

# Contents

<b>Preface</b>	<b>1</b>
1 What is MOKA?	2
2 Aims and structure of the MOKA guides	2
3 The contents of this book	3
4 Assumptions made about you	4
5 The 'Actors' in MOKA	6
6 The layout of the chapters	6
7 The style of this book	7
8 The people behind MOKA	7
<b>Chapter 1 Knowledge Based Engineering</b>	<b>9</b>
1.1 What is Knowledge Based Engineering?	10
1.2 What can KBE offer?	11
1.3 What is MOKA?	14
1.4 What does MOKA do that other methodologies don't?	14
<b>Chapter 2 MOKA</b>	<b>19</b>
2.1 What is MOKA?	20
2.2 What were the objectives for MOKA?	20
2.3 What were the inspirations for MOKA?	24
2.4 When should you use MOKA?	28
2.5 What do you need to use MOKA?	29
2.6 How does MOKA work?	30
2.7 MOKA lifecycle and Route Map	30
2.8 MOKA knowledge representation	31
2.9 MOKA software tool	33
2.10 MOKA case studies	34
<b>Chapter 3 The KBE Lifecycle</b>	<b>41</b>
3.1 KBE lifecycle	42
3.2 IDENTIFY	45
3.3 JUSTIFY	46
3.4 CAPTURE	47
3.5 FORMALIZE	49
3.6 PACKAGE	51
3.7 ACTIVATE	52
3.8 How does MOKA represent the lifecycle?	52

<b>Chapter 4 IDENTIFY/JUSTIFY Steps</b>	<b>55</b>
4.1 The early stages, KBE and MOKA	56
4.2 The IDENTIFY step	57
4.3 The JUSTIFY step	64
<b>Chapter 5 Collecting Knowledge</b>	<b>71</b>
5.1 Collecting Knowledge – part of the CAPTURE step	72
5.2 A3.1 Prepare for collection	73
5.3 A3.2 Collect required knowledge	77
5.4 Methods of eliciting knowledge	78
5.5 Methods of analysis	81
Table: Comprehensive list of the types of knowledge associated with engineering design	82
<b>Chapter 6 Structuring Knowledge</b>	<b>87</b>
6.1 Why bother to 'structure knowledge'?	88
6.2 What are the outputs from structuring knowledge	89
6.3 The steps involved in Structure	91
6.4 Who should be involved with structuring knowledge	96
<b>Chapter 7 ICARE Forms</b>	<b>99</b>
7.1 What are ICARE forms?	100
7.2 How do ICARE forms function within the MOKA Informal Model?	101
7.3 The 'Entity' form (E-form)	102
7.4 The 'Activity' form (A-form)	116
7.5 The 'Constraint' form (C-form)	123
7.6 The 'Rule' form (R-form)	129
7.7 The 'Illustration' form (I-form)	134
7.8 Navigating the forms	136
7.9 Verifying the ICARE forms	136
<b>Chapter 8 Informal Model Charts</b>	<b>141</b>
8.1 What are MOKA charts?	142
8.2 Why are charts optional in MOKA?	142
8.3 Links between the ICARE forms	142
8.4 Charts available in MOKA	144
8.5 Using the charts to construct the Informal Model	150
<b>Chapter 9 Transferring Raw Knowledge</b>	<b>153</b>
9.1 The basic process	154
9.2 The output: elements of the Informal Model	154
9.3 The structuring process	155
9.4 The role of a software tool in transferring knowledge	156
9.5 Dividing up the raw knowledge into objects	159
9.6 Linking the ICARE elements	163
9.7 Common methods of transferring the raw knowledge	164
9.8 Checking the Informal Model	166
9.9 What can the Informal Model be used for?	169

<b>Chapter 10 Formalizing Knowledge</b>	<b>175</b>
10.1 Why bother to 'formalize' knowledge?	176
10.2 How does the Formal Model relate to the Informal Model?	178
10.3 The basis for the Formal Model	178
10.4 The role of MML in the construction of Formal Models	179
10.5 More about the Formal Model	183
10.6 The steps involved in formalizing	186
10.7 Who should be involved in the FORMALIZE process?	189
<b>Chapter 11 Product Model</b>	<b>193</b>
11.1 What is the Product Model?	194
11.2 The basis of the Product Model	194
11.3 Handling constraints	199
11.4 The Product Meta-model	203
11.5 The Structure View	203
11.6 The Function View	206
11.7 The Behaviour View	208
11.8 The Technology View	211
11.9 The Representation View	212
11.10 The relationship of the Product Model to the Informal Model	214
<b>Chapter 12 Design Process Model</b>	<b>219</b>
12.1 What is the Design Process Model?	220
12.2 Challenges for modelling the design process	220
12.3 An Abstract Model of the design process	221
12.4 The underlying concepts of the MOKA DPM	222
12.5 Static and dynamic processes	225
12.6 UML Activity Diagrams	226
12.7 MML extensions to the UML Activity Diagram	229
12.8 Strategy description	231
12.9 Links between the Design Process and the Product Models	232
12.10 Alternative ways to represent the Design Process Model	233
12.11 Relationship of the MML Design Process Model to the Abstract Model	234
12.12 Relationship of the Design Process Model to the Informal Model	234
<b>Chapter 13 Transferring Knowledge Between Informal and Formal Models</b>	<b>237</b>
13.1 Guidelines – not rules	238
13.2 Guiding strategy	238
13.3 Choosing a framework	241
13.4 Iterations in building the Formal Model	242
13.5 Modelling using the design process as the framework	243
13.6 Modelling using the product as the framework	244
13.7 Checking completeness of the models	246
13.8 Checking boundary definition	247
13.9 Handling 'management information' in the Formal Model	247

13.10	Handling the links between the Informal and Formal Models	248
13.11	Frequently asked questions about the Formal Model	248
<b>Chapter 14 Using MOKA Models in KBE Systems</b>		<b>251</b>
14.1	The PACKAGE step	252
14.2	Retrieving the MOKA Formal Models	253
14.3	Transferring Knowledge to the KBE platform	255
14.4	Building and testing an application	260
14.5	Example of a translated MOKA Model	262
14.6	Introducing new knowledge to existing KBE applications	263
<b>Chapter 15 Activating Models</b>		<b>267</b>
15.1	The ACTIVATE step	268
15.2	Inputs, outputs, and objectives of ACTIVATE	269
15.3	Linking new KBE applications to existing modules	273
<b>Chapter 16 Knowledge Sharing and Re-use</b>		<b>277</b>
16.1	Extending the <i>usefulness</i> of knowledge	278
16.2	Views on sharing and re-use of knowledge	279
16.3	MOKA and knowledge sharing/re-use	280
16.4	MOKA Models in a virtual enterprise	282
16.5	New applications	282
16.6	Using MOKA Models alongside other representations	283
16.7	Maintaining applications based on MOKA	284
16.8	Decisions concerning maintenance	285
<b>The Future of MOKA</b>		<b>289</b>
<b>Glossary of frequently used acronyms and symbols</b>		<b>291</b>
<b>Index</b>		<b>293</b>