, SST, SSD
COMMENTS:	Retrofit

NAME:	Simultaneous Access Control
CATEGORY:	Internal Control 17 (Data Processing/System Control)
DESCRIPTION:	Software and hardware to prevent simultaneous access to data in modes that would allow unauthorized modification. For example, a file should be lockable from the time a record is modified until appropriate control entries have been made in the master file and history file.
PURPOSE:	To prevent unauthorized data modification.
APPLICABLE VULNERABILITY CATEGORIES:	DMI
COMMENTS:	Difficult to retrofit unless hardware capability is already present.

NAME:	Storage Purge
CATEGORY:	Internal Control 18 (Data Processing/System Control)
DESCRIPTION:	Procedures, software, and hardware to overwrite all types of storage after use for sensitive processing. The intent is to discourage scavenging through residue information on magnetic medium.
PURPOSE:	To prevent unauthorized disclosure of data or programs.
APPLICABLE VULNERABILITY CATEGORIES:	DDiI, PDiI
COMMENTS:	Retrofit

NAME:	Processing Time Control
CATEGORY:	Internal Control 19 (Data Processing/System Control)
DESCRIPTION:	Procedures and software to check actual time of use against authorized time for the application. The intent is to restrict application systems to certain times of the day, month, or year for which it is authorized.
PURPOSE:	To prevent unauthorized use or denial of system service.
APPLICABLE VULNERABILITY CATEGORIES:	SST, SSD
COMMENTS:	Retrofit

NAME:	Hardware Monitors
CATEGORY:	Hardware Support 1 (Data Processing/System Control)
DESCRIPTION:	Procedures, software, hardware, and facilities to monitor channel usage by application system or location over time and match actual usage with predicted or historical usage records.
PURPOSE:	To detect theft of system services.
APPLICABLE VULNERABILITY CATEGORIES:	SST
COMMENTS:	Retrofit

NAME:	Remote Encryption Capability
CATEGORY:	Hardware Support 2 (Data Processing/System Control)
DESCRIPTION:	Software, hardware, and/or facilities to provide encryption capability for storing and processing sensitive data at remote data processing facilities. This capability must be consistent with the encryption mechanisms in use at the central facility.
PURPOSE:	To prevent unauthorized disclosure of data.
APPLICABLE VULNERABILITY CATEGORIES:	DDiE
COMMENTS:	Retrofit

NAME:	Encryption for Transport
CATEGORY:	Hardware Support 3 (Data Processing/System Control)
DESCRIPTION:	Software and facilities to encrypt data that are to be transported by a third party outside the computer facility.
PURPOSE:	To prevent unauthorized disclosure of data.
APPLICABLE VULNERABILITY CATEGORIES:	DDiE
COMMENTS:	Retrofit

NAME:	Communication Encryption
CATEGORY:	Hardware Support 4 (Data Processing/System Control)
DESCRIPTION:	Software and hardware to provide encryption of information passing over communication lines. Of particular interest is transmission of data over low-speed lines between terminal and computer.
PURPOSE:	To prevent unauthorized disclosure of data.
APPLICABLE VULNERABILITY CATEGORIES:	DDiI
COMMENTS:	Retrofit is possible, but difficult.

NAME:	Alternate Communication Paths
CATEGORY:	Hardware Support 5 (Data Processing/System Control)
DESCRIPTION:	Hardware and facilities to ensure that alternative communication paths exist for critical on-line systems. For example, ensure duplicate paths exist between the computer facility and the telephone company central office.
PURPOSE:	To prevent denial of system service.
APPLICABLE VULNERABILITY CATEGORIES:	SSD
COMMENTS:	Retrofit is possible but with difficulty and expense.

NAME:	Media Usage Log
CATEGORY:	Operations 1 (Data Processing)
DESCRIPTION:	Procedures to log all movement and usage of removable, sensitive media, possibly using controlled external labels and times of the mount and dismount by job and user.
PURPOSE:	To detect unauthorized modification or disclosure of data or programs or unauthorized use.
APPLICABLE VULNERABILITY CATEGORIES:	DMI, DDeI, DDiI, PMI, PDeI, PDiI, SST
COMMENTS:	Retrofit

NAME: I/O Data Control

CATEGORY: Operations 2 (Data Processing)
Data Handling 2 (Operations Division)

DESCRIPTION: Procedures to ensure that specific control points exist for data movement throughout the user area. The intent is to provide for traceability and accountability.

PURPOSE: To prevent unauthorized modification or disclosure of data or programs.

APPLICABLE VULNERABILITY CATEGORIES: DME, DDiE, PME, PDiE

COMMENTS: Retrofit; The most numerous incidents of misuse identified are in the data-handling areas outside the computer system. Each organization has to develop specific control points that are meaningful with the context of its environment.

NAME: I/O Data Storage

CATEGORY: Operations 3 (Data Processing)
Data Handling 3 (Operations Division)

DESCRIPTION: Procedures and facilities to provide lockable storage for sensitive data, programs, and reports. This safeguard is not directed at government, classified material.

PURPOSE: To prevent unauthorized modification, destruction, or disclosure of data or programs.

APPLICABLE VULNERABILITY CATEGORIES: DME, DDeE, DDiE, PME, PDeE, PDiE

COMMENTS: Retrofit; In a large number of cases, had safes or other lockable storage been used, not only would much of the data disclosure problem been solved, but also much of the data and program destruction problem would have been reduced.

NAME:	Tape/Disk Movement Control
CATEGORY:	Operations 4 (Data Processing)
DESCRIPTION:	Procedures and software to ensure control of movement of removable media through the operations area. This includes a capability for traceability and accountability. This safeguard includes requirement for external labels on all media.
PURPOSE:	To prevent unauthorized disclosure of data or programs.
APPLICABLE VULNERABILITY CATEGORIES:	DDiE, PDiE
COMMENTS:	Retrofit

NAME:	External Sensitive Area Access Control
CATEGORY:	Operations 5 (Data Processing) Data Handling 5 (Operations Division)
DESCRIPTION:	Procedures and facilities to deny or control unauthorized personnel access to sensitive user work areas. The intent of this safeguard is to ensure that a minimum number of people have access to user work areas where they might be able to change records that are in a format they understand.
PURPOSE:	To prevent unauthorized modification, destruction, or disclosure of data or programs.
APPLICABLE VULNERABILITY CATEGORIES:	DME, DDeE, DDiE, PME, PDeE, PDiE
COMMENTS:	Retrofit

NAME:	Sensitive Operator Input Control
CATEGORY:	Operations 6 (Data Processing)
DESCRIPTION:	Procedures and software to restrict and control sensitive inputs and adjustments that can be made at the operator console without special authorization. The intent of this safeguard is to ensure that systems are designed or modified so as to minimize operator involvement.
PURPOSE:	To prevent modification and disclosure of data or programs.
APPLICABLE VULNERABILITY CATEGORIES:	DMI, DDiI, PMI, PDiI
COMMENTS:	Retrofit

NAME:	File Backup Standard
CATEGORY:	Operations 7 (Data Processing)
DESCRIPTION:	Procedures and software to ensure backup of critical files. This safeguard includes the requirement of a backup schedule for all files and programs to prompt operations personnel when backups are required. It also includes provision for proper user notification and supervision.
PURPOSE:	To prevent denial of system service.
APPLICABLE VULNERABILITY CATEGORIES:	SSD
COMMENTS:	Retrofit

NAME:	Card Password Protection
CATEGORY:	Operations 8 (Data Processing)
DESCRIPTION:	Procedures to ensure protection of pass word information in punched cards, e.g., in JCL decks. For example, the safeguard might call for users to place their own card decks in the card reader.
PURPOSE:	To prevent unauthorized modification, destruction, or disclosure of intellectual property or denial or theft of service or process.
APPLICABLE VULNERABILITY CATEGORIES:	DMI, DDeI, DDiI, PMI, PDeI, PDiI, SST, SSD
COMMENTS:	Retrofit

NAME:	Sensitive Forms Control
CATEGORY:	Operations 9 (Data Processing)
DESCRIPTION:	Procedures to ensure that sensitive forms, such as checks and certificates are properly controlled and secured. For example: Each set of serially-numbered forms should be maintained in such a manner that an audit can account for all forms used and remaining in storage.
PURPOSE:	To prevent theft of forms.
APPLICABLE VULNERABILITY CATEGORIES:	CE&ST
COMMENTS:	Retrofit

NAME:	Expiration Date Control
CATEGORY:	Operations 10 (Data Processing)
DESCRIPTION:	Procedures and software to ensure that expiration date mechanisms are used properly on all files in which such mechanisms are applicable. The intent of the safeguard is to ensure that expiration dates are maintained and changed only by authorized persons.
PURPOSE:	To prevent data and program modification and denial of system service.
APPLICABLE VULNERABILITY CATEGORIES:	DMI, PMI, SSD
COMMENTS:	Retrofit

NAME:	Console Configuration Control
CATEGORY:	Operations 11 (Data Processing)
DESCRIPTION:	Software and hardware to effect hardwiring of the addresses of privileged terminals, such as the system operator console. The intent of this safeguard is to ensure that the addresses of privileged terminals are not program-changeable.
PURPOSE:	To prevent unauthorized modification, destruction, or disclosure of intellectual property or denial or theft of service or process.
APPLICABLE VULNERABILITY CATEGORIES:	DMI, DDeI, DDiI, PMI, PDeI, PDiI, SST, SSD
COMMENTS:	Retrofit

NAME:	Configuration Control
CATEGORY:	Operations 12 (Data Processing)
DESCRIPTION:	Procedures to prevent compromise of any files in the event of a system reconfiguration due to malfunctioning equipment or scheduled maintenance. The intent of the safeguard is to ensure that all system configurations, including emergency configurations, do not allow data or program compromise.
PURPOSE:	To prevent unauthorized modification or disclosure of data or programs.
APPLICABLE VULNERABILITY CATEGORIES:	DMI, DDiI, PMI, PDiI
COMMENTS:	Retrofit

VULNERABILITY CATEGORY DEFINITIONS

Following are definitions of the seventeen vulnerability categories that make up the vulnerability taxonomy. Modification has been defined to include selective destruction in which the intent of the destruction is personal gain--e.g., destroying a record of a personal bill. Destruction has been restricted to include malicious acts in which the primary intent was to cause damage--e.g., throwing disk packs out the window.

1. Unauthorized Modification of Data Internal to the Computer System (DMI)

   Vulnerabilities include unauthorized modification of computer data residing within the computer system proper. Covered are insertion of new data and modification or deletion of existing data by using an application system, system programs, or system facilities.

2. Unauthorized Destruction of Data Internal to the Computer System (DDeI)

   Vulnerabilities include unauthorized destruction of computer data residing within the computer system proper. Entailed is the intentional arbitrary destruction of existing data by using an application system, system programs, or system facilities.

3. Unauthorized Disclosure of Data Stored Internal to the Computer System (DDiI)

   Vulnerabilities include unauthorized disclosure of computer data residing within the computer system proper. Entailed is the disclosure to unauthorized persons of existing data obtained by using an application system, system programs, or system facilities.

4. Unauthorized Modification of Programs Internal to the Computer System (PMI)

   Vulnerabilities include unauthorized modification of programs residing within the computer system proper. Covered are insertion of new program modules and modification or deletion of existing programs by using an application system, system programs, or system facilities.

5. Unauthorized Destruction of Programs Internal to the Computer System (PDeI)

   Vulnerabilities include unauthorized destruction of programs residing within the computer system proper. Entailed is the intentional arbitrary destruction of existing programs by using an application system, system programs, or system facilities.

6. Unauthorized Disclosure of Programs Stored Internal to the Computer System (PDiI)

   Vulnerabilities include unauthorized disclosure of programs residing within the computer system proper. Entailed is the disclosure to unauthorized persons of existing programs obtained by using an application system, system programs, or system facilities.

7. Unauthorized Modification of Data External to the Computer System (DME)

   Vulnerabilities include unauthorized physical modification of computer data residing outside the computer system proper. Examples of misuse that might be committed during data origination, data preparation, or input handling are insertion of new data and modification or deletion of existing data.

8. Unauthorized Destruction of Data External to the Computer System (DDeE)

   Vulnerabilities include unauthorized physical destruction of computer data residing outside the computer system proper. Entailed is the intentional arbitrary destruction of data destined either as input to the system or output from the system.

9. Unauthorized Disclosure of Data Stored External to the Computer System (DDiE)

   Vulnerabilities include unauthorized disclosure of computer data residing outside the computer system proper. Entailed is the disclosure to unauthorized persons of data destined either as input to the system or output from the system.

10. Unauthorized Modification of Programs External to the Computer System (PME)

    Vulnerabilities include unauthorized modification of programs residing outside the computer system proper. Covered are insertion of new program modules and modification or deletion of existing programs stored on cards, tapes, or disks, possibly by using outside computer facilities.

11. Unauthorized Destruction of Programs External to the Computer System (PDcE)

    Vulnerabilities include unauthorized destruction of programs residing outside the computer system proper. Entailed is the intentional arbitrary destruction of existing programs stored on cards, tapes, or disks, possibly by using outside computer facilities.

12. Unauthorized Disclosure of Programs Stored External to the Computer System (PDiE)

    Vulnerabilities include unauthorized disclosure of programs residing outside the computer system proper. Entailed is the disclosure to unauthorized persons of existing programs stored on listings, cards, tapes, disks, or other storage media, possibly by using outside computer facilities.

13. Unauthorized Modification of Computer Equipment or Supplies (CE&SM)

    Vulnerabilities include unauthorized physical modification of computer system equipment or supplies. Covered are insertion of a new element, substitution of one element for another; and modification or deletion of an existing element with intent to benefit or for malicious reasons.

14. Unauthorized Destruction of Computer Equipment or Supplies (CE&SDc)

    Vulnerabilities include unauthorized physical destruction of computer system equipment and supplies. Entailed is intentional arbitrary destruction.

15. Theft of Computer Equipment or Supplies (CE&ST)

Vulnerabilities include theft of computer system equipment or supplies with intent to benefit or for malicious reasons.

16. Unauthorized Use of Computer System Services (SST)

Vulnerabilities include the unauthorized use of any computer system services or resources.

17. Denial of Computer System Services (SSD)

Vulnerabilities include the denial of computer system services to authorized users. Entailed is the intentional denial of system services.

GLOSSARY

Action Plan

The group of activities, schedules, and resources recommended as a result of a BSP study (may be referred to as a general information systems plan) [39, p. 161].

Address

The name of the destination(s) to which a message is to be delivered [3, p. 251].

Administrator, System

A person who defines, controls, and manages the information-system environment within which the information-processing activities of an enterprise are handled [3, p. 251].

Application

A data processing activity providing information to one or more organizational units [39, p. 161].

Application Architecture

The structure of all applications required to support the enterprise through the strategic time period [32, p. 76].

Application Developer

A person who is responsible for tailoring the basic capabilities of the information system into a form suitable for the end users [3, p. 252].

Application Program

A set of statements defining certain tasks associated with an application that are to be executed by a computer [3, p. 252].

Architecture

The structure required for various I/S components [32, p. 76].

Architecture Priorities

The recommended sequence for implementation of the information architecture [39, p. 161].

Asynchronous Transmission

A mode in which the receiving mechanism synchronizes at the start and end of each character [3, p. 252].

Availability

The measures of time that define the interval during which a service or resource is fully operational [32, p. 76].

Batch Processing

A mode of computer use in which input data (transactions) are accumulated into groups of convenient size before processing [3, p. 252].

Business

The organizational entity being studied, regardless of its size or purpose, either private or public sector [39, p. 161].

Business Process

A group of logically related decisions and activities required to manage the resources of the business [39, p. 161].

Business System

The management system supporting the enterprise [32, p. 76].

Business Systems Planning

A structured approach to assist a business in establishing an information systems plan to satisfy its near- and long-term information needs [39, p. 161].

Centralized Information System

An Information System in which all processing logic is located at one site [3, p. 253].

Changes

Modification of I/S resource [32, p. 76].

Concentration

The collection of data from a number of links onto a smaller number of higher-capacity links, with the distribution of the return of the flow from fewer to more links [3, p. 253].

Concentrator

A network processor which performs the concentration function [3, p. 253].

Control Room

A work and interview room set aside for the continuous use of the team throughout the BSP study [39, p. 161].

Coupling

The function of interconnecting the links of the network to the terminals and/or processors [3, p. 253].

Cross-Complier

A complier which operates on one type of computer, often a large-scale general-purpose computer, but generates object code suitable for execution on a different type of computer -- typically a minicomputer or microcomputer [3, p. 253].

Customer

Person or group of persons receiving services from I/S [32, p. 76].

Data Architecture

The structure of all data required to support the enterprise over the strategic time period [32, p. 76].

Data Base

A non-redundant collection of interrelated data items processable by one or more applications [39, p. 161].

Data Class

A category of logically related information. Examples are customer, vendor, customer orders, parts inventory, and appropriations [39, p. 161].

Data-communications Network

The collection of transmission facilities, network processors, etc., which provides for data movement among terminals and information processors [3, p. 254].

Data Dictionary

A central repository for storing data about data and data

relationships [27, p. 2;27, p. 2].

Data Element

The contents of a field within a file or database [3, p. 254].

Data File

An individual group of data related to or used by an existing application before implementation of a data base approach [39, p. 161].

Data Set

A device which converts digital data at the sending terminal or processor into a form suitable for transmission and reconverts it to the original form at the receiving location [3, p. 254].

Database Administrator (DBA)

The person or group of people responsible for definition of an organization's database(s) and for the monitoring and control of operations against the database(s) [3, p. 254].

Database/Data Communications

The term used by IBM to describe transaction processing [3, p. 254].

Database Management System (DBMS)

The functions which support the semipermanent storage of user-owned data and provide access to those data [3, p. 254].

Database Structure

The field, record, and interrecord relationships which collectively define the format in which data are stored [3, p. 254].

Database Synchronization

The process of ensuring that the component parts of a distributed database are logically consistent [3, p. 254].

Datagram

A technique for sending messages in a data network, in which each message/packet contains all of the information necessary to reach its destination and is handled independently of all other messages/packets [3, p. 254].

Decentralized Information System

Two or more sets of information-processing equipment, operated by the same organization, but without any implied coordination among the sets [3, p. 255].

Dedicated Link

A communication link which is continuously available to the user [3, p. 255].

Destination

A logical location to which data are moved, a data receiver [3, p. 255].

Dial Link

A communications link which is shared with other users and therefore available only when not already in use [3, p. 255].

Distributed Database

A single logical database which has been implemented in more

than one physical segment, attached to more than one information processor [3, p. 255].

Distributed Information System

A coordinated set of information-processing capabilities implemented in two or more relatively independent resource centers such as computer sites, terminal locations, and so on [3, p. 255].

Distributed Processing

A technique for implementing one logically related set of information-processing (application-related) functions within multiple physical devices [3, p. 255].

Distribution

The movement of data or information through the enterprise [32, p. 76].

Domain

In IBM's Systems Network Architecture (SNA) the set of processors, terminal controllers, and terminals assigned to a specific processor's System Services Control Point (SSCP) for access control and session establishment [3, p. 256].

Downline

The transmission of a program or data from one processor (usually a host) to another (usually a satellite), for execution and/or retention there [3, p. 256].

Education

Formal methods for improving the knowledge of the I/S or user

personnel, for example, courses, self-study guides [32, p. 76].

Electronic Data Processing

Applications that vary considerably from routine applications that process a small payroll to complex, integrated applications that process accounting, production, marketing, and administrative information simultaneously [12;28, p. 321.03].

Element

A logical subdivision of a process or data class [32].

Encryption

The process of converting data into an encoded form, undecipherable except to a processor or human which possesses the correct decryption formula [3, p. 256].

End Point

A logical or physical entity at the end of a branch of a network [3, p. 256].

End User

A person who utilizes an information system during the performance of his or her normal duties [3, p. 256].

Enterprise

The total business supported by the I/S organization [32, p. 76].

External Environment

Influences that exist outside the business being studied and over which the business has little or no control, e.g., government

regulations, industry, competition, economy [39, p. 161].

Fallback

A procedure or facility which provides for continued operation, perhaps in degraded mode, when failures occur [3, p. 256].

File

A named increment of storage [3, p. 256].

Flow Control

The means of preventing overload within a data-communications network by limiting data flow according to some algorithm(s) [3, p. 257].

Follow-on Projects

Activities that occur after and as a result of the BSP study [39, p. 161].

Fully Connected Network

A meshed network in which every processor is directly connected to every other processor [3, p. 257].

Global Architecture

The combined data, application, and technology architectures [32, p. 76].

Global Catalog

An association of the names of objects (e.g., files, end points, processes) and the location(s) at which each object exists [3, p. 257].

Goal

A broad, general direction or intent [39, p. 161].

Hierarchically Distributed Processing

A distributed system in which the logical relationships among the components--information processors, terminal controllers, real-time device controllers, etc.--form a graded series, or hierarchy [3, p. 257].

Hierarchical Network

A data-communications network structure which forms a graded series, or hierarchical, pattern of connections [3, p. 257].

Horizontally Distributed Processing

A distributed system in which the information processors co-operate in an equal partnership [3, p. 251].

Hybrid Distributed Processing

A distributed system which includes both hierarchically distributed processing and horizontally distributed processing [3, p. 258].

Information Architecture

The structure of information systems and data that will provide information to support the business [39, p. 161].

Information Network

An interconnected set of hardware and software components, including communications facilities, configured to meet (some part of) the application workload requirements of an enterprise [3, p. 258].

Information Processing

The hardware and software functions which provide computation, decision making, and data manipulation, supporting the execution of computerized applications [3, p. 258].

Information Resource Management

Those functions required to manage information (both manual and automated) throughout the business [39, p. 161].

Information Systems (I/S)

A logical group of subsystems and data required to support the information needs of one or more processes [39, p. 161].

Information Systems Management

Those functions required to manage the Information Systems resources for the most efficient and effective support of the business [39, p. 161].

Information System Plan

A plan that gives specific goals, strategies, project descriptions, resources, and schedules for the design, development, and implementation of an information architecture [39, p. 161].

Integrity

The prevention of, and/or recovery from, failures and errors in such a way that data and/or processes within an Information System are neither lost nor damaged [3, p. 258].

Interface

A set of rules by which services can be requested and provided [3, p. 258].

Intermediate Processor

An information processor which fulfills a subsidiary role in a hierarchically distributed processing system [3, 258].

Isochronous Transmission

A mode of data transmission in which characters are delimited by start-stop bits, as in asynchronous mode, but are transmitted with a constant time interval between successive character/bits, as in synchronous mode [3, p. 258].

Job Control Language (JCL)

The set of commands which defines required operations -- e.g., compile, execute, access a file -- in batch processing [3, p. 259].

Journal

A location for the storage of information retained for later recovery and/or auditing purposes [3, p. 259].

Line

A link implemented as a physical connection, such as wire or group of wires, as contrasted to a microwave or communications satellite link [3, p. 259].

Link

The interconnection between two nodes of a network [3, p. 259].

Load Leveling

The function of allocating a given workload evenly over some number of processors or transmission facilities [3, p. 259].

Loop Multipoint Link

A data-communications link which begins at a processor, extends to connect two or more terminals, and returns to the processor [3, p. 259].

Maintenance

Repairing broken hardware, software, and facilities [32, p. 76].

Management System

The combination of organization, processes, data, and Information Systems [32, p. 76].

Message

A collection of data to be moved as a logical entity [3, p. 259].

Message Switching

Computer-controlled transfer of messages from a terminal to other terminal(s) [3, p. 259].

Microcomputer

A computer built around a "processor on a chip" [3, p. 259].

Minicomputer

A "small-scale" information processor, capable of operating in

office or hostile environments; i.e., with minimal environmental control [3, p. 259].

Mission

The purpose for the business units [32, p. 76].

Modem

A form of coupling device [3, p. 259].

Multidrop Link

A data-communications circuit which extends past two or more terminal devices, each of which is connected to the link by a "drop" [3, p. 259].

Multipoint Link

A data-communications circuit which allows connection of more than one terminal device [3, p. 260].

Multiplexing

The support on a single physical link of two or more logical data streams [3, p. 260].

National Bureau of Standards (NBS)

An agency of the United States Department of Commerce, involved in setting standards in many areas, including certain computer-related areas [3, p. 260].

Network

The mechanism for distributing information and/or data [32, p. 76].

Network Addressable Unit (NAU)

In IBM's Systems Network Architecture (SNA), a location to which data can be sent [3, p. 260].

Network Control Program/Virtual Storage (NCP/VS)

Software provided by IBM for operation in their front-end and remote communications controllers, managing the physical network facilities [3, p. 260].

Node

An end point of any branch of a network, or a junction common to two or more branches of a network [3, p. 260].

Objective

A specific and measurable item or element of a goal [32, p. 161].

Packet

A transmission increment in a packet-switched network [3, p. 260].

Packet-Switched Network

A data-communications network in which messages to be transmitted are separated into packets (usually short and of fixed length), each of which may travel a different route to reach the desired destination [3, p. 260].

Partitioned Database

A distributed database formed by splitting up the total set of

data elements and attaching the resulting partitions to two or more processors [3, p. 261].

Password

A private code which must be supplied by a user or device to satisfy a predefined access-control validation procedure [3, p. 261].

Performance

A measure of the amount of workload that will be or was processed by a service or resource in a given period of time [32, p. 161].

Physical Unit (PU)

In IBM's Systems Network Architecture (SNA), the device interface between the network and a host, communications controller, terminal controller, or terminal [3, p. 261].

Plan

The specific action required to meet the objectives [32, p. 76].

Poll and Select

The method by which a processor controls a multipoint link, polling to obtain input or selecting to send output [3, p. 261].

Privacy

The ability to protect data or other resources belonging to one user or user group from access, use, or modification by other users [3, p. 261].

Procedure

A series of operations performed in a regular sequence to accomplish a stated purpose [3, p. 261].

Process

A logical Grouping of activities or decisions [32, p. 76].

Production

The processing of data into useful information [32, p. 76].

Propagation Delay

The time required for data to travel over a communications circuit [3, p. 261].

Protocol

A set of rules for the exchange of information [3, p. 261].

Reliability

The ability of an information-system component (hardware or software) to operate continuously without failure [3, p. 261].

Replicated Database

A distributed database formed by copying at least some of the data elements at two or more processors [3, p. 261].

Resource

That which is used or consumed by the business in the fulfillment of its objectives [39, p. 161].

Resource Sharing

The ability to make unique resources (which exist at only one

or selected locations) accessible by users or applications at other locations [3, p. 262].

Response

The speed with which output follows input [3, p. 262].

Routing

The function of selecting the appropriate path(s) for the movement of data within a network, ensuring that all data are directed to the appropriate destination [3, p. 262].

Satellite, Communications

A device which, when placed in orbit around the earth, reflects back transmissions directed to it [3, p. 262].

Schema

An explicit declaration of the interrecord and intrarecord relationship structures of a database [3, p. 262].

Scope

The defined boundaries of the business being studied-divisions, functions, and geographic locations included and excluded [39, p. 161].

Security

The function of controlling access to, and/or the use of, resources within an information system [3, p. 262].

Service

The defined I/S offerings to the user/customer [32, p. 76].

Service-Level

The measures of the service [32, p. 76].

Session

The term used in IBM's Systems Network Architecture (SNA), and in some other contexts, to describe a logical connection between two processes -- such as an application program and a terminal controller or two application programs -- for data exchange [3, p. 262].

Sink

In data communications, synonymous with destination [3, p. 262].

Site

A physical location for the housing of information-system equipment [3, p. 262].

Software

The non application code, such as operating systems [32, p. 76].

Source

A physical and/or logical entity (process, person, or terminal) which originates information to be moved within an information network [3, p. 262].

Specialized-communications Common Carrier

A common carrier which provides only certain specialized services, rather than a full range of voice, data, and/or record services as provided by the conventional common carriers [3, p. 262].

Sponsor

The executive who gives approval for the BSP study and to whom the team is responsible [39, p. 161].

Strategic

Time period for direction (2-10 years) [32, p. 76].

Star Network

A data-communications network structure in which links radiate from a central information processor to surrounding terminals and/or terminal controllers [3, p. 262].

Strategy

A planning action for achieving an objective [39, p. 161].

Subschema

A description of a logically consistent subset of database, defining the areas to be accessed by a specific program or set of related programs [3, p. 263].

Subsystem

A portion of an information system usually with all the attributes of the parent information system [39, p. 161].

Synchronous Data Link Control (SDLC)

A protocal for data communications defined by IBM and used in their products, and in certain other vendors' products [3, p. 263].

Synchronous Transmission

A mode in which the receiving hardware synchronizes at the

block level, by recognition of special character(s) preceeding the transmission block [3, p. 263].

Systems

A collection of components which is under a single unified management [3, p. 263].

Systems Inventory

The listing and status of resources available to deliver service [32, p. 76].

Systems Network Architecture (SNA)

The architecture defined and used by IBM in providing capabilities for networks and distributed systems [3, p. 263].

Tactical

Time period of committed resources (1-2 years) [32, p. 76].

Team Leader

The person who directs the study team, participates full time, and is responsible for the success of the study [39, p. 161].

Technology Architecture

The structure of hardware, software, and facilities required to support the enterprise over the strategic time period [32, p. 76].

Telecommunications

A term used by IBM and some other vendors to refer to network processing [3, p. 263].

Telecommunications Access Method (TCAM)

Software provided by IBM for their general-purpose computer systems [3, p. 263].

Teleprocessing

The term used by IBM to refer to information processing plus data communications [3, p. 263].

Terminal

A device which embodies a set of interface functions between people and systems, such as a teleprinter or keyboard-and-display cathode-ray tube (CRT) device [3, p. 263].

Terminal Controller

A device which provides detailed control for one or more terminal devices [3, p. 263].

Time Sharing

An interactive mode of computer use in which multiple terminal users concurrently access the same set of computer resources [3, p. 264].

Training

Informal education of I/S or user [32, p. 76].

Transaction

An event (sale, order, payroll change, etc.) of interest to the organization [3, p. 264].

Transaction Processing

An interactive mode of computer use in which each event of

interest (i.e., a transaction) is entered into the computer for processing at the time that the event occurs [3, p. 264].

Transparency

Having the property of masking details from the "observer" [3, p. 264].

Two-wire

A communications circuit which includes two wires [3, p. 264].

Update

Add new function to existing resource [32, p. 76].

Upline dump

The transmission of memory content, following a problem or failure, from one processor (usually a satellite) to another (usually a host) for problem analysis [3, p. 264].

User

Same as customer of I/S [32, p. 76].

Virtual Circuit

A technique for sending messages in a data network, in which a logical connection (the virtual circuit) is established between the sender and receiver [3, p. 265].

Virtual Telecommunications Access Method (VTAM)

Software provided by IBM for use in their general-purpose computer systems, which controls network access and conforms to the rules of Systems Network Architecture (SNA) [3, p. 265].

Work Plan

A plan that is developed to show activities, responsibilities and schedules for the work to be performed during the BSP study [39, p. 161].

BUSINESS SYSTEMS PLANNING:
AN IMPLEMENTATION APPROACH

by

JOHN ROBERT VACCA

B.B.A., Washburn University, 1976
M.B.A., Emporia State University, 1978

AN ABSTRACT OF A MASTER'S THESIS

submitted in partial fulfillment of the

requirements for the degree

MASTER OF SCIENCE

Department of Computer Science

KANSAS STATE UNIVERSITY
Manhattan, Kansas

1982

ABSTRACT

Business Systems Planning (BSP) is representative of enterprise analysis tools that are growing in importance and are likely to become mandatory for any Corporation that continues to grow and evolve. BSP has common roots in its attempt to describe a corporation at the organizational level in terms of its information characteristics. As our understanding of Information Systems evolves, it is becoming clear that some organizational level description of a business unit is required.

This thesis has developed an ideal strategic Information Systems plan to help implement the Business Systems Planning concept, with special emphasis on its support of both the short-and long-term information needs in the daily operations of U.S. Corporations. In addition, the most pertinent material relating to the Business Systems Planning methodology developed through this study, was found in the 112 questionnaires that were returned by the corporations.

Furthermore, the corporations will benefit from this thesis by gaining a better working relationship with their User departments and top executives within the organization, thus obtaining top management's approval of the long- and short-term plans. Also, the thesis will help the corporations develop an in-depth knowledge of their business. Therefore, this thesis has helped to provide the BSP concept with the opportunity to introduce the information center concept to satisfy many of the top-management information needs.

11. If the study team was full time, did the following resources fall within the following limits (check if any):

____ Number of team members: 4 - 7.
____ Number of weeks: 6 - 8.
____ Other(s) Specify_____

12. Check if any of the activities of the team leader included:

____ Conducting the study team orientation session.
____ Conducting a kickoff meeting for team members at the outset of the formal activities of the BSP study.
____ Setting and confirming executive session schedules.
____ Managing the logistics of the study, including day-to-day administration.
____ Providing guidance and business perspective.
____ Providing resource material.
____ Maintaining the schedule.
____ Presenting the study report to management at the completion of the study.
____ Other(s) Specify_____

13. The team leader should compose a study announcement letter to be signed by the chief executive officer. Check if the letter included the following:

____ Objectives of the program.
____ Potential value to the organization.
____ Need for functional executives to be involved.
____ Need for candor and cooperation of executives.
____ Other(s) Specify_____

14. Check if preparation for the study involved the following:

____ Early selection of interviewees.
____ Establishment of a control room.
____ Establishment of a study control book.
____ Other(s) Specify_____

15. Check if the following output was contained in your corporation's study control book?

____ Study work plan.
____ Interview schedule.
____ Schedule of checkpoint reviews with the sponsor.
____ Outline of the final report from the BSP study.
____ Business and information systems data, analyzed, charted, and
____ ready for the initial meeting.
____ A review by the BSP study sponsor.
____ Other(s) Specify_____