

Contents

1	The Patterns of HCI Design: Origin, Perceptions, and Misconceptions	1
1.1	Original Ideas About Design Pattern	1
1.2	HCI Design Patterns—A Working Definition	4
1.3	Examples of Patterns in HCI.....	5
1.4	Pattern Benefits.....	7
1.5	Misconceptions About Design Patterns	9
1.6	Why and How Design Patterns Can Make a Difference?.....	10
	References.....	12
2	From HCI Patterns Languages to Pattern-Oriented Design	15
2.1	Patterns as Tool to Capture Design Knowledge and Best Practices....	15
2.2	HCI Design Pattern Languages.....	18
2.3	HCI Pattern Languages and the User-Centered Design Process.....	20
2.4	Pattern Supported Approach (PSA).....	22
2.5	Pattern-Oriented Design.....	24
2.6	Key Contributions of the Chapter	31
	References.....	32
3	HCI Design Patterns as a Building Block in Model-Driven Engineering	35
3.1	Motivations	35
3.2	Patterns and User Interface Model-Driven Engineering.....	36
3.3	Pattern-Driven and MBUI (PD-MBUI) Framework.....	38
	3.3.1 Basic Concepts and Terminology	38
	3.3.2 PD-MBUI Major Models.....	39
3.4	Examples of Patterns.....	41
	3.4.1 HCI Patterns Taxonomy and Samples	41
	3.4.2 Patterns Instantiation and Application	41
3.5	Examples of Models Construction Using Patterns	44
	3.5.1 Patterns in Task Modeling.....	44
	3.5.2 Patterns in Dialog Modeling	46

3.5.3	Patterns in Presentation Modeling	47
3.5.4	Patterns in Layout Management Modeling.....	48
3.6	An Illustrative Case Study	50
3.6.1	The Task Model.....	50
3.6.2	Completing the Find Room Task	52
3.6.3	Designing the Dialog Structure.....	52
3.6.4	Defining the Presentation and Layout Model	54
3.7	Key Contributions of This Chapter.....	56
	References.....	58
4	Adding Usability Quality Attributes into Interactive Systems	
	Architecture: A Pattern-Based Approach	59
4.1	Software Architecture—A Definition	59
4.2	Drawbacks and Fundamentals	61
4.3	A Pattern-Based Integration of Usability in Architecture	62
4.4	Identifying and Categorizing Typical Scenarios.....	63
4.5	From Scenario to Design Patterns.....	67
4.5.1	System Design Patterns.....	68
4.5.2	Interaction Design (HCI) Patterns	72
4.6	Modeling the Cause–Effect Relationships Between the Model and User Interface.....	75
4.7	Application.....	78
4.8	Key Contributions of this Chapter	79
	References.....	80
5	A Pattern Framework for Task Modeling in Smart Environments.....	81
5.1	Task Modeling for User Interface	81
5.2	Proposed Pattern Framework for Task Modeling	82
5.3	Task Modeling Patterns Notation.....	83
5.3.1	The Model-Based Approach We Used.....	83
5.3.2	Pattern Notation	84
5.4	Pattern References and Pattern Interfaces.....	90
5.4.1	Example of a Pattern.....	90
5.4.2	Application of Patterns.....	91
5.5	Case Study: Task Modelling in Smart Environments	96
5.6	Summary	104
	References.....	105
6	HCI Patterns in Multiplatform Mobile Applications	
	Reengineering	109
6.1	On the Needs for Reengineering.....	109
6.2	Steps in User Interface Reengineering.....	111
6.2.1	Reverse Engineering	111
6.2.2	Transformation.....	112
6.2.3	Forward Engineering	112

6.3	Patterns in Reengineering	113
6.3.1	A Brief Overview on Patterns	113
6.3.2	The Various Role of Patterns in the UI Reengineering Process	114
6.4	Examples of UI Reengineering with Patterns	116
6.4.1	Migration from Text-Based to GUI for Legacy Interactive Systems	116
6.4.2	Reengineering a Web-Based Interface for Small Devices	117
6.4.3	Reengineering Navigation Systems to different Architecture Sizes	118
6.5	Key Issues and Contributions	121
	References	121
7	Generative Patterns for Cross-Platform User Interfaces: The Case of the Master-Detail Pattern	123
7.1	Introduction	123
7.2	Related Work	125
7.2.1	Master-Detail Pattern—An Operational Definition	125
7.2.2	The M-D Pattern Usage in Pattern Collections	127
7.2.3	The Master-Detail as a Generative Pattern	128
7.2.4	Previous Work on M-D Pattern	130
7.2.5	Shortcomings and Requirements	132
7.3	Revisiting the M-D Pattern Description	133
7.4	Integrate the M-D Pattern in the Whole UI Development Process	136
7.4.1	Task Model	136
7.4.2	Domain Model	136
7.4.3	Abstract User Interface Model	139
7.4.4	Concrete User Interface	139
7.4.5	The M-D Pattern Application Support Toward FUI	140
7.5	The M-D Pattern Application Support	145
7.5.1	Support for M-D Pattern Application	146
7.5.2	M-D Pattern Presentation for Tabbed List Presentation in Mobile Application	148
7.5.3	M-D Pattern in Grouped, Ordered, or Structured List Presentation	149
7.6	Contributions of the Chapter	150
	References	151
8	POMA: Pattern-Oriented and Model-Driven Architecture	155
8.1	Key Concepts of POMA	155
8.2	POMA Overview	157
8.3	POMA Justifications	157
8.4	POMA Specifications and Representation	159
8.4.1	The eXtensible Markup Language (XML) Notation	159
8.4.2	The Unified Modeling Language (UML) Notation	160

8.5	Architectural Levels and Categories of Patterns, Composition, and Mapping Rules.....	160
8.5.1	Architectural Levels and Categories of Patterns.....	161
8.5.2	Patterns Composition.....	168
8.5.3	Patterns Mapping.....	169
8.6	Model Categorizations.....	175
8.6.1	Domain Model.....	176
8.6.2	Task Model.....	176
8.6.3	Dialog Model.....	177
8.6.4	Presentation Model.....	177
8.6.5	Layout Model.....	178
8.6.6	Transformation Rules.....	178
8.7	Key Issues and Contributions.....	179
	References.....	179
9	Patterns in Web-Based Information Systems.....	181
9.1	Introduction.....	181
9.2	Design Challenges of Web Applications.....	183
9.3	Web Design Principles.....	185
9.4	Case Study: A Detailed Discussion.....	186
9.4.1	Overview.....	186
9.4.2	Defining the Domain Model.....	188
9.4.3	Defining the Task Model.....	193
9.4.4	Defining the Dialog Model.....	201
9.4.5	Defining the Presentation and Layout Models.....	205
9.5	Key Issues and Contributions.....	215
	References.....	216
10	HCI Pattern Capture and Dissemination: Practices, Lifecycle, and Tools.....	219
10.1	Capture and Reuse of HCI (Human–Computer Interaction) Patterns.....	219
10.2	A Survey on Patterns Usages.....	221
10.2.1	The Survey Structure and Population.....	222
10.2.2	Analysis Method and Key Findings.....	222
10.3	An Extended Schema for Representing Patterns.....	225
10.3.1	Why a Schema?.....	225
10.3.2	A Schema for a Generalized Pattern Model.....	226
10.4	Modeling the Pattern Discovery and Dissemination Life Cycle.....	229
10.4.1	The Challenges of Dissemination.....	230
10.4.2	The 7C’s Lifecycle for Collection and Dissemination of Patterns.....	230
10.4.3	Qualities of Design Patterns.....	233

10.5 Tools Support for Pattern Reuse and Dissemination	234
10.5.1 An Online Database for Patterns Documentation and Sharing.....	235
10.5.2 Pattern-Based Assisted Dissemination and Design Environment.....	237
10.6 Key Contributions	240
References.....	241
11 PatternCity: A Gamification Approach to Collaborative Discovery and Delivery of HCI Design Pattern.....	243
11.1 Introduction.....	243
11.2 The Problem of Representing and Delivering HCI Design Patterns.....	244
11.2.1 Early Prototype	246
11.2.2 Exploration Phase	247
11.2.3 The PatternCity Concept.....	249
11.2.4 Implementation	251
11.3 Conclusion	255
Appendix A	256
References.....	257
12 A Pedagogic Pattern Model for Upskilling Software Engineering Students in HCI Design Practice.....	259
12.1 Introduction.....	259
12.2 A Five-Step Approach to Using a Pedagogic Pattern Model	262
12.2.1 General Description and Context.....	263
12.2.2 Spatiotemporal Boundary Markers	263
12.2.3 Overall Action Plan of Pedagogical Techniques/Tools.....	264
12.2.4 Group Interactions Between Poles of the Pedagogic Triangle.....	265
12.2.5 Feedback	265
12.3 Case Study in HCI Design.....	265
12.3.1 Protocol.....	265
12.3.2 Spatiotemporal Boundary Markers	266
12.3.3 Action Plan of Pedagogical Techniques or Tools Used	267
12.3.4 Group Interactions at Each Pole of the Pedagogic Triangle	269
12.3.5 Feedback	270
12.4 Conclusions.....	270
References.....	271