

Overview Contents

Preface	1
1 Point of Departure	1
2 Research Objectives and Structure	4
3 Outline of Thesis	5
Part I Roadmap for the Fuzzy Front End	7
1 Innovation.....	10
2 Roadmap for the Fuzzy Front End	33
3 Summary of FFE Roadmap.....	129
Part II Ontology	133
1 Concept Formation.....	134
2 Deployment in Business.....	143
3 Potential of Ontologies.....	160
4 Elements of Ontologies	162
5 Classification – The OntoCube	172
Part III Design Science Ontology Lifecycle	197
1 Multimethodological Background	199
2 Empirical Approach	229
Part IV Results: The OntoGate	253
1 Results of Prepare.....	256
2 Results of Develop/ Build.....	259
3 Results of Justify/ Evaluate.....	324
Conclusion	335

Contents

Preface	1
1 Point of Departure	1
2 Research Objectives and Structure	4
3 Outline of Thesis	5
Part I Roadmap for the Fuzzy Front End	7
1 Innovation.....	10
1.1 Idea, Concept and Innovation.....	11
1.1.1 Invention	12
1.1.2 Imitation	13
1.2 Types of Innovation.....	14
1.2.1 The POP of Innovation	15
1.2.2 Degree of Novelty Involved.....	18
1.3 Innovation Management	23
1.3.1 Holistic Innovation Management	24
1.3.2 Fundamental Delimitations	27
1.3.3 The Innovation Process	30
1.4 Focus of this Research.....	31
2 Roadmap for the Fuzzy Front End	33
2.1 The Fuzzy Front End	35
2.1.1 Delimitation of the Fuzzy Front End	35
2.1.2 Management of the Fuzzy Front End.....	37
2.1.3 Methods for the Fuzzy Front End	37
2.1.4 Idea Assessment	40
2.2 Ideation	48
2.2.1 Note on Environment & Knowledge Base.....	51
2.2.2 Participants of Ideation	54
2.2.3 Methods for Ideation	57

2.3 Concept Gate	67
2.3.1 Note on the Invisible Funnel	68
2.3.2 Participants of the Concept Gate	70
2.3.3 Methods for the Concept Gate	77
2.3.4 Outputs of the Concept Gate.....	88
2.4 Concept Development.....	88
2.4.1 Participants of Concept Development.....	90
2.4.2 Methods for Concept Development	96
2.4.3 Support Activities: Monitoring.....	103
2.5 Innovation Gate.....	103
2.5.1 Participants of the Innovation Gate.....	105
2.5.2 Methods for the Innovation Gate	107
2.5.3 Outputs of the Innovation Gate	128
3 Summary of FFE Roadmap	129

Part II Ontology **133**

1 Concept Formation.....	134
1.1 Ontology in Philosophy.....	134
1.1.1 Metaphysics	135
1.1.2 Analytic and Scientific Philosophy	136
1.1.3 Modern Ontology.....	138
1.2 Ontologies in Information Science.....	138
1.2.1 An Explicit Specification of a Conceptualization	139
1.2.2 A Logical Theory Which Gives an Explicit, Partial Account of a Conceptualization ..	140
1.2.3 An Explicit Partial Account of a Shared Conceptualization	142
2 Deployment in Business.....	143
2.1 Enterprise Ontologies.....	144
2.1.1 Enterprise Ontology	144
2.1.2 Toronto Virtual Enterprise (TOVE).....	146
2.1.3 E-Business Model Ontology.....	147
2.1.4 Evaluation.....	148

2.2 E-Business (B2B) Ontologies	148
2.2.1 Semantic Web	148
2.2.2 UNSPSC & NAICS	151
2.2.3 E-cl@ss	152
2.2.4 Rosetta Net.....	152
2.2.5 Evaluation.....	153
2.3 Management Ontologies	153
2.3.1 Human Resource Management with Ontologies	154
2.3.2 Knowledge Management Ontologies.....	155
2.3.3 Evaluation.....	158
2.4 Note on Deployment in Other Areas	158
3 Potential of Ontologies.....	160
4 Elements of Ontologies.....	162
4.1 Principles.....	162
4.1.1 Constructs.....	162
4.1.2 Axioms and Inference Rules.....	166
4.2 Languages.....	167
4.2.1 First Ontology Languages.....	167
4.2.2 Ontology Markup Languages	168
5 Classification – The OntoCube.....	172
5.1 Existing Classifications	172
5.1.1 Guarino & Giaretta's Terminological Clarification.....	173
5.1.2 Typology of Ontology by Mizoguchi et al.	174
5.1.3 Uschold's Three Key Dimensions.....	176
5.1.4 Two-Dimensional Classification by van Heijst et al.	177
5.1.5 Note on Benjamins' & Gómez-Pérez' Note on (Re-) Usability	179
5.1.6 The Ontology Spectrum of Lassila & McGuiness	179
5.1.7 Development of OntoCube.....	181

5.2 Subject matter.....	182
5.2.1 Application Ontology	182
5.2.2 Task Ontologies.....	183
5.2.3 Domain Ontology	183
5.2.4 General Ontologies	184
5.2.5 Representation Ontologies	186
5.3 Formality.....	186
5.3.1 Informal Notation.....	187
5.3.2 Semi-Informal and Semi-Formal Notation	189
5.3.3 Formal Notation.....	189
5.4 Expressiveness	190
5.4.1 Taxonomy.....	191
5.4.2 Thesaurus.....	192
5.4.3 Topic Map	193
5.4.4 Lightweight & Heavyweight Ontology	194

Part III Design Science Ontology Lifecycle 197

1 Multimethodological Background	199
1.1 Ontology Engineering.....	199
1.1.1 Synopsis on Ontology Engineering.....	201
1.1.2 State of Research on Ontology Evaluation	211
1.2 Design Science	215
1.2.1 Introduction to Design Science	216
1.2.2 Overview of the Field.....	217
1.2.3 Design Science & the Topics of this Thesis.....	226
2 Empirical Approach	229
2.1 Research Methodology	230
2.1.1 Framework	230
2.1.2 Methodology	232
2.1.3 Field	235

2.2 Design Science Ontology Lifecycle	237
2.2.1 Prepare	237
2.2.2 Develop/ Build.....	238
2.2.3 Justify/ Evaluate.....	248
2.2.4 Support Activity: Document	252
Part IV Results: The OntoGate	253
1 Results of Prepare	256
1.1 Analysis of Knowledge Base.....	256
1.2 Feasibility Study	257
2 Results of Develop/ Build.....	259
2.1 Kickoff	259
2.2 Knowledge Acquisition	260
2.2.1 Hans Einhell AG	260
2.2.2 C. & E. Fein GmbH	264
2.2.3 Marquardt GmbH	269
2.2.4 Rohde & Schwarz GmbH & Co.KG	272
2.2.5 Comparison of Approaches.....	275
2.3 Formalization	279
2.3.1 Informal Taxonomy.....	280
2.3.2 Formal Ontology	294
2.3.3 Summary of Formalization	322
3 Results of Justify/ Evaluate	324
3.1 Typic OntoGate.....	325
3.2 Generic OntoGate.....	329
3.3 Summary of Justify/ Evaluate	333

Conclusion.....	335
1 Synopsis of Thesis	336
2 Résumé	337
2.1 Assessment of Research Project.....	337
2.1.1 Research Domain	337
2.1.2 Research Objectives	338
2.1.3 Research Approach	338
2.1.4 Degree of Genericness	338
2.2 Empirical Findings	339
2.2.1 Company-Specific Findings.....	339
2.2.2 General Findings	340
2.3 Contribution to Knowledge Bases.....	341
3 Outlook.....	344
3.1 Further Research.....	344
3.2 Implication for Business.....	345
Annex	347
1 Glossary of Informal Taxonomy.....	347
2 References	355
3 Index.....	403