
Contents

1	Business Process Management	1
1.1	History of Business Process Management	2
1.2	Definition of Business Process Management	4
1.3	Definition of Business Process Modeling	7
1.4	Business Process Modeling and Errors	12
1.5	Summary	14
2	Event-Driven Process Chains (EPC)	17
2.1	EPC Notation	18
2.2	EPC Syntax	20
2.2.1	Approaches to EPC Syntax Formalization	21
2.2.2	Formal Syntax Definition of Flat EPCs	22
2.2.3	Formal Syntax Definition of Hierarchical EPCs	26
2.2.4	Formal Syntax Definition of Standard EPCs	28
2.3	EPC Syntax Extensions	28
2.3.1	Control Flow Extensions	29
2.3.2	Configurability Extensions	30
2.4	EPC Semantics	30
2.4.1	Informal Semantics as a Starting Point	31
2.4.2	EPC Formalization Problems	31
2.4.3	Approaches to EPC Semantics Formalization	34
2.4.4	EPC Semantics Based on State and Context	40
2.4.5	Reachability Graph of EPCs	47
2.4.6	Tool Support for EPC Semantics	50
2.5	EPCs and Other Process Modeling Languages	55
2.5.1	Comparison Based on Routing Elements	55
2.5.2	Comparison Based on Workflow Patterns	56
2.6	Summary	56

3	Verification of EPC Soundness	59
3.1	Soundness of EPCs	59
3.1.1	Correctness Criteria for Business Process Models	59
3.1.2	Definition of EPC Soundness	62
3.2	Reachability Graph Verification of Soundness	64
3.3	Verification by Reduction Rules	67
3.3.1	Related Work on Reduction Rules	69
3.3.2	A Reduction Kit for EPCs	72
3.3.3	A Reduction Algorithm for EPCs	91
3.3.4	Reduction of the SAP Reference Model	95
3.4	Summary	102
4	Metrics for Business Process Models	103
4.1	Measurement Theory	104
4.2	Metrics in Network Analysis	107
4.3	Metrics in the Software Engineering Process	110
4.4	Related Work on Metrics for Process Models	114
4.5	Definition of Metrics for Process Models	117
4.5.1	Size	118
4.5.2	Density	119
4.5.3	Partitionability	121
4.5.4	Connector Interplay	125
4.5.5	Cyclicity	127
4.5.6	Concurrency	128
4.6	Calculating Metrics	130
4.7	Summary	133
5	Validation of Metrics as Error Predictors	135
5.1	Analysis Data Generation	135
5.2	The Sample of EPC Models	136
5.2.1	How Do the Four Groups Differ?	137
5.2.2	How Do Correct and Incorrect Models Differ?	140
5.2.3	Correlation Analysis	140
5.3	Logistic Regression	143
5.3.1	Introduction to Logistic Regression	143
5.3.2	Preparatory Analyses	144
5.3.3	Multivariate Logistic Regression Model	145
5.4	External Validation	147
5.5	Summary	150
6	Implications for Business Process Modeling	151
6.1	Seven Process Modeling Guidelines (7PMG)	152
6.2	Discussion	153
6.3	Future Research	154

A Transition Relation of EPCs Based on State and Context 155

 A.1 Phase 1: Transition Relation for Dead Context Propagation 155

 A.2 Phase 2: Transition Relation for Wait Context Propagation 156

 A.3 Phase 3: Transition Relation for Negative State Propagation 159

 A.4 Phase 4: Transition Relation for Positive State Propagation 160

References 165

Index 191