

Contents

Part A:	Architecture and Description of Integrated Information Systems	1
A.I	Architecture of Integrated Information Systems (ARIS)	4
A.I.1	Integrated Information Systems	4
A.I.2	The ARIS Approach	10
A.I.2.1	Descriptive Views	10
A.I.2.2	Descriptive Levels	13
A.II	Selecting and Representing the Description Methods Employed	17
A.II.1	Requirements Definitions	18
A.II.1.1	Requirements Definition: The Function View (Functional Structure, Process Sequence, Processing Forms)	18
A.II.1.2	Requirements Definition: The Organization View	23
A.II.1.3	Requirements Definition: The Data View	30
A.II.1.3.1	The Basic ER Model	30
A.II.1.3.2	Extended ER Models	33
A.II.1.3.2.1	Extending the Model with Design Operators	34
A.II.1.3.2.2	Event and Condition Representations	38
A.II.1.3.2.3	Extended Cardinalities	39
A.II.1.3.2.4	Identification and Existential Dependence	40
A.II.1.3.3	Alternative Forms of Representation	41
A.II.1.3.4	Establishing the Design Aids Used	43
A.II.1.3.5	An Example	44

A.II.1.4	Requirements Definition: The Control View	45
A.II.1.4.1	Combining Functions with Organization	45
A.II.1.4.2	Combining Functions with Data	46
A.II.1.4.2.1	Event Control and Data Flow	46
A.II.1.4.2.2	Object-Oriented Modeling	52
A.II.1.4.3	Combining Organization with Data	55
A.II.1.4.4	Functions - Organization - Data	57
A.II.2	Design Specifications	57
A.II.2.1	Design Specification: The Function View (Module and Transaction Design)	58
A.II.2.2	Design Specification: The Organization View (Network Topology)	60
A.II.2.3	Design Specification: The Data View (Relational Model, Network Model)	61
A.II.2.3.1	The Relational Model	62
A.II.2.3.2	The Network Model	65
A.II.2.4	Design Specification: The Control View	67
A.II.2.4.1	Combining Functions with Organization	67
A.II.2.4.2	Combining Functions with Data	67
A.II.2.4.3	Combining Organization with Data	68
A.II.2.4.4	Functions - Organization - Data	68
A.II.2.4.4.1	Trigger and Action Control	69
A.II.2.4.4.2	Distributed Data Processing	71
A.II.3	Implementation Description	72
A.II.3.1	Implementation Description: The Function View	73
A.II.3.2	Implementation Description: The Organization View	73
A.II.3.3	Implementation Description: The Data View (Database Scheme)	74
A.II.3.3.1	Relational Database Description	74
A.II.3.3.2	Network Database Description	76
A.II.3.4	Implementation Description: The Control View	77
A.III	Further Procedures	77
A.III.1	Summary of Methods Used	78
A.III.2	Tool Use	79
A.III.3	Structural Criteria and Book Format	81

Part B:	Logistics Processes	86
B.I	Production Logistics	86
B.I.1	Overview: Production Logistics Subprocesses	86
B.I.2	Primary Requirements Management	90
B.I.3	Requirements Planning	92
B.I.3.1	Overview: Requirements Planning	92
B.I.3.2	Requirements Definitions for Requirements Planning	95
B.I.3.2.1	Managing Bills of Materials	95
B.I.3.2.1.1	The Basic Bill of Materials	97
B.I.3.2.1.2	Extensions of Bills of Materials	109
B.I.3.2.1.2.1	Variants	109
B.I.3.2.1.2.2	Combined Bills of Materials	117
B.I.3.2.1.2.3	Cycles	119
B.I.3.2.2	Requirements Explosion	120
B.I.3.2.2.1	Planning Types - Planning Level - Production Level	122
B.I.3.2.2.2	Secondary Requirements, Inventory, Orders	125
B.I.3.2.2.3	Gross-Net Calculation	128
B.I.3.2.2.4	Lot Sizing	137
B.I.3.2.2.5	Inventory Management	142
B.I.3.2.2.5.1	Data Entry Functions	143
B.I.3.2.2.5.2	Analyses	145
B.I.3.2.2.5.3	Inventory	146
B.I.3.2.3	Requirements Tracking	147
B.I.3.2.3.1	Single-Level Requirements Tracking	148
B.I.3.2.3.1.1	Procedure	148
B.I.3.2.3.1.2	An Example	152
B.I.3.2.3.2	Multi-Level Requirements Tracking	156
B.I.3.2.3.2.1	Procedure	156
B.I.3.2.3.2.2	An Example	158
B.I.3.2.4	Summarizing and Supplementing the Requirements Definitions for Requirements Planning	158
B.I.3.2.4.1	Requirements Definition for Requirements Planning: The Function View	158
B.I.3.2.4.2	Requirements Definition for Requirements Planning: The Organization View	163
B.I.3.2.4.3	Requirements Definition for Requirements Planning: The Data View	164
B.I.3.2.4.4	Requirements Definition for Requirements Planning: The Control View	164
B.I.3.2.4.4.1	Functions - Organization	164

B.I.3.2.4.4.2	Functions - Data	169
B.I.3.2.4.4.3	Organization Data	173
B.I.3.2.4.4.4	Functions - Organization - Data	175
B.I.3.3	Design Specification for Requirements Planning	175
B.I.3.3.1	Design Specification for Requirements Planning: The Function View	175
B.I.3.3.2	Design Specification for Requirements Planning: The Organization View	177
B.I.3.3.3	Design Specification for Requirements Planning: The Data View	179
B.I.3.3.4	Design Specification for Requirements Planning: The Control View	187
B.I.3.3.4.1	Functions - Organization	187
B.I.3.3.4.2	Functions - Data	188
B.I.3.3.4.3	Organization - Data	188
B.I.3.3.4.4	Functions - Organization - Data	189
B.I.3.4	Implementation Description for Requirements Planning	192
B.I.3.4.1	Implementation Description for Requirements Planning: The Data View	192
B.I.3.4.2	Implementation Description for Requirements Planning: The Function View	194
B.I.4	Scheduling and Capacity Planning	198
B.I.4.1	Overview: Scheduling and Capacity Planning	198
B.I.4.2	Requirements Definitions for Scheduling and Capacity Planning	200
B.I.4.2.1	Basic Data Management	200
B.I.4.2.1.1	Routings and Resources	201
B.I.4.2.1.2	An Example	216
B.I.4.2.1.3	Analyses	218
B.I.4.2.2	Medium-Term Capacity Planning	219
B.I.4.2.2.1	Supplementing Production Order Data	219
B.I.4.2.2.2	Scheduling without Regard to Capacity Limits	226
B.I.4.2.2.2.1	Throughput Scheduling	226
B.I.4.2.2.2.2	Capacity Overviews	230
B.I.4.2.2.3	Scheduling with Regard to Capacity Effects	232
B.I.4.2.2.4	Integrating Requirements Planning and Scheduling	237
B.I.4.2.3	Summarizing and Supplementing the Requirements Definitions for Scheduling and Capacity Planning	245
B.I.4.2.3.1	Requirements Definition for Scheduling and Capacity Planning: The Function View	246
B.I.4.2.3.2	Requirements Definition for Scheduling and Capacity Planning: The Organization View	248
B.I.4.2.3.3	Requirements Definition for Scheduling and Capacity Planning: The Data View	250

B.I.4.2.3.4	Requirements Definition for Scheduling and Capacity Planning: The Control View	250
B.I.4.2.3.4.1	Functions - Organization	250
B.I.4.2.3.4.2	Functions - Data	250
B.I.4.2.3.4.3	Organization - Data	252
B.I.4.2.3.4.4	Functions - Organization - Data	253
B.I.4.3	Design Specifications for Scheduling and Capacity Planning	253
B.I.4.3.1	Design Specification for Scheduling and Capacity Planning: The Function View	253
B.I.4.3.2	Design Specification for Scheduling and Capacity Planning: The Organization View	255
B.I.4.3.3	Design Specification for Scheduling and Capacity Planning: The Data View	255
B.I.4.3.4	Design Specification for Scheduling and Capacity Planning: The Control View	257
B.I.4.4	Implementation Description for Scheduling and Capacity Planning	258
B.I.5	Production (CAM in the Broader Sense)	259
B.I.5.1	Overview: Production	259
B.I.5.2	Requirements Definitions for Production	268
B.I.5.2.1	Order Release	268
B.I.5.2.1.1	Static and Dynamic Availability Checks	273
B.I.5.2.1.2	Order Release and Distribution	275
B.I.5.2.2	Detailed Scheduling	283
B.I.5.2.2.1	Data Management	283
B.I.5.2.2.2	Information Objects for Detailed Scheduling	285
B.I.5.2.2.3	Leitstand Organization	293
B.I.5.2.2.4	A Simple Algorithm for Detailed Scheduling	297
B.I.5.2.3	CAM in the Narrower Sense	299
B.I.5.2.3.1	NC Machines	299
B.I.5.2.3.2	Toolmaking and Tooling Control	305
B.I.5.2.3.3	Warehouse Control	307
B.I.5.2.3.4	Materials Handling Control	311
B.I.5.2.3.5	Quality Assurance	314
B.I.5.2.3.6	Maintenance	320
B.I.5.2.4	Factory Data Entry	324
B.I.5.2.5	Production Information System - Production Monitoring - Production Controlling	329
B.I.5.2.6	Summarizing and Supplementing the Requirements Definitions for Production	335
B.I.5.2.6.1	Requirements Definition for Production: The Function View	336

B.I.5.2.6.2	Requirements Definition for Production: The Organization View	339
B.I.5.2.6.2.1	Computer-Supported Forms of Organization for Production Flexibility	339
B.I.5.2.6.2.2	The Object-Oriented Organizational Model	343
B.I.5.2.6.3	Requirements Definition for Production: The Data View	346
B.I.5.2.6.4	Requirements Definition for Production: The Control View	347
B.I.5.3	Design Specifications for Production	352
B.I.5.3.1	Design Specification for Production: The Function View	352
B.I.5.3.2	Design Specification for Production: The Organization View	353
B.I.5.3.2.1	Network Topologies for Functional and Object- Oriented Organizational Models	355
B.I.5.3.2.2	Network Standards for Production	357
B.I.5.3.3	Design Specification for Production: The Data View	363
B.I.5.3.4	Design Specification for Production: The Control View	367
B.I.5.4	Implementation Description for Production	369
B.I.6	Application Systems for Production Logistics	369
B.I.6.1	Change in Emphasis between Planning and Control	369
B.I.6.2	Parameters and Scenarios	372
B.I.6.3	Special Forms	381
B.I.6.3.1	KANBAN	381
B.I.6.3.2	Progress Numbers	382
B.I.6.4	Standard Software for Production Logistics	383
B.II	Inbound and Outbound Logistics	386
B.II.1	Overview: Inbound and Outbound Logistics	387
B.II.2	Requirements Definition for Inbound and Outbound Logistics	392
B.II.2.1	Inbound Logistics	392
B.II.2.1.1	Basic Data Management	396
B.II.2.1.1.1	Data on Goods and Suppliers	396
B.II.2.1.1.2	Documents and Terms	400
B.II.2.1.1.3	Texts	402
B.II.2.1.1.4	Account Coding	402
B.II.2.1.2	Purchasing Process	404
B.II.2.1.2.1	Requirements and Purchasing Requisitions	405

B.II.2.1.2.2	Selecting Suppliers and Determining Quantities to be Ordered	409
B.II.2.1.2.3	Data Transfer	411
B.II.2.1.2.4	Purchase Order Control	411
B.II.2.1.2.5	Receiving	412
B.II.2.1.2.6	Invoice Control	415
B.II.2.1.2.7	Payment Procedures	417
B.II.2.1.2.8	Potential for Simplifying the Purchasing Process	418
B.II.2.1.2.9	Analyses	423
B.II.2.1.3	Special Purchasing Processes	424
B.II.2.2	Outbound Logistics	425
B.II.2.2.1	Basic Data Management	426
B.II.2.2.1.1	Data on Articles and Customers	426
B.II.2.2.1.2	Documents and Terms	431
B.II.2.2.1.3	Texts and Price Rules	431
B.II.2.2.1.4	Account Coding	432
B.II.2.2.2	Sales Process	432
B.II.2.2.2.1	Inquiry Processing and Quote Preparation	432
B.II.2.2.2.2	Order Acceptance and Control	436
B.II.2.2.2.2.1	Standard Articles	436
B.II.2.2.2.2.2	One-Off Production and Project Management	438
B.II.2.2.2.3	Shipping	441
B.II.2.2.2.4	Invoicing	443
B.II.2.2.2.5	Payment Procedures	444
B.II.2.2.2.6	Potential for Simplifying the Sales Process	445
B.II.2.2.2.7	Analyses	448
B.II.2.3	Summarizing and Supplementing the Requirements Definitions for Inbound and Outbound Logistics	448
B.II.2.3.1	Requirements Definition for Inbound and Outbound Logistics: The Function View	448
B.II.2.3.2	Requirements Definition for Inbound and Outbound Logistics: The Organization View	451
B.II.2.3.3	Requirements Definition for Inbound and Outbound Logistics: The Data View	454
B.II.2.3.4	Requirements Definition for Inbound and Outbound Logistics: The Control View	456
B.II.3	Design Specifications for Inbound and Outbound Logistics	457
B.II.3.1	Design Specification for Inbound and Outbound Logistics: The Function View	457
B.II.3.2	Design Specification for Inbound and Outbound Logistics: The Organization View	457
B.II.3.3	Design Specification for Inbound and Outbound Logistics: The Data View	459

B.II.3.4	Design Specification for Inbound and Outbound Logistics: The Control View	460
B.II.4	Implementation Description for Inbound and Outbound Logistics	460
B.III	Human Resource Logistics	461
B.III.1	Overview: Human Resource Logistics	461
B.III.2	Requirements Definitions for Human Resource Logistics	466
B.III.2.1	Basic Data Management	466
B.III.2.2	Human Resource Accounting	470
B.III.2.2.1	Time and Performance Data Capture for Calculating Gross Pay	471
B.III.2.2.2	Net Pay Calculation	474
B.III.2.2.3	Data Interchange	477
B.III.2.3	Human Resource Planning	477
B.III.2.3.1	Human Resource Requirements Planning	478
B.III.2.3.2	Human Resource Recruitment Planning	480
B.III.2.3.3	Human Resource Placement Planning	480
B.III.2.3.4	Human Resource Development Planning	482
B.III.2.4	Summarizing and Supplementing the Requirements Definitions for Human Resource Logistics	483
B.III.2.4.1	Requirements Definition for Human Resource Logistics: The Function View	483
B.III.2.4.2	Requirements Definition for Human Resource Logistics: The Organization View	484
B.III.2.4.3	Requirements Definition for Human Resource Logistics: The Data View	485
B.III.2.4.4	Requirements Definition for Human Resource Logistics: The Control View	485
B.III.3	Design Specifications for Human Resource Logistics	486
B.III.4	Implementation Description for Human Resource Logistics	486
B.IV	Overall Concepts for Logistics	487

B.IV.1	Integrated Planning of Sales, Production and Purchasing Programs (Primary Requirements Planning)	487
B.IV.1.1	Data Consolidation	488
B.IV.1.2	Linking Rough and Detailed Planning in Sequential Planning Systems	493
B.IV.1.3	Linking Simultaneous Rough Planning Models with Sequential Planning Systems	496
B.IV.2	MRP II	501
B.IV.3	Job Control Center with Networked Segmentation	503
 Teil C:	 Integrated Product Development Processes	 517
 C.I	 Overview: The Product Development Process	 517
 C.II	 Requirements Definitions for Product Development	 526
C.II.1	Marketing	526
C.II.1.1	Basic Data Management: Marketing Information Systems (MAIS)	527
C.II.1.2	Decision Support	534
C.II.2	Design Engineering	538
C.II.2.1	Basic Data Management: Product Models	541
C.II.2.1.1	Integrated Product Models for Design	541
C.II.2.1.2	Topological/Geometrical Product Models	544
C.II.2.1.3	Relationships between Geometry Management and Bill of Materials Management	550
C.II.2.1.4	CAD Interface Standards	551
C.II.2.2	Design Process	553
C.II.2.2.1	Phase-Oriented Design Process	554
C.II.2.2.2	Distributed Design	554
C.II.3	Process Planning (CAP)	558

C.II.3.1	Basic Data Management	561
C.II.3.2	Process Planning Process	568
C.II.4	Quality Assurance	569
C.II.5	Planning Tooling and Fixtures	570
C.II.6	Development-Concurrent Costing	570
C.II.6.1	Data Management	573
C.II.6.2	Development-Concurrent Costing Process	575
C.II.7	Planning Disposal and Recycling	577
C.II.8	Summarizing and Supplementing the Requirements Definitions for Product Development	579
C.II.8.1	Requirements Definition for Product Development: The Function View	580
C.II.8.2	Requirements Definition for Product Development: The Organization View	582
C.II.8.3	Requirements Definition for Product Development: The Data View	585
C.II.8.4	Requirements Definition for Product Development: The Control View	587
C.III	Design Specifications for Product Development	590
C.III.1	Design Specification for Product Development: The Function View	590
C.III.2	Design Specification for Product Development: The Organization View	590
C.III.3	Design Specification for Product Development: The Data View	593
C.III.4	Design Specification for Product Development: The Control View	599
C.IV	Implementation Description for Product Development	601

Part D: Information and Coordination Processes 603

D.I	Accounting (Value-Oriented Information and Coordination Processes)	603
D.I.1	Overview: Accounting	603
D.I.2	Requirements Definitions for Accounting	608
D.I.2.1	Financial Accounting	609
D.I.2.1.1	Basic Data Management	610
D.I.2.1.1.1	Accounts	610
D.I.2.1.1.2	Entries and Documents	615
D.I.2.1.2	Posting Procedures	619
D.I.2.2	Cost and Income Accounting	625
D.I.2.2.1	Basic Data Management	626
D.I.2.2.1.1	Cost and Income Categories	628
D.I.2.2.1.2	Cost Centers	631
D.I.2.2.1.3	Reference Variables/Cost Drivers	633
D.I.2.2.1.4	Cost Objectives	635
D.I.2.2.2	Cost and Income Accounting Process	636
D.I.2.2.2.1	Cost and Income Category Accounting	636
D.I.2.2.2.2	Cost Center Accounting	637
D.I.2.2.2.2.1	Overhead Cost Allocation	637
D.I.2.2.2.2.2	Cost Planning and Analysis	641
D.I.2.2.2.3	Cost Objective Accounting	644
D.I.2.2.2.3.1	Product Costing	645
D.I.2.2.2.3.2	Period Costing	651
D.I.2.2.2.4	Activity-Based Costing	654
D.I.2.3	Controlling/EIS	657
D.I.2.4	Summarizing and Supplementing the Requirements Definitions for Accounting	660
D.I.2.4.1	Requirements Definition for Accounting: The Function View	660
D.I.2.4.2	Requirements Definition for Accounting: The Organization View	662
D.I.2.4.3	Requirements Definition for Accounting: The Data View	663
D.I.2.4.4	Requirements Definition for Accounting: The Control View	663
D.I.3	Design Specifications for Accounting	664

D.II	Information Management	668
D.II.1	Overview: Information Management	668
D.II.2	Requirements Definitions for Information Management	675
D.II.2.1	Basic Data Management (ARIS Information Model)	675
D.II.2.1.1	Functions	678
D.II.2.1.2	Organization	680
D.II.2.1.3	Data	680
D.II.2.1.4	Control	681
D.II.2.2	Project Process (Application Development)	682
D.II.2.2.1	General ARIS Procedural Model	682
D.II.2.2.2	Detailed Procedural Model for Developing an Enterprise-Wide Data Model (EDM)	686
D.II.2.2.2.1	Project Process	686
D.II.2.2.2.2	Top-down or Bottom-up Procedure	689
D.II.2.2.2.3	Degrees of Consolidation in Data Models	694
D.II.2.3	Workflow Management	695
D.II.2.3.1	Characteristics of Office Activities	697
D.II.2.3.2	Message Exchange	698
D.II.2.3.3	Personal Resource Management	701
D.II.2.4	Summarizing and Supplementing the Requirements Definitions for Information Management	702
D.II.2.4.1	Requirements Definition for Information Management: The Function View	705
D.II.2.4.2	Requirements Definition for Information Management: The Organization View	705
D.II.2.4.3	Requirements Definition for Information Management: The Data View	706
D.II.2.4.4	Requirements Definition for Information Management: The Control View	706
D.II.3	Design Specifications for Information Management	706
Literature		711
Abbreviations		743
Index		747