

# CONTENTS

---

FOREWORD	XI
PREFACE	XIII
PART I: BACKGROUND AND MOTIVATION	1
<b>1 INTRODUCTION</b>	<b>3</b>
1.1 Seeking a Better Level of Abstraction / 3	
1.2 Code-Driven and Model-Driven Development / 4	
1.3 An Example: Modeling with a General-Purpose Language and a Domain-Specific Language / 7	
1.4 What is DSM? / 15	
1.5 When to Use DSM? / 18	
1.6 Summary / 19	
<b>2 BUSINESS VALUE</b>	<b>21</b>
2.1 Productivity / 21	
2.2 Quality / 27	
2.3 Leverage Expertise / 31	
2.4 The Economics of DSM / 34	
2.5 Summary / 41	

<b>PART II: FUNDAMENTALS</b>	<b>43</b>
<b>3 DSM DEFINED</b>	<b>45</b>
3.1 DSM Characteristics / 45	
3.2 Implications of DSM for Users / 52	
3.3 Difference from Other Modeling Approaches / 55	
3.4 Tooling for DSM / 59	
3.5 Summary / 61	
<b>4 ARCHITECTURE OF DSM</b>	<b>63</b>
4.1 Introduction / 63	
4.2 Language / 68	
4.3 Models / 77	
4.4 Code Generator / 79	
4.5 Domain Framework and Target Environment / 86	
4.6 DSM Organization and Process / 88	
4.7 Summary / 92	
<b>PART III: DSM EXAMPLES</b>	<b>93</b>
<b>5 IP TELEPHONY AND CALL PROCESSING</b>	<b>97</b>
5.1 Introduction and Objectives / 97	
5.2 Development Process / 100	
5.3 Language for Modeling Call Processing Services / 101	
5.4 Modeling IP Telephony Services / 111	
5.5 Generator for XML / 112	
5.6 Framework Support / 117	
5.7 Main Results / 118	
5.8 Summary / 118	
<b>6 INSURANCE PRODUCTS</b>	<b>120</b>
6.1 Introduction and Objectives / 120	
6.2 Development Process / 121	
6.3 Language for Modeling Insurances / 123	
6.4 Modeling Insurance Products / 131	

6.5	Generator for Java / 132	
6.6	Framework Support / 138	
6.7	Main Results / 138	
6.8	Summary / 139	
<b>7</b>	<b>HOME AUTOMATION</b>	<b>140</b>
7.1	Introduction and Objectives / 140	
7.2	Development Process / 142	
7.3	Home Automation Modeling Language / 144	
7.4	Home Automation Modeling Language in Use / 150	
7.5	Generator / 153	
7.6	Main Results / 157	
7.7	Summary / 158	
<b>8</b>	<b>MOBILE PHONE APPLICATIONS USING A PYTHON FRAMEWORK</b>	<b>160</b>
8.1	Introduction and Objectives / 160	
8.2	Development Process / 163	
8.3	Language for Application Modeling / 164	
8.4	Modeling Phone Applications / 174	
8.5	Generator for Python / 176	
8.6	Framework Support / 184	
8.7	Main Results / 185	
8.8	Extending the Solution to Native S60 C++ / 185	
8.9	Summary / 189	
<b>9</b>	<b>DIGITAL WRISTWATCH</b>	<b>191</b>
9.1	Introduction and Objectives / 191	
9.2	Development Process / 193	
9.3	Modeling Language / 193	
9.4	Models / 207	
9.5	Code Generation for Watch Models / 212	
9.6	The Domain Framework / 220	
9.7	Main Results / 222	
9.8	Summary / 224	

<b>PART IV: CREATING DSM SOLUTIONS</b>	<b>225</b>
<b>10 DSM LANGUAGE DEFINITION</b>	<b>227</b>
10.1 Introduction and Objectives / 227	
10.2 Identifying and Defining Modeling Concepts / 228	
10.3 Formalizing Languages with Metamodeling / 247	
10.4 Defining Language Rules / 250	
10.5 Integrating Multiple Languages / 253	
10.6 Notation for the Language / 257	
10.7 Testing the Languages / 261	
10.8 Maintaining the Languages / 264	
10.9 Summary / 266	
<b>11 GENERATOR DEFINITION</b>	<b>267</b>
11.1 “Here’s One I Made Earlier” / 268	
11.2 Types of Generator Facilities / 270	
11.3 Generator Output Patterns / 276	
11.4 Generator Structure / 297	
11.5 Process / 304	
11.6 Summary / 308	
<b>12 DOMAIN FRAMEWORK</b>	<b>311</b>
12.1 Removing Duplication from Generated Code / 313	
12.2 Hiding Platform Details / 315	
12.3 Providing an Interface for the Generator / 317	
12.4 Summary / 327	
<b>13 DSM DEFINITION PROCESS</b>	<b>329</b>
13.1 Choosing Among Possible Candidate Domains / 329	
13.2 Organizing for DSM / 330	
13.3 Proof of Concept / 335	
13.4 Defining the DSM Solution / 339	
13.5 Pilot Project / 345	
13.6 DSM Deployment / 347	
13.7 DSM as a Continuous Process in the Real World / 352	
13.8 Summary / 356	

<b>14 TOOLS FOR DSM</b>	<b>357</b>
14.1 Different Approaches to Building Tool Support / 357	
14.2 A Brief History of Tools / 359	
14.3 What is Needed in a DSM Environment / 365	
14.4 Current Tools / 390	
14.5 Summary / 395	
<b>15 DSM IN USE</b>	<b>397</b>
15.1 Model Reuse / 397	
15.2 Model Sharing and Splitting / 400	
15.3 Model Versioning / 404	
15.4 Summary / 407	
<b>16 CONCLUSION</b>	<b>408</b>
16.1 No Sweat Shops—But no Fritz Lang’s Metropolis Either / 409	
16.2 The Onward March of DSM / 410	
<b>APPENDIX A: METAMODELING LANGUAGE</b>	<b>411</b>
<b>REFERENCES</b>	<b>415</b>
<b>INDEX</b>	<b>423</b>