



# **Systems Modeling** **f o r Business Process** **Improvement**

**David Bustard**  
**Peter Kawalek**  
**Mark Norris**

**editors**

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## FOREWORD

Hammer and Champy, in their analysis of the impact of information technology (IT) on organizations (*Reengineering the Corporation*, Nicholas Brealey Publishing, 1993), identify innumerable ways in which the rapid evolution of technology can have a massively disruptive effect. They argue that to identify and meet new business objectives, an organization needs inductive thinking, building on the possibilities of the technology and the business opportunities that it provides. Yet, such systems thinking requires skills from two quite distinct cultures: *information systems* and *software engineering*. Traditionally, these two communities have taken quite different views being respectively socioeconomic and technically oriented. Increasingly, the two communities are being pushed together as the rapid evolution of business, driven by the explosion in IT, leads to ever-more complex, interrelated and interworking systems whose development can no longer be achieved without considerations from both sides.

In this book, Dave Bustard and his colleagues have brought together representatives of both communities who present their views in a way that is sympathetic to the idea that recognizing a shared problem is important. The emphasis on modeling is well chosen because it is shared models of systems that will lead to the common understanding on which rapid progress can be made. It is clear that the two communities take a very different approach to modeling.

Information systems models tend to be soft, manifesting themselves as diagrams that on purpose leave some aspects of interpretation open. Software engineering models tend to be hard, ideally being sufficiently accurate and complete that they can actually become part of the system. Bridging this gap in modeling is the core theme of this book.

Lest you think there is less of a gap here than I make out, consider the use of terminology by the two cultures. Many words are shared, but few meanings. A speaker using the words *ontology* or *ethnography* is probably from the information systems community. A speaker using the words *component* or *agent* is probably from the software engineering community. But what of a speaker using the words *process* or *system*? Such a speaker could be from either community, but you would need to know from which to understand what each word meant. You will see the authors of the papers in this book valiantly trying to bridge this gap in understanding.

The difficulty we have in researching topics such as those addressed here arises from the fact that systems-level research is necessarily interdisciplinary and necessarily bridges many cultures. This is a major challenge for research in the United Kingdom and worldwide. It is, however, an area of research in which we might expect the United Kingdom to excel having, as we often claim, a tradition for breaking down the barriers between institutions. This book makes an excellent contribution to the important objective of uniting the systems thinkers (the inductive thinkers) from both information systems and software engineering. Much remains to be done—but this is a good place to start.

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Coordinator, Systems Engineering for Business Process Change  
(an EPSRC research program)

September 1999

## PREFACE

Organizations need to improve to survive. Information technology (IT) currently plays a significant part in helping to achieve that improvement. This book examines the nature of such organizational change and considers, in particular, the supporting contribution of systems modeling to the change process.

Through IT, modern organizations can improve both their efficiency and their effectiveness. The Internet, for example, offers businesses access to potential customers, in any part of the developed world, 24 hours a day, 365 days a year, with minimal overhead costs.

Unfortunately, the many cited cases of failure make it clear that the potential gains through IT are not easily realized. The essence of the problem is that it can be *very hard* to achieve beneficial organizational change. This is true whether the goal is to introduce imaginative new ways of working, migrate to new technologies, or simply make improvements in areas of known weakness. The resulting upheaval is met with resistance—often with justifiable cause.

Making good use of IT is therefore a challenging design task. If we want to bring about genuine improvement within an organization, if we want outcomes to be managed and not left to chance, then we need appropriate design techniques and processes. This is the subject matter of this book. The particular focus is the development and use of *system models*. These provide a basis for understanding

where change is desirable and describing how it can be achieved. A model can cover any relevant aspect of a business, its IT support, or the change process.

The title of the book brings together two concepts that have become dominant themes in the design of IT systems: one is *systems* and the other *business process improvement*.

## WHY SYSTEMS?

Any organizational change program is likely to be *systemically* complex. That is, it will be characterized by a network of interdependent factors. Any tug at this network is likely to have ramifications elsewhere. For example, the task of developing a new database can quickly become associated with issues of work practices, levels of training, reward schemes, and alternative political manifestos for the development of the organization. Within this complex organizational context is the technical task itself, namely the challenge that the IT development team faces in trying to comprehend, define, and support the organizational activities of current and potential IT users.

Systems approaches strive to provide a means for understanding and managing such complex situations. Many techniques have been in use for a long time, such as *sociotechnical systems design* and *soft systems methodology*. It is reassuring that their value is now becoming better recognized in the IT community. By taking a systems approach, the IT practitioner is seeking to find a way of appreciating the complex relationships that affect change, resisting the urge to ignore soft factors that are difficult to control and yet trying to preserve sufficient rigor and thoroughness in the work.

## WHY BUSINESS PROCESS IMPROVEMENT?

Any IT intervention will have to account for its value in some terms or other, such as reduced costs, greater opportunities generated, or higher user satisfaction. Therefore, both at the design stage and at an evaluation stage, it is necessary to define the scope of IT in a way that allows a thorough appreciation of its contribution. By considering this impact of IT on business processes, IT designers can take a sufficiently rich vantage point from which to consider a computing system's true implications for the business. The design task becomes still more complex, however, as any business process will be a function of organizational, technological, and human resource factors.

Thus, the design task is enlarged. Far from being a technical intervention, we are likely to find ourselves undertaking a sociotechnical and, perhaps, multidisciplinary project. Such enlargement of scope and perspective carries with

it its own risks but has the potential to enhance our understanding and improve the quality of the IT design.

It follows that at the design stage, the IT system should be described in a way that allows its impact on the business process to be understood. The business can then sensibly debate the merits of the new design and can compare it with existing or previous designs. At the evaluation stage, a rich set of process metrics can be assembled to provide evidence of the value of the new process. These metrics might be quantitative, such as costs, customer contacts, or cycle time, or they might be qualitative, such as accounts of customer experience or descriptions of user satisfaction.

Interpreted in this way, the business process design is used as the fulcrum of a broader systemic intervention. It is not the only concern, but the design of the business process does allow the impact of a wide range of variables to be discussed. It can be used to help build a rich model of the organization—a model that can then be used alongside other models in the quest to bring out the full potential of IT support.

## **WHY IS THIS BOOK IMPORTANT?**

Arguably, IT has been the defining technology of recent years. Advances in IT have shaped and reshaped our lives. This book is concerned with furthering this process. As IT becomes ever-more deeply embedded in our work and social activities, it becomes more important that we are able to manage it, to use it efficiently, and above all to use it effectively.

This book is the work of prominent researchers and practitioners in the application of IT in organizations. The ideas and approaches that are described deal with various aspects of organizational change, taken from business, information systems, and software engineering perspectives. Together they address the major concepts and issues in systems thinking and business process improvement. An emphasis on systems modeling provides a unifying theme across the contributions and gives a practical emphasis in the work. The net effect is a book that is *really* useful—one that can help inform any analysis, design, or evaluation of organizational change involving IT.

## **WHO SHOULD READ THIS BOOK?**

This book is written for all those concerned with deploying IT in organizations. The chapters are written by and for those with software engineering and information systems backgrounds, but the material is also of value to those more concerned with business and management. We anticipate that both academic and

company researchers will find it interesting to consider the value of the thinking and approaches offered. Students, especially those at a Master's level and above, will also benefit from access to the ideas, methods, and techniques described.

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Dave Bustard, University of Ulster  
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# CONTENTS

Chapter 1	Overview	1
	1.1 Introduction	1
	1.2 Abstracts	4
Chapter 2	Simulation Modeling and Change Management Panaceas: The Missing Link	13
	2.1 Introduction	13
	2.2 Four Management Innovation and Change Programs	14
	2.2.1 Total Quality Management	15
	2.2.2 Just-in-Time	16
	2.2.3 Business Process Reengineering	17
	2.2.4 Process Innovation	19
	2.3 Simulation Modeling	21
	2.4 Simulation Modeling and Change Panaceas	23
	2.4.1 Simulation Modeling and TQM	23
	2.4.2 Simulation Modeling and JIT	24
	2.4.3 Simulation Modeling and BPR	24
	2.4.4 Simulation Modeling and Process Innovation	24
	2.4.5 An Example of a Business Simulator	25
	2.5 A Comparison of Change Management Programs	26
	2.6 Conclusions	28
Chapter 3	System Dynamics in Information Systems Analysis: An Evaluation Case Study	33
	3.1 Overview of Gigante	33
	3.2 The Problem	34

	3.3	Initial Investigation	35
	3.4	Problems With Traditional IS Modeling Techniques	36
	3.5	A Systems View	36
	3.6	Some Findings From the Systems Dynamics Model	39
	3.7	Comments on Use of System Dynamics for Business Process Modeling	40
	3.8	Toward Integrating the Views	42
Chapter 4		Business Process Modeling With Objects, Costs, and Human Resources	47
	4.1	Business Process Modeling	47
	4.2	Types of Modeling and Object Orientation	50
	4.3	Model and Metamodel	51
	4.4	Activities and Their Costs	55
	4.5	Human Resource Management and Skills	57
	4.6	Conclusions	59
Chapter 5		The Organization, the Process, and the Model	61
	5.1	Introduction	61
	5.1.1	The Problem	62
	5.2	Organizational Process Modeling	63
	5.3	A Case Study	63
	5.3.1	The What, the Why, and the How	64
	5.3.2	Designing the Process	70
	5.3.3	Software Support for the Process	73
	5.4	Discussion and Conclusions	75
	5.4.1	The Value and Basis of OPM	75
	5.4.2	The Task of Designing Software Support	76
	5.4.3	The Task of Designing Processes	78
Chapter 6		Exploiting Organizational Knowledge in Adaptive Workflow Systems	81
	6.1	Introduction	81
	6.2	Knowledge-Based Capability Matching	83
	6.3	Motivation for Adding Knowledge About Organization and Authority	84
	6.4	Organizational Structure Modeling Language	85
	6.5	Authority Modeling Language Proposal	87
	6.5.1	The Culture Perspective	88
	6.5.2	Using Organizational Structure and Authority	89
	6.5.3	Further Authority Modeling Issues	90
	6.6	Conclusions	90

Chapter 7	A Common Process Methodology for Engineering Process Domains	95
7.1	Introduction	95
7.2	Building on Past Research	97
7.2.1	COntrolled Requirements Expression	97
7.2.2	Task Formalism Method	98
7.3	Fitting Into a Framework	100
7.4	Common Process Methodology	100
7.5	Aim of CPM	102
7.6	Main CPM Activities	102
7.6.1	Viewpoint Generation	102
7.6.2	Functional Viewpoint Structuring	106
7.6.3	Information Gathering	107
7.6.4	Viewpoint Analysis	109
7.6.5	Systems Analysis	110
7.6.6	Operational Analysis	111
7.6.7	Constraints Analysis	111
7.7	Tool Support	112
7.8	Conclusions	113
Chapter 8	Business Modeling Interprocess Relationships	117
8.1	Introduction	117
8.2	A Framework for Business Process Modeling	118
8.2.1	Process Models	119
8.2.2	Structural Models of Organizations	119
8.2.3	Domain and Environmental Context	121
8.3	Designing Interorganizational Relationships	122
8.3.1	Applying Transaction Cost Theory to Process Reengineering	123
8.3.2	Defining Business Process Relationships	123
8.3.3	Stages in Process Engineering	124
8.4	A Case Study of Process Reengineering	127
8.4.1	Preparatory Phase	127
8.4.2	Transaction Analysis	128
8.4.3	Implications for Organizational Change	130
8.5	Discussion	131
Chapter 9	Process Improvement Using ISO 15504	135
9.1	Introduction	135
9.2	Process Assessment	136
9.3	The ISO 15504 Standard	137
9.3.1	The Process Categories	138

	9.3.2	The Capability Levels	139
	9.3.3	The Two-Dimensional Model	140
	9.4	A Case Study	140
	9.5	Conclusions	144
Chapter 10		Metrics-Based Process Modeling With Illustrations From the FEAST/1 Project	147
	10.1	Introduction	147
	10.2	Antecedents	148
	10.3	Feedback in the Global Software Process	150
	10.4	Feedback and the Laws of Software Evolution	154
	10.5	FEAST/1	155
	10.6	Some FEAST/1 Results	156
		10.6.1 Black-Box Studies	156
		10.6.2 The Models as Predictors	160
		10.6.3 White-Box Studies	162
	10.7	Further Work—FEAST/2	164
	10.8	Conclusions	166
Chapter 11		Modeling Information System Requirements for Complex Systems	171
	11.1	Introduction	171
	11.2	UMISD	172
	11.3	Interpretivist Modeling	172
	11.4	A First Step—Using Client-Led Design	173
	11.5	Bridging the Gap	178
	11.6	Representing the Client's IS Requirements	179
	11.7	The Object-Oriented Approach	180
	11.8	Organizational Analysis, Information, and Natural Language	181
	11.9	Conclusions	182
Chapter 12		An Interpretivist Approach to Modeling Client Requirements for Information Systems	187
	12.1	Introduction	187
	12.2	Traditional Methods of Design: The Problems	188
	12.3	Interpretivism: A Different Approach	188
	12.4	Action Research	189
	12.5	Appreciating the Situation	190
	12.6	Linking a Rich Analysis to Object-Oriented Design	191
	12.7	Conversation Modeling	191
	12.8	Coordination Maps	193
	12.9	Present Research	193

Chapter 13	Information Systems Specifications Within the Framework of Client-Led Design	199
13.1	Introduction	199
13.2	Feasibility of a Link Between Soft and Hard Methods	200
13.3	Strategies to Cross the Gap	200
13.4	CLD: A Possible Framework for Integrating SSM With Hard Systems Development Techniques	201
13.5	Integration of DFD Into CLD	202
13.6	Integration of OO Into CLD	203
13.7	Integration of Situation Theory Into CLD	206
13.8	Conclusions	209
Chapter 14	Developing a Business-IT Coevolutionary Change Plan	213
14.1	Introduction	213
14.1.1	Basic Change Model	214
14.2	The Coevolutionary Change Process	215
14.3	Stage 1: Understanding the Situation of Concern	218
14.4	Stage 2: Defining the Target System	221
14.4.1	Root Definitions	221
14.4.2	Conceptual Models	222
14.4.3	IT Support	223
14.5	Stage 3: Defining the Initial System	225
14.5.1	Activity Mapping	226
14.5.2	Organizational Mapping	227
14.5.3	Surplus Activity Identification	227
14.5.4	IT Mapping	227
14.5.5	Surplus IT Identification	228
14.6	Stage 4: Developing Recommendations for Change	228
14.6.1	Recommendation Summary	228
14.6.2	Change Increments	229
14.7	Conclusions	230
Chapter 15	Relating Organizational Semiotics, Process Modeling, and Stakeholder Viewpoints to Elucidate and Record Requirements	233
15.1	Introduction	233
15.2	Semantic Analysis and Ontology Charts	234
15.3	Features of Ontology Charts	236
15.3.1	Insurance Claim Example	236
15.3.2	Affordances and Processes	237
15.3.3	Roles and Legitimate Concerns	238
15.3.4	Limitations of Ontology Charts	239
15.4	The Elicitation Process	239

15.5	A Case Study	240
15.5.1	Problem Definition	240
15.5.2	Candidate Term Generation	241
15.5.3	Candidate Grouping	241
15.5.4	Ontology Charting	241
15.5.5	Gathering User Viewpoints	242
15.5.6	Modeling Processes	243
15.6	Conclusions	245
Chapter 16	Modeling Organizational Communication: Top-Down Analysis and Bottom-Up Diagnosis	249
16.1	Introduction	249
16.2	A Framework for Modeling Organizations	250
16.2.1	A Model of a Learning Organization	250
16.2.2	Measures of Performance—Communication Effectiveness	251
16.3	Top-Down Analysis	252
16.3.1	Extended Structure Analysis	252
16.3.2	Tools for Top-Down Analysis	254
16.4	Bottom-Up Diagnosis	257
16.4.1	Message Coding	257
16.4.2	Mapping Communication	258
16.5	Top-Down and Bottom-Up	259
16.6	Conclusions	260
Chapter 17	Social Analysis in the Requirements Engineering Process: From Ethnography to Method	263
17.1	Introduction	263
17.2	Ethnographers Working With Designers	264
17.2.1	Strengths	266
17.2.2	Weaknesses	267
17.2.3	Outcomes	267
17.3	Modifying Ethnography	267
17.3.1	Moving out From the Control Room	267
17.3.2	Presenting Ethnography in RE	268
17.3.3	Strengths	270
17.3.4	Weaknesses	270
17.3.5	Outcomes	271
17.4	Ethnographically Informed Method	271
17.4.1	Viewpoint-Oriented Requirements	272
17.4.2	Social Viewpoints and Concerns	272
17.4.3	Linking With System Models	276
17.4.4	Strengths	278

	17.4.5 Weaknesses	278
	17.4.6 Outcomes	279
	17.5 Conclusions	279
Chapter 18	Overcoming the Legacy Dilemma: Modeling Sociotechnical Change Options	283
	18.1 Problems of Legacy Systems and Some Solutions	283
	18.2 The SABA Model	285
	18.3 The Organizational Scenarios Tool	286
	18.4 The Technology Scenarios Tool	288
	18.5 An Example	291
	18.6 Conclusions	293
Chapter 19	Models, Diagrams, and Their Importance to Information Systems Analysis and Design	295
	19.1 Introduction	295
	19.2 Information Systems Analysis	296
	19.3 An Historical Context for Models and Modeling	297
	19.4 Categorizations of Models	298
	19.4.1 Infological Versus Datalogical	299
	19.4.2 Interpretivist Versus Functionalist	300
	19.5 Information Systems Analysis and Modeling	301
	19.6 Diagrams and Diagramming	304
	19.6.1 Diagrams and ISA	306
	19.7 Conclusions—The Need for and Nature of Awareness	307
Chapter 20	Ontological Support for Business Process Improvement	313
	20.1 Introduction	313
	20.2 Models, Goals, and Meaning	315
	20.2.1 Inherited Models From Mechanistic Organization	315
	20.2.2 The Demise of the Mechanistic Concept and the Consequences on Models	316
	20.2.3 The ABC/ABM Approach	318
	20.3 Evolution and Similarities	319
	20.3.1 Improvement in Procedures	320
	20.3.2 System Redesign	320
	20.3.3 The Coevolution of Information and Management Systems	321
	20.4 Similarities	322
	20.5 Integration Through Metamodeling	323
	20.5.1 UML: A Modeling Notation	323
	20.5.2 Ontologies	325

	20.5.3 From Object-Oriented Programming to Ontology-Driven Modeling	328
	20.6 Conclusions	329
Chapter 21	Compositional Modeling: The Formal Perspective	333
	21.1 Introduction	333
	21.2 Interval Temporal Logic	335
	21.2.1 ITL: Syntax and Semantics	335
	21.2.2 Data Representation in ITL	336
	21.3 Public Service Systems: A Case Study	336
	21.3.1 System Description	337
	21.4 Compositional Modeling	338
	21.5 Animations and Execution	340
	21.6 Discussion	341
Appendix 21A		347
	21A.1 Frequently Used ITL Constructs	347
	21A.2 ITL Specification of Client and Cash Point	348
	21A.2.1 Cash Point Component	348
	21A.2.2 Client Component	349
	21A.2.3 Specification of Auxiliary Functions	352
Index		355