

AN INTRODUCTION TO

REQUIREMENTS ENGINEERING

IAN K. BRAY




ADDISON
WESLEY

Contents

Acknowledgements	xi
Part 1 – The topics	1
1 Introduction	3
1.1 Is this book for you?	3
1.2 Know the beast	4
1.3 Does requirements engineering really matter?	5
1.4 The nature of requirements engineering	7
1.5 The problem domain (and other domains)	8
1.6 Requirements	14
1.7 Exercises	20
2 The requirements engineering process	23
2.1 Analysis	24
2.2 Elicitation	26
2.3 Specification	27
2.4 Human to machine interface design	29
2.5 Validation	29
2.6 A requirements engineering process model	30
2.7 Design (and 'analysis and design')	34
2.8 Problem data vs solution data	36
2.9 Modelling static data	37
2.10 Other activities	38
2.11 Exercises	39
3 Elicitation	41
3.1 The information to elicit	42
3.2 Sources of information	42
3.3 Elicitation techniques	44

viii Contents

3.4	Elicitation strategy	45
3.5	Exercises	49
4	Analysis	51
4.1	The trouble with analysis	52
4.2	Approaches to analysis	53
4.3	Structured analysis	54
4.4	Object oriented analysis	77
4.5	Problem domain oriented analysis	92
4.6	Writing requirements	127
4.7	Summary of analysis	128
4.8	The requirements document	129
4.9	Exercises	133
5	Specification	135
5.1	Introduction	135
5.2	External design (edesign)	140
5.3	Documenting behaviour	144
5.4	The specification document	160
5.5	Approaches to specification	171
5.6	Specification techniques and mechanisms	184
5.7	Specification examples	185
5.8	Exercises	203
6	Validation	210
6.1	Simple checks	210
6.2	Review	211
6.3	Logical analysis	211
6.4	Prototypes, use-cases, etc.	212
6.5	Functional test design	212
6.6	User manual development	213
7	Where next?	214
	Part 2 – Technology	217
8	Techniques	219
8.1	Notations	219
8.2	Methods	220
8.3	Tools	221
8.4	Technique selection	221

9	Elicitation techniques	223
9.1	Background reading	223
9.2	Interviewing	224
9.3	Questionnaires	229
9.4	Document inspection	229
9.5	Task observation	230
9.6	Ethnography	232
9.7	Use-cases and scenarios	232
9.8	Brainstorming	233
9.9	Requirements stripping	234
10	Modelling techniques	235
10.1	Representational modelling	235
10.2	Behavioural modelling	236
10.3	Structural modelling	237
10.4	Modelling technique classification	237
11	Representational modelling	239
11.1	Indications for use	239
11.2	Static representational modelling	239
11.3	Dynamic representational modelling (prototypes)	241
12	Behavioural (functional) modelling	245
12.1	Function statements and functional decomposition	245
12.2	Task analysis	249
12.3	Use-cases and scenarios	250
12.4	Decision tables	259
12.5	State-based techniques	266
12.6	Finite state machines	266
12.7	Petri nets	283
13	Internal modelling	291
13.1	Process oriented techniques	291
13.2	Algorithmic techniques	301
13.3	Data structure oriented techniques	302
13.4	Process/data combination	311
14	Text-based definition	318
14.1	Formality of text	319
14.2	Natural language	319

x Contents

14.3	'Unnatural' language	323
14.4	Means and ends	329
14.5	Data dictionary	334
Part 3 – Case studies		335
15	The yacht racing results (YRR) case study	337
15.1	Elicitation plan	337
15.2	Elicitation notes	337
15.3	Requirements document	340
15.4	Specification	346
16	The lift controller case study	357
16.1	Elicitation notes	357
16.2	Requirements document	358
16.3	Specification	365
17	The F2K drill file translation case study	371
17.1	Requirements document	371
17.2	Specification	374
18	The Petri net diagram tool case study	376
18.1	Requirements document	376
18.2	Specification	379
19	References	385
20	Bibliography	391
21	Glossary	394
22	Abbreviations	400
23	Index	403