

# Contents

|           |   |           |
|-----------|---|-----------|
| <b>1</b>  | <b>The Subject of Business Information Systems .....</b>                | <b>1</b>  |
| 1.1       | Examples of Business Application Systems .....                          | 1         |
| 1.2       | Information as a Factor in Production .....                             | 5         |
| 1.3       | Business Information Systems in the Context of Different Subjects ..... | 6         |
| 1.4       | Structure of the Book .....   | 9         |
| 1.5       | Literature for Chapter 1 .....  | 10        |
| <b>2</b>  | <b>Computers and Networks .....</b>                                     | <b>11</b> |
| 2.1       | Hardware .....  | 11        |
| 2.1.1     | Central Processing Unit .....   | 14        |
| 2.1.1.1   | Processor .....   | 14        |
| 2.1.1.2   | Main Memory .....   | 14        |
| 2.1.2     | External Memory .....   | 15        |
| 2.1.3     | Data Paths .....  | 18        |
| 2.1.4     | Data Input and Output Devices .....                                     | 18        |
| 2.2       | Software .....  | 20        |
| 2.2.1     | System Software .....   | 21        |
| 2.2.1.1   | Operating Systems for Microcomputers .....                              | 21        |
| 2.2.1.2   | Programming Languages .....   | 23        |
| 2.2.1.3   | Translation Programs .....  | 26        |
| 2.2.1.4   | Utility Programs, Protocols and Drivers .....                           | 27        |
| 2.2.2     | Application Software .....  | 27        |
| 2.2.2.1   | Standard Software .....   | 27        |
| 2.2.2.1.1 | Basic Software .....  | 28        |
| 2.2.2.1.2 | Standard Office Software .....  | 29        |
| 2.2.2.1.3 | Standard Business Software Supporting Functions of<br>Enterprises ..... | 30        |
| 2.2.2.2   | Individual Software .....   | 31        |
| 2.3       | Computer Classification .....   | 32        |
| 2.3.1     | Mainframe Computers .....   | 32        |
| 2.3.2     | Workstations .....  | 33        |
| 2.3.3     | Network Computers and Thin-Clients .....                                | 34        |
| 2.4       | Computer Networks and Network Architectures .....                       | 34        |
| 2.4.1     | Components of Computer Networks .....                                   | 35        |
| 2.4.2     | Local Area Networks .....   | 37        |
| 2.4.3     | Wide Area Networks .....  | 39        |
| 2.4.4     | Client-Server Concept as a Model for Cooperation .....                  | 40        |
| 2.5       | Worldwide Networking: The Internet .....                                | 42        |

|           |  |           |
|-----------|--|-----------|
| 2.5.1     | The Protocol Family TCP/IP .....                                 | 44        |
| 2.5.2     | Services and Technologies of Networking.....                     | 46        |
| 2.5.3     | Intranets and Extranets.....                                     | 47        |
| 2.5.4     | Security in Information and Communication Networks.....          | 48        |
| 2.5.5     | Computer and Network Infrastructures.....                        | 51        |
| 2.6       | Literature for Chapter 2.....                                    | 52        |
| <b>3</b>  | <b>Data and their Integration.....</b>                           | <b>55</b> |
| 3.1       | Data and Databases.....  | 56        |
| 3.1.1     | Goals and Requirements of Data Integration .....                 | 56        |
| 3.1.2     | Classification of Data .....                                     | 57        |
| 3.1.3     | Basic Terminology and Data Organization .....                    | 57        |
| 3.1.4     | Database Organization vs. Data File Organization.....            | 59        |
| 3.1.5     | Components of a Database System .....                            | 60        |
| 3.1.6     | Architecture of a Database System .....                          | 61        |
| 3.1.7     | Data Structuring .....   | 63        |
| 3.1.8     | Database Models .....  | 64        |
| 3.1.8.1   | Relational Database Models .....                                 | 64        |
| 3.1.8.2   | Object-oriented Database Models .....                            | 66        |
| 3.1.9     | Query Possibilities for Database Systems.....                    | 68        |
| 3.2       | Networked Databases.....   | 69        |
| 3.2.1     | Distributed Database Systems.....                                | 69        |
| 3.2.2     | Data Warehouse .....   | 71        |
| 3.2.3     | Online Analytical Processing .....                               | 74        |
| 3.2.4     | External Databases and Information Retrieval .....               | 74        |
| 3.2.5     | The Internet as a Database .....                                 | 75        |
| 3.2.6     | Research on the Internet .....                                   | 76        |
| 3.3       | Literature for Chapter 3.....                                    | 78        |
| <b>4</b>  | <b>Goals, Forms and Means of Integrated Data Processing.....</b> | <b>79</b> |
| 4.1       | Goals.....   | 79        |
| 4.2       | Forms.....   | 79        |
| 4.3       | Methodological Aids.....   | 82        |
| 4.3.1     | Systems for Procedural Support.....                              | 82        |
| 4.3.1.1   | Transaction Systems.....   | 82        |
| 4.3.1.2   | Workflow Management Systems .....                                | 82        |
| 4.3.1.3   | Document Management Systems.....                                 | 83        |
| 4.3.1.4   | Workgroup Support Systems .....                                  | 83        |
| 4.3.1.5   | Knowledge Management Systems .....                               | 84        |
| 4.3.2     | Planning and Control Systems.....                                | 84        |
| 4.3.2.1   | Types of Planning and Control Systems.....                       | 85        |
| 4.3.2.2   | Aids for Preparing Management Information .....                  | 87        |
| 4.3.2.2.1 | Determination and Representation of Report Objects ...           | 87        |
| 4.3.2.2.2 | Management Support Systems.....                                  | 88        |
| 4.3.2.3   | Methods of Artificial Intelligence .....                         | 89        |

|          |   |           |
|----------|---|-----------|
| 4.3.2.4  | Methods of Operation Research and Statistics/Method Databases ..... | 90        |
| 4.4      | Literature to Chapter 4 .....                                       | 91        |
| <b>5</b> | <b>Integrated Application Systems.....</b>                          | <b>93</b> |
| 5.1      | Application Systems in the Industry Sector.....                     | 93        |
| 5.1.1    | Research and Product Development.....                               | 94        |
| 5.1.1.1  | Product Design (CAD/CAE).....                                       | 94        |
| 5.1.1.2  | Computer Aided Planning (CAP) .....                                 | 95        |
| 5.1.2    | Marketing and Sales .....   | 96        |
| 5.1.2.1  | Customer Inquiry and Sales Offer Processing.....                    | 96        |
| 5.1.2.2  | Quotation Follow-up.....  | 97        |
| 5.1.2.3  | Order Entry and Order Verification .....                            | 97        |
| 5.1.2.4  | Customer Relationship Management (CRM).....                         | 98        |
| 5.1.3    | Procurement.....  | 99        |
| 5.1.3.1  | Order Scheduling .....  | 99        |
| 5.1.3.2  | Purchasing .....  | 101       |
| 5.1.3.3  | Delivery Monitoring .....   | 102       |
| 5.1.3.4  | Goods Receiving Control .....                                       | 103       |
| 5.1.4    | Warehousing .....   | 103       |
| 5.1.4.1  | Material Valuation .....  | 103       |
| 5.1.4.2  | Inventory Control.....  | 103       |
| 5.1.4.3  | Inventory .....   | 104       |
| 5.1.4.4  | Support of Processes in the Warehouse .....                         | 104       |
| 5.1.5    | Production .....  | 105       |
| 5.1.5.1  | CIM—The Complexity Problem .....                                    | 105       |
| 5.1.5.2  | Primary Requirements Planning/MRP II .....                          | 107       |
| 5.1.5.3  | Material Requirements Planning/MRP I.....                           | 108       |
| 5.1.5.4  | Throughput Scheduling.....  | 109       |
| 5.1.5.5  | Capacity Balancing .....  | 110       |
| 5.1.5.6  | Availability Check.....   | 110       |
| 5.1.5.7  | Order Clearance.....  | 111       |
| 5.1.5.8  | Job Shop Scheduling .....   | 111       |
| 5.1.5.9  | Computer Aided Manufacturing .....                                  | 112       |
| 5.1.5.10 | Computer Aided Quality Assurance (CAQ) .....                        | 113       |
| 5.1.5.11 | Production Data Entry.....  | 114       |
| 5.1.5.12 | Production Progress Control.....                                    | 114       |
| 5.1.6    | Shipping .....  | 114       |
| 5.1.6.1  | Assignment.....   | 114       |
| 5.1.6.2  | Delivery Clearance.....   | 115       |
| 5.1.6.3  | Shipping Logistics .....  | 115       |
| 5.1.6.4  | Invoicing .....   | 116       |
| 5.1.7    | Customer Service .....  | 116       |
| 5.1.7.1  | Maintenance/Repair.....   | 116       |
| 5.1.7.2  | Customer Queries .....  | 116       |
| 5.1.8    | Finance .....   | 117       |

|           |   |     |
|-----------|---|-----|
| 5.1.9     | Accounting .....  | 117 |
| 5.1.9.1   | Cost and Result Accounting.....                           | 117 |
| 5.1.9.1.1 | Cost Center Accounting .....                              | 117 |
| 5.1.9.1.2 | Product Cost Accounting.....                              | 118 |
| 5.1.9.2   | Supplier Accounts Auditing .....                          | 119 |
| 5.1.9.3   | General Accounting.....                                   | 119 |
| 5.1.9.4   | Sub-Ledger Accounting .....                               | 120 |
| 5.1.9.4.1 | Accounts Receivable.....                                  | 120 |
| 5.1.9.4.2 | Accounts Payable.....                                     | 120 |
| 5.1.10    | Human Resources .....                                     | 120 |
| 5.1.10.1  | Work Schedule Management.....                             | 120 |
| 5.1.10.2  | Payroll Accounting .....                                  | 121 |
| 5.1.10.3  | Reporting Programs.....                                   | 121 |
| 5.1.10.4  | Special Action Programs.....                              | 121 |
| 5.1.10.5  | Employees-Tasks-Assignments.....                          | 121 |
| 5.1.11    | Facility Management.....                                  | 122 |
| 5.1.12    | An Example of a Computer-supported Planning System .....  | 122 |
| 5.1.13    | Example of a Computer-supported Control System .....      | 124 |
| 5.2       | Application Systems in the Services Sector.....           | 125 |
| 5.2.1     | Particularities of the Services Sector .....              | 125 |
| 5.2.2     | Information Systems Support of Service Processes.....     | 126 |
| 5.2.3     | Marketing in the Service Process .....                    | 129 |
| 5.2.3.1   | Special Considerations .....                              | 129 |
| 5.2.3.2   | Use of the Internet.....                                  | 130 |
| 5.2.3.3   | Micro-geographic Systems in Insurance Marketing.....      | 131 |
| 5.2.3.4   | Sales Force Support in Insurance Sales .....              | 132 |
| 5.2.4     | Performance Provision in the Service Process.....         | 134 |
| 5.2.4.1   | Special Considerations .....                              | 134 |
| 5.2.4.2   | Yield-Management Systems in the Tourism Industry .....    | 134 |
| 5.2.5     | Information and Advising in the Service Process .....     | 136 |
| 5.2.5.1   | Special Considerations .....                              | 136 |
| 5.2.5.2   | Enquiry Systems in Passenger Traffic.....                 | 136 |
| 5.2.5.3   | Advisory Systems in Retail Sales .....                    | 137 |
| 5.2.5.4   | Advisory Systems in the Bank Investments Area .....       | 138 |
| 5.2.6     | Agreement in the Service Process.....                     | 139 |
| 5.2.6.1   | Special Considerations .....                              | 139 |
| 5.2.6.2   | Individualized Magazine Offers.....                       | 139 |
| 5.2.6.3   | Securities Trading at the Electronic Stock Exchange ..... | 140 |
| 5.2.7     | Settlement in the Service Process.....                    | 142 |
| 5.2.7.1   | Special Considerations .....                              | 142 |
| 5.2.7.2   | Services in the Health Care Sector.....                   | 144 |
| 5.2.7.3   | Awarding Bank Credit .....                                | 147 |
| 5.2.7.4   | Freight Forwarding .....                                  | 148 |
| 5.2.7.5   | Services in the Hotel Business .....                      | 150 |
| 5.2.8     | Billing and Payment in the Service Process .....          | 151 |
| 5.2.8.1   | Special Considerations .....                              | 151 |
| 5.2.8.2   | Point-of-Sale Billing and Payment .....                   | 152 |

|          |   |            |
|----------|---|------------|
| 5.2.8.3  | Payment with a Pre-paid Card .....  | 155        |
| 5.2.8.4  | Payment with a Debit Card .....   | 157        |
| 5.2.8.5  | Cashless Transaction Systems of Banks .....                                     | 158        |
| 5.3      | Electronic Commerce .....   | 161        |
| 5.3.1    | Overview .....  | 161        |
| 5.3.2    | Flow of an E-Commerce Business Transaction .....                                | 163        |
| 5.4      | Integration of Enterprises through Supply Chain Management ...                  | 164        |
| 5.5      | Literature for Chapter 5 .....  | 166        |
| <b>6</b> | <b>Planning, Implementation and Deployment of<br/>Application Systems .....</b> | <b>169</b> |
| 6.1      | Fundamental Decision: Software Packages versus Individual<br>Software .....     | 169        |
| 6.2      | Structuring of Projects .....   | 171        |
| 6.2.1    | System Development Life Cycle for Custom Software .....                         | 171        |
| 6.2.1.1  | Planning Step .....   | 172        |
| 6.2.1.2  | Definition Step .....   | 172        |
| 6.2.1.3  | Design Step .....   | 174        |
| 6.2.1.4  | Implementation Step .....   | 176        |
| 6.2.1.5  | Acceptance and Introduction Step .....  | 177        |
| 6.2.1.6  | Maintenance Step .....  | 177        |
| 6.2.1.7  | Life-cycle-spanning Characteristics .....                                       | 178        |
| 6.2.2    | Prototyping for Individual Software .....                                       | 179        |
| 6.2.3    | Phase Model for Software Packages .....   | 179        |
| 6.2.3.1  | Selection and Installation .....  | 180        |
| 6.2.3.2  | Adaptation and Initialization .....   | 181        |
| 6.2.3.3  | Maintenance .....   | 181        |
| 6.3      | Project Management .....  | 182        |
| 6.3.1    | Project Organization .....  | 182        |
| 6.3.2    | Project Planning and Control .....  | 183        |
| 6.4      | Tools for Project Implementation .....  | 186        |
| 6.4.1    | Modeling Techniques .....   | 186        |
| 6.4.1.1  | Process Modeling .....  | 186        |
| 6.4.1.2  | Data Modeling .....   | 187        |
| 6.4.1.3  | Modeling of Functions .....   | 190        |
| 6.4.1.4  | Object Modeling .....   | 192        |
| 6.4.2    | Tools .....   | 194        |
| 6.4.3    | Libraries .....   | 194        |
| 6.5      | Literature for Chapter 6 .....  | 195        |