BPM CBOK®

VERSION 4.0



ABPMP INTERNATIONAL

GUIDE TO THE BPM COMMON BODY OF KNOWLEDGE

Guide to the

Business Process Management

Common Body of Knowledge

ABPMP BPM CBOK

© 2019 ABPMP All Rights Reserved

Copyright

Copyright © by ABPMP 2009 – 2019. All rights reserved.

This reference book is the copyrighted property of the Association of Business Process Management Professionals. All material is protected by copyright and permission should be obtained in writing prior to any reproduction, storage in a retrieval system, or transmission in any form by any means. Requests should be made by contacting the ABPMP through the website.

www.abpmp.org

ISBN-13: **9781704809342**

Trademarks

The following are registered trademarks of the Association of Business Process Management Professionals.

BPM CBOK®
Business Process Management Common Body of Knowledge®
BPM Competency Model®
CBPA®
CBPL®
CBPP®

Capability Maturity Model® is a registered trademark of the Carnegie Mellon University's Software Engineering Institute.

Excel®, PowerPoint®, Word®, and Visio® are registered trademarks of Microsoft Corporation.

PMBOK® is a registered trademark of the Project Management Institute, Inc.

SCOR® and DCOR® are registered trademarks of the ASCM (Association of Supply Chain Management) ascm.org.

Tallyfy® is a registered trademark of Tallyfy, Inc.

All other marks and protected product names are trademarks or registered trademarks of their respective holders.

Table of Contents

1 The BPM Professional: Career Path Architecture 25

1.1 Knowledge Areas of the BPM CBOK 28

1.1.1 Overview of BPM CBOK Knowledge Areas 29

1.1.2 Business Process Management 29

1.1.3 Process Modeling 29

1.1.4 Process Analysis 29

1.1.5 Process Design 29

1.1.6 Process Performance Measurement 30

1.1.7 Business Process Transformation 30

1.1.8 Technology and Transformation 30

1.1.9 Process Management Organization and Culture 31

1.1.10 Enterprise Process Management 31

1.2 BPM Skills and Competencies (BPM Competency Model) 31

1.3 ABPMP BPM Certification Levels 32

2 Introduction 34

2.1 What Is a Body of Knowledge? 34

2.2 What Is the *BPM CBOK Guide*? 34

2.2.1 Purpose of the *BPM CBOK Guide* 35

2.2.2 Organization of Sections 35

2.3 Why BPM Matters 36

2.4 The BPM Professional Space 36

3 Business Process Management 38

3.1 What Is BPM? 38

3.1.1 Scope of BPM Initiatives 38

3.1.2 Definition 39

3.1.3 Core Principles of Business Process Management 39

3.1.4 How Organizations Should Approach Business Change 40

3.1.5 The BPM Life Cycle Framework 40

3.1.5.1 Phase 1: Alignment to Strategy and Goals 40

3.1.5.2 Phase 2: Architect Changes 41

3.1.5.3 Phase 3: Develop Initiatives 41
3.1.5.4 Phase 4: Implement Changes 41
3.1.5.5 Phase 5: Measure Success 41
Alignment of Knowledge Areas to BPM Life Cycle Phases 41
3.1.6 Types of Processes 42
3.1.6.1 Primary Processes (20%) 42
3.1.6.2 Support Processes (70%) 42
3.1.6.3 Management Processes (10%) 43
3.1.7 Types of Activities 43
3.1.7.1 Value Adding 43
3.1.7.2 Handoff 43
3.1.7.3 Controls and Control Activities 43
3.1.8 BPM Is a Management Discipline 44
3.1.8.1 Process Owner 45
3.1.8.2 Process Leader 48
3.1.8.3 Process Steward 49
3.1.8.4 Process Analyst 50
3.1.8.5 Process Governor 50
3.1.9 BPM Links Strategy to Execution 51
3.1.9.1 Segmenting Business Processes for Strategy Execution 54
3.1.9.2 Strategy-Driven Design and Implementation 57
3.1.9.3 BPM-Discipline to Sustain Strategic Value 61
3.1.9.4 Executive Commitment 63
3.1.10 Drivers of Business Change 64
3.1.11 Internal 64
3.1.11.1 Strategy Maps 65
3.1.11.2 Porter's Value Chain Analysis 65
3.1.12 External 67
3.1.12.1 Porter's Five Forces 67
3.1.12.2 SWOT 72
4 Business Process Modeling 75
4.1.1 Use of Process Models 75

4.1.2 Process Model Contents 76
4.1.3 Identifying a Process Model 76
4.1.3.1 Static Versus Dynamic Models 77
4.1.3.2 Dynamic Models 77
4.1.3.3 Dynamic Modeling Tools 77
4.1.3.4 Combining Static and Dynamic Models 77
4.2 Process Repository Components and Tools 77
4.2.1 Capturing Process Components 77
4.2.2 What Is a Repository? 77
4.2.2.1 Why Do Organizations Need a Process Repository? 78
4.2.2.2 Key Elements of Good Repository: 79
4.2.2.3 Identify the Usage 80
4.2.2.4 Scope the Content 80
4.2.3 Defining a Standard Format 81
4.2.3.1 Select the Repository Management Tools 81
4.2.3.2 Finalize the Process Repository Governance 81
4.2.4 Identifying Outcome-Based Usage Scenarios 82
4.2.5 Scoping the Right Process Knowledge Content 83
4.2.5.1 How to Structure Content 84
4.2.5.2 Using Reference Models 85
4.2.6 Defining Process Knowledge Architecture 85
4.2.6.1 Commonly-Used Architecture Elements 86
4.2.7 Selecting the Right Repository and Modelling Tool 88
4.2.7.1 Types of Repository Tools 89
4.2.7.2 How to Select the Right Tool for Your Organization 90
4.2.8 Repository Governance 90
4.2.8.1 Process Governance 90
4.2.8.2 Business Architecture Related Methods and Conventions 91
4.2.8.3 Process Governance and Repository Governance 91
4.2.9 Monitoring Repository Usage and Expansion 93
4.2.10 Repository Best Practices 93
4.2.11 Repository Metrics 94

4.3 Process Modeling Tool Capabilities 94
4.4 Purpose of Process Modeling 94
4.4.1 Process Modeling Is a Means to Business Ends 95
4.5 Commonly Used Process Modeling Notations 96
4.5.1.1 Guidelines for Selecting a Modeling Notation 97
4.5.2 Business Process Model and Notation (BPMN) 2.0 97
4.5.3 Swim Lanes 99
4.5.4 Flowcharting 100
4.5.5 Event-Driven Process Chain (EPC) 101
4.5.6 Unified Modeling Language (UML) 103
4.5.7 IDEF0 104
4.5.8 Value Stream Mapping 106
4.5.9 Specialized Approaches in Process Modeling 107
4.5.10 Value Chain 107
4.5.11 SIPOC 108
4.5.12 System Dynamics 109
4.6 Process Model Levels 111
4.6.1 Assigning Process Information 111
4.6.2 Aligning Process Information 111
4.6.2.1 Levels Vary in Number and Name 111
4.6.3 Best Practice: Business Modeling Standards 112
4.6.4 An Example Set of Model Levels 113
4.6.4.1 Integrating Process Models 113
4.6.4.2 Process Repository Maintains Alignment 113
4.6.4.3 Enterprise Process Models 113
4.7 Business Architecture Alignment and Capability Map Development 117
4.7.1 Business Process Models 119
4.7.1.1 Business Perspective 119
4.7.1.2 What Business Process Models Include 119
4.7.2 Workflow Models 120
4.7.2.1 Operations Perspective 120
4.7.2.2 What Workflow Models Include 120

4.7.2.3 Rolling Up Activities 120
4.7.2.4 Details Below the Workflow Model 120
4.7.3 Task Steps 120
4.7.3.1 What the Task Steps Level Includes 120
4.7.4 Worker Perspective 121
4.7.4.1 Task Steps and Work Performed 121
4.8 Capturing Process Information and Modeling Participants 122
4.8.1 Direct Observation 122
4.8.2 Interviews 122
4.8.3 Survey or Written Feedback 122
4.8.4 Structured Workshops 123
4.8.5 Web-Based Conferencing 123
4.8.6 Process Mining 123
4.8.7 Modeling Participants 124
4.9 Frameworks and Reference Models 124
4.9.1 Modeling Within a Framework 125
4.9.1.1 Complex Modeling Frameworks 125
4.9.1.2 Framework Management and Compliance 125
4.9.2 Using a Reference Model 125
4.10 Modeling Techniques and Tools 127
4.10.1 Drawing Tools and Reports 127
4.11 Process Validation and Simulation 127
4.11.1 Process Simulation Uses 127
4.11.2 Simulation Tools and Environments 127
4.11.3 Technical Simulation and Load Analysis 128
4.12 Business Process Modeling Key Concepts 128
5 Process Analysis 130
5.1 What Is Process Analysis? 130
5.1.1 Why Do Process Analysis? 131
5.1.2 When to Perform Analysis 132
5.1.2.1 Continuous Monitoring 132
5.1.2.2 Event-Triggered Analysis 132

5.1.3 Process Analysis Roles 133
5.1.3.1 Optimal Team Attributes 134
5.1.3.2 Analysis Roles and Responsibilities 134
5.1.4 Preparing to Analyze a Process 135
5.1.5 Prioritize the Process 135
5.1.6 Scope the Depth of the Analysis 136
5.1.7 Using Process Frameworks for Analysis 137
5.1.8 Performing the Analysis 137
5.1.8.1 Business Context 137
5.1.8.2 Organizational Culture Context 138
5.1.8.3 Performance Measurement 139
5.1.8.4 Variation 142
5.1.8.5 Cost 142
5.1.8.6 Human Involvement 142
5.1.8.7 Process Controls 143
5.1.8.8 Other Factors 144
5.1.9 Gathering Information 144
5.1.9.1 Interviewing 144
5.1.9.2 Observing 144
5.1.9.3 Researching 145
5.1.10 Analyzing the Business Environment 145
5.1.10.1 SWOT 145
5.1.10.2 Benchmarking 145
5.1.10.3 Critical Success Factors 146
5.1.10.4 Porter's Value Chain Analysis 147
5.1.11 Analyzing Information Systems 147
5.1.11.1 Data Flow Analysis 147
5.1.11.2 Business Rules 148
5.1.11.3 Systems Documentation and Suitability for Use 148
5.1.11.4 Process Mining 148
5.1.12 Analyzing the Process 148
5.1.12.1 Cost Analysis 149

5.1.12.2 Root Cause Analysis 149
5.1.12.3 Cycle Time Analysis 150
5.1.12.4 Sensitivity Analysis 150
5.1.12.5 Risk Analysis 151
5.1.13 Analyzing Human Interactions 151
5.1.13.1 Direct Observation 151
5.1.13.2 Apprentice Learning 151
5.1.13.3 Activity Simulation 152
5.1.13.4 Workplace Layout Analysis 152
5.1.13.5 Resource Allocation Analysis 152
5.1.13.6 Motivation and Reward Analysis 153
5.1.14 Document the Analysis 153
5.1.15 Assess Business Process Maturity 154
5.1.16 Process Analysis Considerations 155
5.1.16.1 Executive Leadership 155
5.1.16.2 Organizational Process Management Maturity 155
5.1.16.3 Avoid Designing Solutions During Analysis 156
5.1.16.4 Paralysis from Analysis 157
5.1.16.5 Proper Time and Resource Allocation 157
5.1.16.6 Customer Focus 157
5.1.16.7 Understanding Organizational Culture 158
5.1.17 Conclusion 158
5.1.18 Process Analysis Key Concepts 160
6 Process Design 161
6.1 What Is Process Design? 161
6.1.1 The Value of Process Design 161
6.1.2 Process Design Roles 163
6.1.3 Preparing for Process Design 164
6.1.3.1 Key Activities and a Roadmap for Design 165
6.1.4 Designing the New Process 165
6.1.4.1 Defining Activities in a New Process 166
6.1.4.2 Comparison to Existing Process 166

6.1.4.3 Creating a Physical Design 166
6.1.4.4 IT Infrastructure Analysis and Design 167
6.1.4.5 Creating an Implementation Plan 167
6.1.4.6 Model Simulation and Testing 168
6.1.5 Process Design Principles 169
6.1.5.1 Design from the Outside-In Starting with Customer Interactions 169
6.1.5.2 Design Around Value-Adding Activities 169
6.1.5.3 Minimize Handoffs 170
6.1.5.4 Have Work Performed Where it Makes the Most Sense 170
6.1.5.5 Provide a Single Point of Contact 171
6.1.5.6 Create a Separate Process for Each Cluster 171
6.1.5.7 Ensure a Continuous Flow 171
6.1.5.8 Reduce Batch Size 171
6.1.5.9 Bring Downstream Information Needs Upstream 172
6.1.5.10 Capture Information Once at the Source and Share It 172
6.1.5.11 Involve as Few Actors as Possible 172
6.1.5.12 Redesign, then Automate 173
6.1.5.13 Ensure Quality at the Beginning 173
6.1.5.14 Standardize Processes 173
6.1.5.15 Use Co-located or Networked Teams for Complex Issues 173
6.1.5.16 Consider Outsourcing Business Processes 173
6.1.6 Process Architecture Model Levels 174
6.1.7 Process Rules 177
6.1.8 Simulation of Future State 177
6.1.9 Process Compliance 178
6.1.10 Process Design Success Factors 178
6.1.10.1 Executive Leadership 179
6.1.10.2 Process Ownership 179
6.1.10.3 Incentive and Rewards 179
6.1.10.4 Cross-Functional Teams 179
6.1.10.5 Continuous Improvement 180
6.1.10.6 Commitment to Investment 180

6.1.10.7 Alignment with Strategy 180
6.1.11 Conclusions 180
6.1.12 Process Design Key Concepts 181
7 Process Performance Measurement 182
7.1.1 Key Process Measurement Definitions 182
7.1.1.1 Example: Order-to-Cash Metrics 184
7.2 Key Process Performance Definitions 185
7.3 Alignment of Business Process and Enterprise Performance 187
7.3.1 What to Measure 189
7.3.1.1 Measurement Methods 190
7.3.1.2 The Voice of the Process 193
7.3.2 Decision Support for Process Owners and Managers 197
7.3.3 Balanced Scorecard 197
7.3.4 Process Performance Measurement Key Concepts 200
8 Technology and Transformation 201
8.1 Business and Digital Transformation 201
8.1.1 Business Driven Change versus Technology Enabled Change 202
8.1.2 Emergence of Chief Digital Officer Role 203
8.2 Technology as an Enabler 204
8.3 Business Capability Development 205
8.3.1 Enterprise and Business Architecture Management 205
8.3.2 Levels of Models 209
8.3.2.1 Enterprise Models 209
8.3.2.2 Business Models 210
8.3.2.3 Operations and Workflow Models 210
8.3.2.4 Systems Models 210
8.3.2.5 Measurement and Control Models 211
8.3.3 Business Architecture Approach and Tools 211
8.3.3.1 The Impact Grid for Enterprise Business Architecture 212
8.3.3.2 The Business Model Canvas 213
8.3.3.3 Porter's Competitive Strategy Matrix 216
8.3.3.4 The Coherence Premium 217

8.4 Enterprise Technologies 225
8.4.1 ERP 226
8.4.2 CRM 227
8.4.3 SCM 228
8.4.4 BPM Technology 229
8.5 Intelligent Business Process Management Suites (iBPMS) 234
8.5.1 iBPM Capabilities 234
8.5.2 Advanced Analytics (Big Data) 235
8.5.3 Dynamic Case Management 236
8.5.4 Process Mining 241
8.5.5 Rules Engines and Business Rule Management Systems (BRMS) 244
8.5.5.1 Rules Repositories and Engines 246
8.5.6 BPMS Vendors 248
8.6 Newer Technology Platforms 249
8.6.1 Robotic Process Automation (RPA) 249
8.6.1.1 What RPA Solves 250
8.6.1.2 RPA Technology Landscape 252
8.6.1.3 Automation versus RPA 255
8.6.1.4 Process Selection Criteria for RPA 256
8.6.1.5 RPA Value Proposition 256
8.6.1.6 RPA Tool Selection 257
8.6.1.7 Implementation of RPA 257
8.6.1.8 General Uses of RPA 258
8.6.1.9 Industry-Specific Uses of RPA 258
8.6.1.10 Five Reasons RPA Deployments Fail 259
8.6.1.11 Best Practices for RPA 259
8.6.1.12 Digital Procurement Research Using RPA 260
8.6.2 Blockchain 262
8.6.2.1 Blockchain in the Supply Chain 274
8.6.3 Artificial Intelligence (AI) and Machine Learning 275
8.6.4 Business Intelligence versus Artificial Intelligence 278
8.6.5 AI, Machine Learning, and Deep Learning 280

8.6.5.1 Types of Machine Learning 281
8.6.5.2 Common Machine Learning Algorithms 283
8.6.5.3 Deep Learning Models 285
8.6.5.4 Supply Chain Example with Eight Criteria for Achieving Success with AI 288
8.6.6 Convergence of BPM and AI 290
8.6.6.1 Microservices 291
8.6.7 Internet of Things (IoT) 293
8.6.7.1 Three Categories of Things 293
8.6.7.2 Six Categories of Connected Things 294
8.6.7.3 Challenges of Connected Things 295
8.6.7.4 IoT Architecture 295
8.6.7.5 IoT and The Supply Chain 298
8.6.8 Technology and Transformation Key Concepts 299
9 Building a Process-Oriented Organization and Culture 302
9.1 Leadership Development 303
9.2 Culture Change 304
9.3 Three Levels of Organizational Change and Engagement 305
9.4 The Process-Driven Organization 306
9.4.1 Enterprise Performance Matrix 307
9.5 Organizational Change 308
9.5.1 Organizational Design 309
9.5.1.1 Designing the New Organization 311
9.5.1.2 Implementing the Design 312
9.5.2 Project Management 312
9.5.3 Change Management 313
9.5.4 Financial Management 318
9.5.5 Risk Management 318
9.5.6 Process Culture 319
9.5.7 Moving from Hierarchical Structures to the Process-Driven Organization 320
9.5.8 How ERP and ERP Systems Facilitated Change in Organizational Structures 320
9.5.9 Process Management Roles 321
9.5.9.1 Process Owner 321

9.5.9.2 Process Manager 323
9.5.9.3 Process Analyst 323
9.5.9.4 Process Designer 323
9.5.9.5 Process Architects 323
9.5.9.6 Other Key Roles 324
9.5.10 Governing Bodies 325
9.5.11 Process Governance 326
9.5.12 BPM Center of Excellence 327
9.5.12.1 BPM CoE Activities 328
9.5.12.2 Centralized or Decentralized BPM CoE? 328
9.5.12.3 Establishing a CoE 329
9.5.12.4 Benefits of a BPM CoE 330
9.5.13 Building a Process-Oriented Organization and Culture Key Concepts 331
10 Enterprise Process Management 335
10.1.1 Definition of Enterprise Process Management (EPM) 337
10.1.2 Benefits of EPM 337
10.1.3 Requirements of EPM 340
10.1.4 Customer-Centric Measurement Framework 341
10.1.5 Process Portfolio Management 341
10.1.6 Enterprise Process Improvement and Management Planning 341
10.1.7 Process Repository Management 343
10.1.8 BPM Process Maturity 343
10.1.9 Revisiting the Balanced Scorecard 345
10.1.10 EPM Best Practices 345
10.1.11 Transformation Is a Journey, Not a Destination 347
10.1.12 Enterprise Process Management Key Concepts 349
11 Appendices 350
11.1 Appendix A: ABPMP BPM Competency Model 351
11.2 Appendix B: ABPMP BPM Core Curriculum 361
11.3 Appendix C: ABPMP Code of Ethics 383
11.4 Appendix D: ABPMP Standards of Conduct 384
11.5 Appendix E: Chapter References 385

11.6 Appendix F: Glossary 396
11.7 Appendix G: Contributors 415

Forward

About ABPMP

Charter

The Association of Business Process Management Professionals is a non-profit, vendor-neutral professional organization dedicated to the advancement of Business Process Management concepts and practices. ABPMP is practitioner oriented and practitioner led.

ABPMP has local chapters in several US areas, and many more are forming in the US and internationally. Individuals wishing to participate who are not located near an existing local chapter are urged to investigate the feasibility of starting a chapter in their locality. When not affiliated with a local operating chapter, members will be part of the Members-At-Large chapter, which has its own elected officers and participates in ABPMP activities as any other chapter would.

ABPMP is governed by an elected Board of Directors. Each chapter president is an ex-officio, voting member of the International Board of Directors. ABPMP also has a Board of Advisors made up of some of the most well-known authors, practitioners, and thought leaders in the field. These advisors are volunteers who periodically offer advice to the chapters and Board of Directors concerning the industry and how ABPMP can best serve its members.

ABPMP is affiliated with other professional organizations, including the European Association of Business Process Management (EABPM), which administers the ABPMP certification process and translates the *BPM CBOK Guide* into the French and German languages. Additional affiliations are described in the Reference Disciplines appendix.

For more information on ABPMP, please see our website at www.abpmp.org. For more details about EABPM see the website at www.eabpm.org.

Vision

The vision of the ABPMP is to:

- Lead the development of BPM as a mainstream discipline
- Be the professional society for Business Process Management Professionals
- Be the recognized authority for certifying BPM practitioners
- Recognize, acknowledge, and honor those who make outstanding contributions to the Business Process Management discipline
- Be the global center for the community of practice in Business Process Management

Mission

The mission of ABPMP is:

- To engage in activities that advance the practice of Business Process Management
- To promote and evolve a common body of knowledge for BPM

- To foster the development and advancement and skills and competencies of the professionals who work in the BPM discipline
- To validate the professional qualification and certify BPM practitioners

President's Note: Why ABPMP Developed the *BPM CBOK Guide*

There are many people involved in Business Process Management who consider themselves *IT people,* and then there are others who consider themselves *business people*, while there are people like me who cross both disciplines. ABPMP International considers Business Process Management (BPM) to be both a management discipline and a set of technologies that support managing by process. Unfortunately, that seems to be the only industry consensus on the definition of BPM, as there is certainly no shortage of opinion about *what* BPM is and *how* to do BPM.

According to the ABPMP International's *Guide to The Business Process Management Common Body of Knowledge (BPM CBOK Guide)*:

> *Business Process Management (BPM) is a disciplined approach to identify, design, execute, document, measure, monitor, and control both automated and non-automated business processes to achieve consistent, targeted results aligned with an organization's strategic goals. BPM involves the deliberate, collaborative, and increasingly technology-aided definition, improvement, innovation, and management of end-to-end business processes that drive business results, create value, and enable an organization to meet its business objectives with more agility. BPM enables an enterprise to align its business processes to its business strategy, leading to effective overall company performance through improvements of specific work activities either within a specific department, across the enterprise, or between organizations.*

Within the ABPMP International, our membership shows a diversity of titles that reflect these divergent approaches to process management. We have well over 150 different titles represented in our database, although there are clusters around some of the titles like Manager, Director, VP, Analyst, Consultant, and Architect usually preceded or followed by Process, BPM, Process Improvement, Process Innovation, and so on.

There is a need in the marketplace to truly set the standard for Business Process Management and the emerging business process professional. Business Process Management is a broad discipline that requires one to understand the necessary skills and competencies that one must develop in order to develop the appropriate skills and effectiveness within the profession.

The ABPMP BPM Competency Model is a developmental path that outlines the skills, competencies, and experience levels for individuals pursuing a career in Business Process Management.

There is certainly no shortage of vendors with BPM training out there, but none have fully defined the full spectrum of Business Process Management knowledge. For BPM Professionals to be a force in the marketplace, it's critical to establish the essential knowledge areas for BPM Professionals, much like the Project Management Institute did for project management professionals and APICS (now the

Association for Operations Management) did for operations professionals. It became clear that there was a similar need to develop some baseline standards, minimum qualifications, and some reasonable path for becoming a professional in BPM.

That is why ABPMP International decided to put a stake in the ground and developed the *Guide to The Business Process Management Common Body of Knowledge* (*BPM CBOK Guide*), the Certified Business Process Associate (CBPA), the Certified Business Process Professional (CBPP), and the soon to be developed Certified Business Process Leader (CBPL).

The *BPM CBOK Guide* is ABPMP International's baseline set of standards for the *what* of BPM — the knowledge, skills, and competencies, coupled with a strategic approach (*how*) by illustrating a BPM Life Cycle Framework for those embarking on a journey to true Business Process Management.

The *what* and *how* of BPM will continue to evolve, as will the content (what) and training (how) for it. ABPMP International's CBPP is a certification that has been developed by and for BPM practitioners. It was the first independent, professional examination and certification program in the area of BPM followed by the CBPA, and a soon to be CBPL, all of which have been designed to comply with international certification standards with the goal of becoming the internationally recognized standard for BPM Professionals.

This fourth version of the ABPMP CBOK is a response to a growing demand for information on what the career path is for BPM professionals, inclusive of how BPM continues to evolve, along with the technologies that BPM can employ to transform organizations to compete in a global economy. As an association, ABPMP has adopted a position that there are three very different perspectives on creating a proficient BPM Professional: *knowledge*, *skills*, and *competencies* integrated into an overall career path with associated BPM certifications for each level, from entry level to senior levels within organizations.

The first level addresses the foundational concepts, which are based on the knowledge areas contained in the *BPM CBOK Guide*, that include current practices supported with some instruction. The second level is related to the additional competencies that are important components for an evolving career in BPM. We have added the BPM Competency Model and a soon to be third BPM Certification, Certified Business Process Leader (CBPL), to address the competency and career components. The BPM CBOK and our professional BPM Certifications are focused on practitioner-level knowledge and experience. We believe that the broad and deep practitioner experience is at the core of BPM, and that it is essential to add to the human change factor necessary for continued success in business process change in organizations.

— Tony Benedict, CPIM, CBPP, CBPL

About the BPM CBOK Guide

The original project to develop the ABPMP CBOK began in late 2003. The first step was to develop a consensus on what the core knowledge areas are for BPM, taking into consideration all of the current published materials, inputs from leading practitioners and academics, and the available BPM

technologies at that time. Version 1.0 took about six years to develop a consensus on the content. ABPMP put out Version 1.0 for feedback, and at that time developed an affiliation with EABPM (European Association of BPM). It took another year to incorporate all the ABPMP and EABPM feedback, edit it, and to finally publish globally, Version 2.0 in 2009. This version was used to develop the Certified Business Process Professional (CBPP) certification, both of which were launched globally in English. It wasn't until the end of 2013, that ABPMP published Version 3.0, which was a two-year effort to update the *BPM CBOK Guide* to reflect current practices and the maturity and adoption of BPMS technologies. The point of view of Version 3.0 was from a business transformation perspective using the available BPMS technologies. The CBPA exam was then developed as an entry-level BPM Certification and our CBPP exam was updated to reflect the content additions to Version 3.0. The approach to Version 4.0 includes all the comments that had been collected from people who were using Version 3.0 of the BPM CBOK, augmented by comments and suggestions from association members in Europe and Brazil. In late 2017, the decision was made to update the *BPM CBOK Guide* again since BPM, BPMS, and Enterprise technologies have changed, especially with the introduction of Agile methodologies, low-code and no-code technologies such as robotic process automation (RPA), and newer platforms like blockchain, artificial intelligence, machine learning and Internet of things (IoT). ABPMP has also acknowledged the feedback from our practitioners to add more content on using a process repository, collaboration techniques, and also to emphasize more explicitly that an effective BPM approach must link strategy to execution to deliver value to organizations.

Lastly, the project to update the *BPM CBOK Guide* to Version 4.0 required ABPMP to align the new BPM CBOK content and knowledge area to the newly developed BPM Competency Model. The table of contents of the BPM CBOK Guide, Version 4.0 reflects this alignment.

Principles of *BPM CBOK Guide* Development

In creating all the versions of the *BPM CBOK Guide*, the ABPMP Board asked all participants that the following principles be used to guide the authors and reviewers:

BPM CBOK Guide Should (Be)	***BPM CBOK Guide*** Should Not (Be)
• Use a standardized terminology • Ease the communication about BPM • Support a common understanding of BPM • Reference related disciplines • Contain commonly accepted practices • Practitioner driven • Vendor neutral • Guide (non-prescriptive) • Not a standard setting body • Facilitate evaluation of solutions • Consistent	• Sell anything (not vendor driven) • Redefine other disciplines • Too detailed • Miss the audience (practitioner) • Incomplete in width • *How to* (recipe) • Hard to read • Have an opinion

Preface

The following was written by Brett Champlin, past President of the Association of Business Process Management Professionals (ABPMP).

Defining a BPM Professional

BPM is both a management discipline and a set of technologies that support managing by process. A convergence of technologies for workflow, enterprise application integration (EAI), document and content management, business rules management, performance management, and analytics, among others, have been brought to bear with a focus on supporting process-based management. A few years ago, BPM software vendors were focused on the execution layer of the technology stack. Today they are delivering BPM suites with a full range of features and functions including artificial intelligence to support process managers and analysts as well as technology developers. With the advent of low-code and no-code technology, the ease of use will gradually migrate away from IT departments into the business units. However, given the magnitude of data now collected from processes, new roles are emerging to support analytical insights garnered from artificial intelligence capabilities, such as data analysts, data scientists, to name a few.

Recent research studies confirm that Business Process Management (BPM) is rapidly evolving as the dominant management paradigm of the twenty-first century. BPM is now generally adopted in companies with more than 80% of the world's leading organizations actively engaged in BPM programs, many of these on a global scale. There is now enough published information that demonstrates that proven strategies, approaches, tools and techniques (including business process frameworks and maturity models) are employed by world-class, process-focused enterprises.

Business Process Management and Performance Management are merging as more and more process management groups begin to recognize the organization as a system of interacting processes whose performance must be balanced, and that must be the focus of fulfilling strategies. Conversely, more and more of those engaged in enterprise performance management are realizing that it is the performance of the business processes, not the organizational functional units or a set of assets, that has to be their central focus in order to gain the true benefits of a performance management initiative. Sophisticated and powerful new technologies are central to successful and sustainable programs for both of these disciplines, and integrating the information delivery capabilities as well as management methods is critical to moving up the scale of maturity in deploying these practices.

Along with Business Process Management, new organizational structures and roles are emerging, and a new genre of professionals is emerging to support these practices. Yet, business schools are just beginning to develop programs to teach us how to manage by process. One thing that is clear is that managing by process and adapting new information systems tools to support those activities is a successful strategy that brings tremendous advantage to those businesses that adopt it. And, it seems that the more broad-based the process management initiative is in the organization, the more effective it is and the more value it adds.

There seem to be as many companies whose BPM efforts are driven by their IT organizations as there are those whose BPM programs are being led by core business areas. Likewise, there seem to be two major approaches: those that are more project-oriented versus those that view BPM as a continuous process improvement and transformation effort. These different models generate roles and responsibilities with widely varying titles and alignments of responsibilities, yet all are process-management focused.

Within the ABPMP, the membership still shows a diversity of titles that reflect these divergent approaches to process management. There are well over 150 different titles represented in the ABPMP database, although there are clusters around some of the titles like Manager, Director, VP, Analyst, Consultant, and Architect, usually preceded or followed by Process, BPM, Process Improvement, Process Innovation, and the like.

One role that is particularly significant in BPM programs is that of the *process owner*. Depending on whether the organization restructures around cross-functional business processes, creates a matrix-managed organization, appoints functional managers to take on a dual role, or relies on a cross-functional council of managers to oversee core business processes, it will ensure that someone takes on the responsibilities of a *process owner* for each of the organization's key operational processes. This role seems to be one of the critical success factors in effective process-oriented organizations.

An organizational factor that seems to reflect the evolution or maturity in organizations implementing BPM is the existence of a specialized group that is recognized as the process specialists. Many begin with a BPM *Center of Excellence* (CoE) or similar group that provides to the organization process modeling, analysis, design, and project expertise along with standard tools, methods, and techniques and acts as an internal consulting group. A more mature or experienced process-oriented organization will have a process management governance group or *Process Management Office* that oversees the organization's portfolio of processes and aligns, prioritizes, and authorizes transformation efforts. Some companies may have both types of groups working together. These groups are staffed with process management professionals with a wide range of titles and alignment of responsibilities.

While there seem to be many successful models for implementing BPM in organizations, one thing they all have in common is the many new roles with new sets of skills and responsibilities all centered on BPM. This is an emerging group of professionals whose work is essential to twenty-first-century business: the business process professional. Judging from the members of ABPMP, they are generally highly educated (67% have a bachelor or advanced degree) and have a significant amount of experience (9.9 years average) working in process improvement and redesign.

Some of the more common titles are:

- Business Process Analyst
- Business Process Engineer
- Business Process Architect
- Business Architect
- Business Process Manager

- Business Process Consultant
- Business Process Manager
- Business Process Owner
- Business Analyst
- Business Systems Analyst
- Manager or Director of Business Performance Improvement
- Manager or Director of Business Process Innovation
- Process Owner
- Process Officer

These titles and their variants cover the majority of the new roles and responsibilities in process-managed organizations. Regardless of the roles or organizational structure, they generally are responsible for the same sets of activities: process modeling, process analysis, process design, process change and transformation, process implementation, process monitoring and control, and process performance improvement. Some of these roles may be staffed in IT organizations and some in business disciplines. Many organizations are staffing with cross-discipline groups combining both IT and business knowledge or with people who have served in both IT and business units, bringing a depth of knowledge and range of skills that transcend traditional boundaries. Many have found that combining people who have general consulting-type knowledge and skills with others who have a depth of business-specific knowledge is a successful strategy for BPM efforts.

There is a new professional in the business world today, the business process professional. The work they do is critical to the future of competitive organizations. And, even though there is no single or clear model that one can adopt, it doesn't diminish the need for more skilled and motivated people to do this work. Eventually, universities will come out with well-researched and structured models based on some of the most visible success stories. In the meantime, businesses can't wait for someone to tell them the *best* way to do this; they have to do this work today, and there just aren't enough knowledgeable, skilled people to go around. Successful organizations are finding that to staff these groups, they have to invest in training and development. Some are building their own curricula and training programs and bringing entry-level people on board to work closely with the few talented BPM Professionals they do have. Others are sending managers, project leaders, and systems analysts to training, such as the BPM-Institute or Object Management Group (OMG) certificate programs, to begin to build the requisite knowledge and skills. This situation will likely continue to be the most viable approach to building process organizations for the near future.

The mission of ABPMP and EABPM is to engage in activities that promote the practice of Business Process Management, to develop a common body of knowledge in this field, and to contribute to the advancement and skill development of professionals who work in this discipline by acting as a certifying body for BPM Certifications. ABPMP and EABPM's local chapters produce periodic events featuring BPM boot camps, case studies, and BPM Certification preparation, and presentations about BPM topics, which provides an inexpensive continuing education program for their members. ABPMP and EABPM have an education committee that continues developing the BPM Common Body of Knowledge. Following that, ABPMP has produced a recommended curriculum for academic and training programs.

ABPMP has created a set of criteria to evaluate training providers and their programs and a process for formal endorsement of training providers and academic programs.

Working in BPM at this time is the most exciting and valuable business experience managers and professionals can get today. I see Business Process Management professionals as the new training background for future business leaders today, much as project management was fifteen years ago. ABPMP has developed through the BPM CBOK Guide and BPM Competency Model the baseline knowledge, skills, standards, competencies, and minimum qualifications for each BPM Certification level as a career path for becoming a professional in this BPM. If you are working in process management, join others in developing the profession — join ABPMP today. Together we can build a new professional discipline that will create the future.

— Brett Champlin, Pat President, ABPMP

The *BPM CBOK Guide* Approach by Version

The general approach, which is consistent among all versions, is to convey knowledge, skills, and competencies that lead to a BPM Certification. The differences between versions are in the certification type, levels, and potential roles, as shown in the following table.

Version	Conveys	Towards BPM Certification	Level	Role
2.0	Knowledge, skills, competencies	CBPP	Intermediate	Process Architect
3.0*	Knowledge, skills, competencies	CBPA	Entry	Process Analyst
4.0	Knowledge, skills, competencies	- CBPP - CBPA	- Entry - Intermediate	- Process Analyst - Process Architect
Future	Knowledge, skills, competencies	CBPL	Leadership	- Chief Process Architect - Enterprise Business Architect

NOTE: The leadership BPM CBOK will be a separate body of knowledge with a didactic exam.
***CBPA level was introduced in version 3.0 and includes updates to CBPP level.**

1 The BPM Professional: Career Path Architecture

For those BPM practitioners who are in it for the long run, ABPMP developed the BPM Competency Model and Career Path Architecture as a roadmap for professional development in the BPM profession. The goal was to make sure that if a person was either a business-oriented or IT-oriented BPM professional, that there was a career path for you to elevate your skills and competencies, and your job title and pay grade.

The pyramid graphic that follows is representative of how any professional evolves through a career path (known as *climbing the ladder*). People start their careers at an entry level. They learn the skills and competencies to do the work at the base *technician* level. Over time, they acquire managerial skills and competencies and become *managers* who supervise people (technicians) working on larger projects or initiatives. Finally, they acquire the skills and competencies to manage a business unit or organization and graduate to the level of senior leader — a manager of managers.

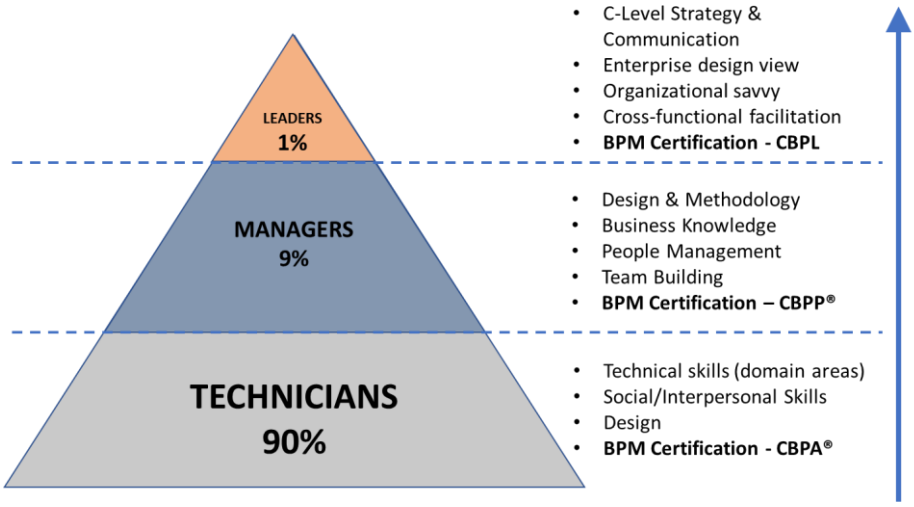


Figure 1.1 Leadership Development Pipeline Pyramid

The larger question is, what are the possibilities of that career evolution within an organization? Following is an example of some of the currently developing job titles in today's marketplace and possible paths to more senior levels. The right side of the diagram shows the growing scope of design responsibilities and accountabilities as your skills, competencies, and experience mature.

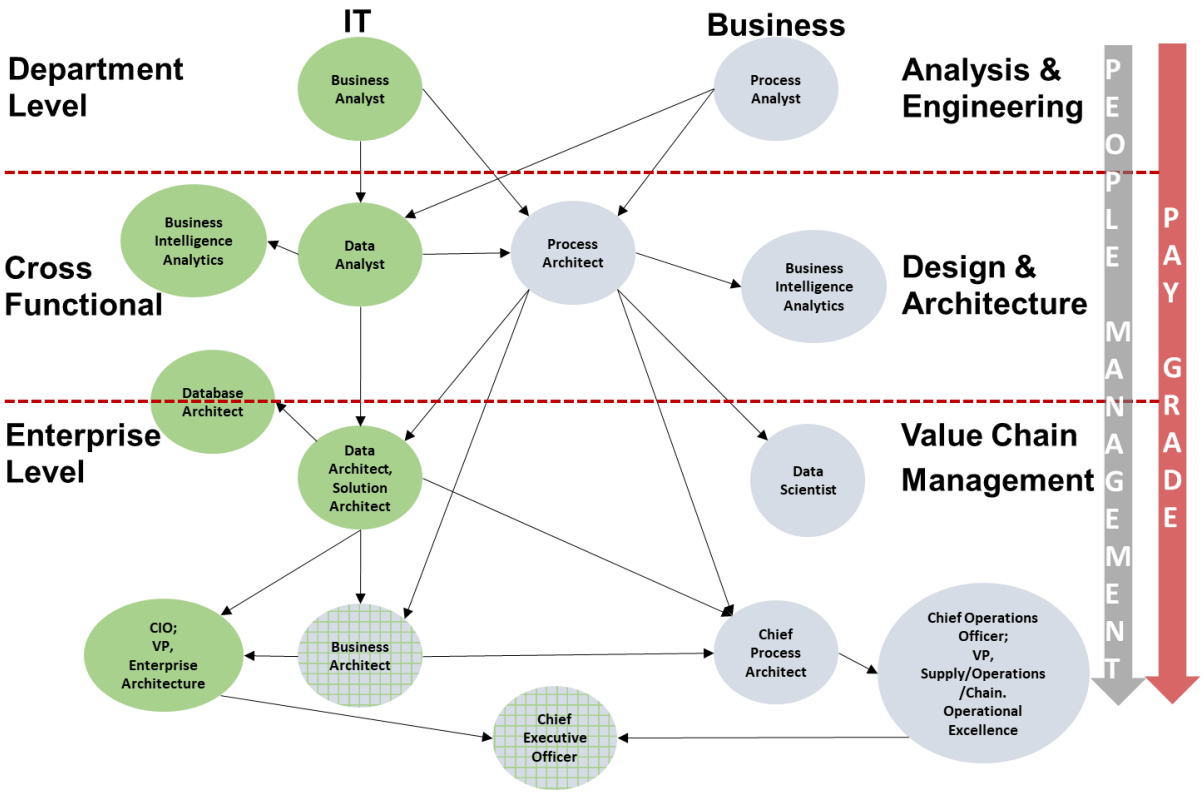


Figure 1.2 Example of Changing Paths in Job Advancement

Again, the idea here is that as you develop more skills and competencies, you will naturally *climb the ladder* of an organization. As you acquire more skills and competencies in BPM and design, you also pick up more managerial skills and competencies as a leader (people manager).

ABPMP has created a career architecture for BPM Professionals to address an unaddressed market need for the BPM profession. If you graduate from college and get your first entry-level position, there is an early need to understand process and human performance. The CBPA is that first step. The CBPP can be attained after four years of experience. Finally, after ten years of experience, you can go for the CBPL certification. Each certification carries with it certain level skills, competencies, and the experience necessary to grow and pursue a career path.

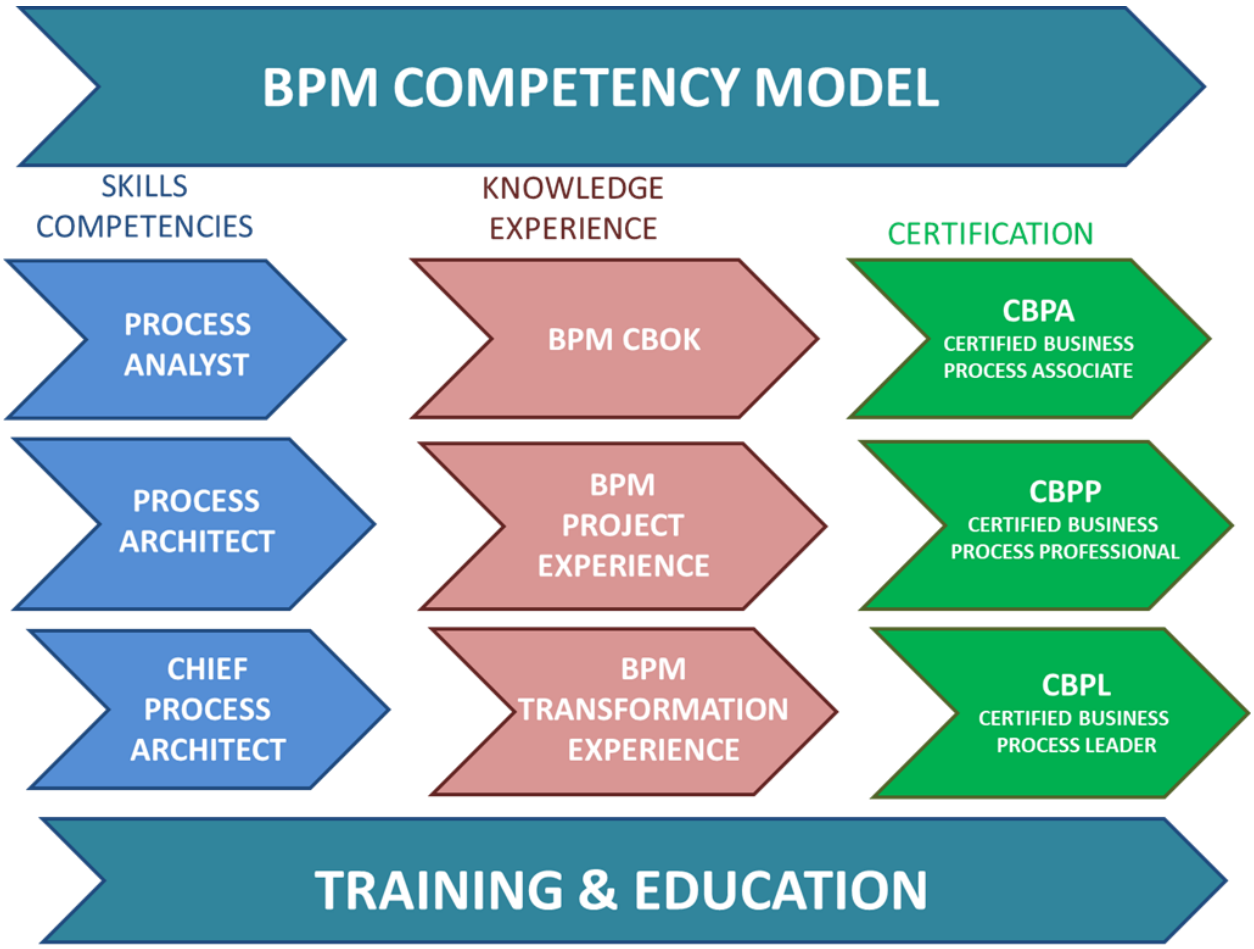


Figure 1.3 The BPM Competency Model

The *BPM CBOK Guide* contains the knowledge areas, skills, and competencies to start one's BPM journey.

1.1 Knowledge Areas of the BPM CBOK

Knowledge areas are complete sets of concepts, terms, and activities that make up a professional field. The following image represents knowledge areas for the Business Process Management profession.

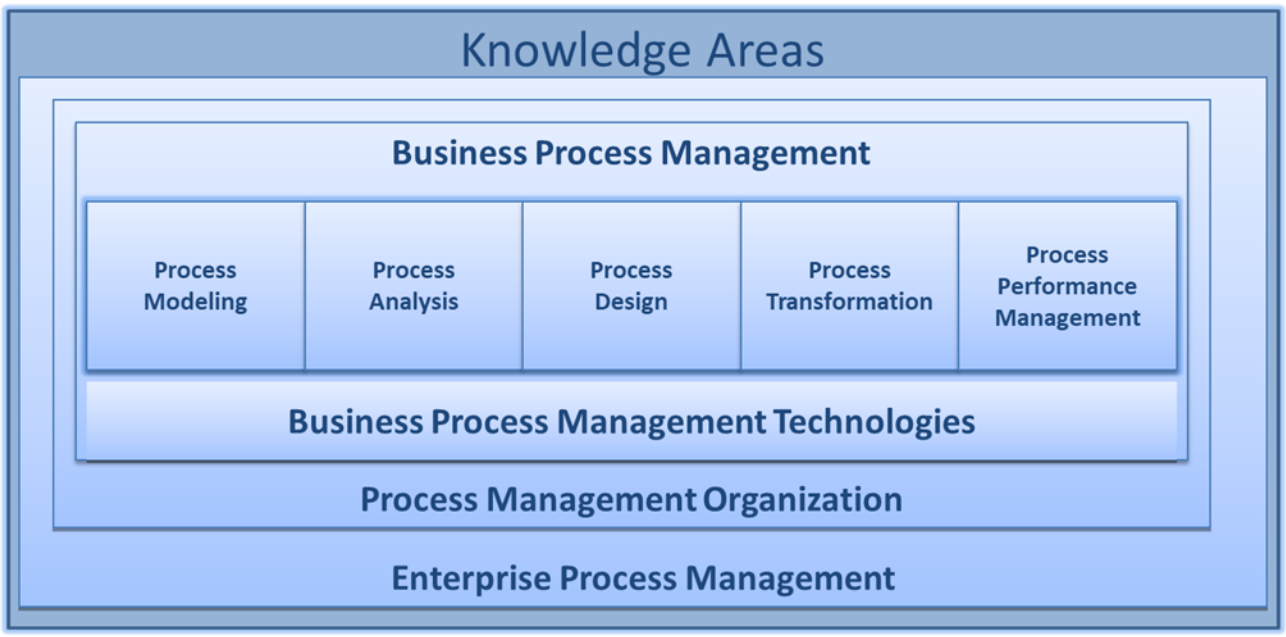


Figure 1.4 BPM Knowledge Areas

This *BPM CBOK Guide* provides a basic reference for BPM practitioners. The primary purpose of the *BPM CBOK Guide* is to define the profession of Business Process Management and to identify and provide an overview of the *knowledge areas* that are generally recognized and accepted as good practice. It includes roles and organizational structures, as well as provisions to steer a process-driven organization. The guide provides a general overview of each knowledge area and a list of common activities and tasks associated with each knowledge area. T*he BPM CBOK Guide* is an enabler of success. It aims to increase capabilities of BPM Professionals so they can develop and guide process-driven business strategy for their organizations, supported by enabling BPM technologies, which leads to the success of the businesses.

This guide is also intended as a springboard for discussions among BPM Professionals. Often, a discipline such as BPM finds different groups using language in different ways, resulting in conflicting terminology or definitions that can confuse discussions on the topic. One purpose of the *BPM CBOK Guide* is to encourage the use of a common, agreed-upon vocabulary for the BPM discipline. It also provides links and references to other sources of information that are part of the broader BPM Common Body of Knowledge.

In addition, the *BPM CBOK Guide* conveys the fundamental knowledge required of a BPM Professional. Any assessment or professional certification in the field requires a demonstrated understanding of the core BPM concepts outlined in the knowledge areas, as well as the ability to perform the activities and

tasks identified within them. The *BPM CBOK Guide* is the basis for developing questions for the exam that individuals must pass to become a Certified Business Process Associate (CBPA) and/or Certified Business Process Professional (CBPP). These examinations have been developed by the ABPMP as the *BPM CBOK Guide* is constructed and with the aid of a professional certification and licensure testing company. ABPMP follows the International Standard ANSI/ISO 17024 and ACE (American Council on Education) General Requirements for Bodies Operating Certification of Persons in the creation of the certification and examination processes.

1.1.1 Overview of BPM CBOK Knowledge Areas

The following sections provide a glimpse of the coverage in subsequent chapters of the BPM knowledge areas.

1.1.2 Business Process Management

The Business Process Management chapter focuses on the concepts of BPM, such as key definitions, end-to-end processes, customer value, and the nature of cross-functional work. Process types, process components, the BPM life cycle, along with critical skills and success factors are introduced and explored. This section defines BPM and provides the foundation for exploring the core knowledge areas of BPM.

1.1.3 Process Modeling

Process modeling includes a critical set of skills and processes that enable people to understand, communicate, measure, and manage the primary components of business processes. The Process Modeling Core Area provides an overview of these skills, activities, and key definitions, along with an explanation of the purpose and benefits of process modeling, a discussion of the types and uses of process models, and the tools, techniques, and modeling standards. As of Version 4, the concept of a *process repository* is included and referenced in other chapters as appropriate.

1.1.4 Process Analysis

Process analysis involves a systematic review and an in-depth examination of business processes, including the efficiency and effectiveness of business processes. This chapter explores process analysis purpose, activities to support process decomposition, and analytical frameworks. It covers the roles, scope, business context, rules, and performance metrics that make up process analysis. The focus is on understanding current-state processes with a view to achieving improvements in the future state. A variety of process analysis types, tools, and techniques are included within this knowledge area.

1.1.5 Process Design

Process design involves creating the future state or design for business processes within the context of the organizational strategy and linking process performance objectives to the strategy and goals. It provides the plans and guidelines for how work processes flow, how rules are applied, simulation of the future state, process compliance, and operational controls. The value of process design is discussed

along with planning for how business processes function and are measured, governed, and managed. This knowledge area explores process design roles, techniques, and principles of good design. The chapter also explores common process design patterns and considerations such as compliance, executive leadership, and strategic alignment.

1.1.6 Process Performance Measurement

Process performance measurement is the formal, planned monitoring of process execution and the tracking of results to determine the effectiveness and efficiency of the process. This information is used to make decisions for improving or retiring existing processes and/or introducing new processes in order to meet the strategic objectives of the organization. Topics covered include the importance and benefits of performance measurement, key process performance definitions, monitoring and controlling operations, alignment of business processes and enterprise performance, what to measure, process and measurement methods and frameworks, modeling and simulation, decision support for Process Owners and managers, and considerations for success.

1.1.7 Business Process Transformation

Process transformation emphasizes that the BPM life cycle, including business and/or digital transformation, begins with strategy and cascades down to execution. The chapter also addresses change management associated with these transformations. Process changes are discussed in the context of the BPM life cycle from planning to implementation. Various process improvement, redesign, and reengineering methodologies are explored, along with the tasks associated with *construction*, quality control, and the introduction and evaluation of new processes. The topic of organizational change management, including change management best practices for transformation are also addressed.

1.1.8 Technology and Transformation

The *technology and transformation* knowledge area covers enterprise technologies that support organizational business transformation. Enterprise technologies, including BPM, enable business and digital transformation. BPM is a technology-enabled and technology-supported management discipline. The section includes BPM technologies available to support the planning, design, analysis, operation, and monitoring of business processes. These technologies include the set of application packages, development tools, infrastructure technologies, and data and information stores that provide support to BPM Professionals and workers in BPM-related activities. Integrated Business Process Management Suites (iBPMS), process repositories, and cloud-based platforms for modeling, analysis, design, execution, and monitoring are discussed. BPM standards, methodologies, and emerging trends are also covered. As of Version 4, robotic process automation (RPA), blockchain, artificial intelligence, machine learning, and Internet of things (IoT) are included in this chapter.

1.1.9 Process Management Organization and Culture

The *process management organization* knowledge area addresses the roles, responsibilities, and reporting structure to support process-driven organizations. The chapter includes a discussion of what defines a process-driven enterprise, along with cultural considerations and cross-functional, team-based performance. The importance of business process governance is explored, along with a variety of governance structures and the notion of a BPM Center of Excellence (CoE). As of Version 4, the role of *collaboration* in BPM is included here and referenced in other chapters.

1.1.10 Enterprise Process Management

Enterprise Process Management is driven by the need to maximize the results of business processes consistent with well-defined business strategies and functional goals based on these strategies. *Process portfolio management* ensures that the process portfolio supports corporate or business-unit strategies and provides a method to manage and evaluate initiatives. The Enterprise Process Management knowledge area identifies tools and methods to assess process management maturity levels, along with required BPM practice areas that can improve a BPM organization state. Several business process frameworks are discussed, along with the notion of process integration — that is, interaction of various processes with each other and with models that tie performance, goals, technologies, people, and controls (both financial and operational) to business strategy and performance objectives. The topics of process architecture and best practices in Enterprise Process Management are explored.

Current Version Comments
Please send comments to ABPMP through our website and let us know if there are any topics you believe we should include or if you have disagreements with the association's point of view. Your comments will be used as a foundation for future versions.

Readers who would like to see additional topics or discussions in future versions are invited to send all suggestions or recommendations for changes to ABPMP at www.abpmp.org/page/feedback_CBOK.

1.2 BPM Skills and Competencies (BPM Competency Model)

The ABPMP BPM Competency Model was developed to address the overall need to provide BPM Professionals a developmental path that outlines the skills, competencies, and experience levels for individuals pursuing a career in Business Process Management. The model also shows how that developmental path aligns BPM CBOK content knowledge areas with the ABPMP BPM Certifications.

The BPM Competency Model graphic that follows provides a conceptual understanding of the experience level requirements as one progresses from entry level (CBPA) to leadership level (CBPL). The CBPA requires either a Bachelor's degree or at least one year of work experience to be eligible. The CBPP level requires a minimum of four years of work experience and is intended for individuals who can demonstrate project-oriented, BPM-related improvements. The CBPL requires a minimum of ten years of experience and should include enterprise-level business process change projects with at least one major cross-functional process.

The BPM Competency Model Matrix is illustrated in the following table as a one-page summary. The full model is thirteen pages and covers each category of skill and competency in detail for each BPM Certification level. The full version of the BPM Competency Model is available in Appendix A.

Equivalent Business Title	Process Analyst	Process Architect	Chief Process Architect
Primary Responsibilities	Entry Level	Middle Manager	Senior Leader
Background			
Education/ Certification	Bachelors/ CBPA®	Bachelors and/or Masters/ CBPP®	Masters/ CBPL™
Work Experience	<1 year	>4, <10 years	>10 years
Business Process Management Competencies			
Process Modeling, Analysis & Design (New Solution Design)	Beginner	Intermediate	Advanced
Process Methodology	<1 Methodology	2 or less Methodologies	>2 Methodologies
Process Measurement & Management (Performance Measurement)	Basic identification & Measurement	Benchmarking	Advanced Benchmarking and Integration into Corporate Strategy
Change Management & Facilitation	Beginner	Intermediate	Advanced
Technology	<1 Implementation, Any technology	<5 Implementations, Any Technology	>5 Implementations, Any Technology
General Business Competencies			
Individual and Leadership Behavior	Participates on Team	Participates and Leads Small to Medium Size Teams	Leads Large Teams
Solutions Delivery	Participates on Team	Participates and Leads Small to Medium Size Teams	Leads Large Teams
Business & Financial IQ	ROI	Benchmarking & ROI	Benchmarking, ROI, Corporate Scorecard

Figure 1.5 BPM Competency Model Matrix Summary

1.3 ABPMP BPM Certification Levels

BPM Certification means that an individual has:

- Achieved appropriate professional experience and/or education
- Passed a rigorous examination of 130 questions
- Agreed to abide by a professional code of conduct
- Committed to maintaining an active credential through meeting continuing professional development requirements

The ABPMP BPM Certification program is unique in our rapidly changing marketplace. The BPM Certifications were developed by and for BPM practitioners. They are the first independent, professional examinations and certification programs in the area of BPM. The BPM Certifications have been designed to comply with international certification standards and are now the internationally recognized standards for BPM Professionals. The BPM Certifications are offered by ABPMP through our chapters and affiliates worldwide, representing the largest qualified constituency of BPM practitioners today.

There are three BPM Certifications: CBPA, CBPP, and CBPL.

CBPA. The *Certified Business Process Associate* certificate is for new BPM practitioners. Those who have completed (or are in process of completing) an undergraduate degree or who have worked in a Business Process Management role for at least one year are eligible to sit for the exam. The exam demonstrates an understanding of business process improvement and transformation concepts across the disciplines covered by the *BPM CBOK Guide*. The CBPA certification allows those new to the profession to demonstrate their understanding of the concepts, approaches, techniques, and technologies needed to succeed in BPM and helps them stand out among their peers. The CBPA certificate is more than an academic certification or a certificate of study. It is independent verification that the individual has a solid level of basic competency in Business Process Management and may have applied the concepts in day-to-day work experience.

CBPP. The *Certified Business Process Professional* certificate is for individuals who are experienced BPM practitioners and requires a minimum of four years of BPM work. It is a pre-requisite for pursuing the Certified Business Process Leader (CBPL) certificate.

CBPL. The *Certified Business Process Leader* certificate is focused on practitioners in leadership and requires a minimum of ten years of experience. Those seeking this level should have experience in enterprise-level business process change that includes at least one major cross-functional process.

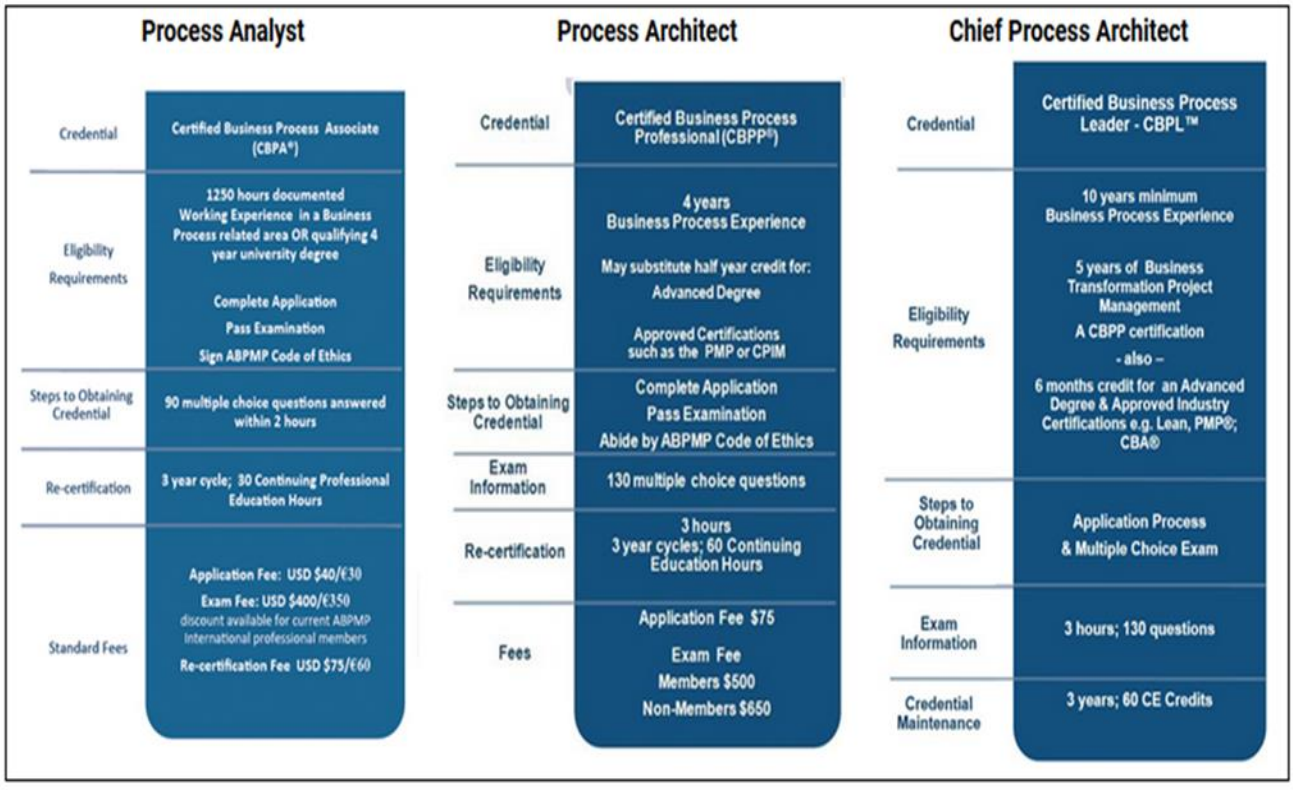


Figure 1.6 Certification Levels with Eligibility Requirements

2 Introduction

In this chapter, you will find definitions related to the *BPM CBOK Guide*, a statement of purpose, how this guide is organized, the drivers for using BPM, and an explanation of where BPM fits in the professional space.

2.1 What Is a Body of Knowledge?

A *body of knowledge* is a collection of all the available knowledge on a topic or all the published material on a subject. This definition of *corpus* (also called body of knowledge) comes from businessdictionary.com.

For the purposes of BPM, we adapt the definition to: *A collection of all the available knowledge on the currently accepted practices of a topic, including all the published material on the subject.*

2.2 What Is the *BPM CBOK Guide*?

Guide to the Business Process Management Common Body of Knowledge (*BPM CBOK Guide*) is the globally recognized standard for the practice of Business Process Management. The *BPM CBOK Guide* describes business process management knowledge areas, key concepts, and generally accepted best practices (skills and competencies) to guide an organization on a process-led journey.

When a new term is used in the market, until it is defined and becomes a best practice, it won't be in the *BPM CBOK Guide*. *Social BPM* is one example of such terminology. *Process mining* is another example where the marketplace (mostly IT and BPM vendors) is using the term defined as follows: *process mining* is a process analysis method that aims to discover, monitor, and improve real processes (processes not assumed) by extracting knowledge easily from available event logs in the systems of current information of an organization. That definition actually describes an existing capability of many BPM systems that do process mining, which is simply a form of process discovery. For more information please refer to: https://medium.com/@pedrorobledobpm/process-mining-plays-an-essential-role-in-digital-transformation-384839236bbe.

Because the term Business Process Management (BPM) is used so frequently throughout this publication, we include the definition, as applied, herein:

> ***Business Process Management (BPM)*** *is a disciplined management approach to identify, design, execute, document, measure, monitor, and control both automated and non-automated business processes to achieve consistent, targeted results aligned with an organization's strategic goals. BPM involves the deliberate, collaborative, and increasingly technology-aided definition, improvement, innovation, and management of end-to-end business processes that drive business results, create value for customers, and enable an organization to meet its business objectives with more agility.*

2.2.1 Purpose of the *BPM CBOK Guide*

This *BPM CBOK Guide* provides a basic reference of BPM best practices for BPM practitioners. The primary purpose of the *BPM CBOK Guide* is to define the profession of Business Process Management and to identify and provide an overview of the knowledge areas that are generally recognized and accepted as best practice. It includes roles and organizational structures as well as provisions to steer a process-driven organization. The guide provides a general overview of each knowledge area and a list of common activities and tasks associated with each knowledge area. The *BPM CBOK Guide* allows BPM Professionals to increase their capabilities and thereby develop appropriate business strategies, supported by enabling BPM technologies, which leads to business success.

This guide is also intended as a springboard for discussions among BPM Professionals. Often, a discipline such as BPM finds different groups using language in different ways, resulting in terminology or conflicting definitions that can confuse discussions on the topic. One purpose of the *BPM CBOK Guide* is to encourage the use of a common, agreed-upon vocabulary for the BPM discipline. It also provides links and references to other sources of information that are part of the broader BPM Common Body of Knowledge.

In addition, the *BPM CBOK Guide* reflects the fundamental knowledge required of a BPM Professional. Any assessment or professional certification in the field requires a demonstrated understanding of the core BPM concepts outlined in the knowledge areas, as well as the ability to perform the activities identified within them. The *BPM CBOK Guide* is the basis for developing examination questions for the exam that individuals must pass to become a Certified Business Process Associate (CBPA) and/or Certified Business Process Professional (CBPP). These examinations have been developed by the ABPMP as the *BPM CBOK Guide* is constructed and with the aid of a professional certification and licensure testing company. ABPMP follows the International Standard ANSI/ISO 17024 and ACE (American Council on Education) General Requirements for Bodies Operating Certification of Persons in the creation of the certification and examination processes.

2.2.2 Organization of Sections

The *BPM CBOK Guide* is organized in BPM knowledge areas or core areas or sections, as outlined in Figure 2.1. These BPM core areas are segmented into a broader, organizational-oriented perspective and a process perspective. BPM core areas reflect BPM capabilities that may be considered by an organization implementing Business Process Management.

BPM concepts are covered in the Business Process Management chapter, which sets the stage for all of the BPM core areas.

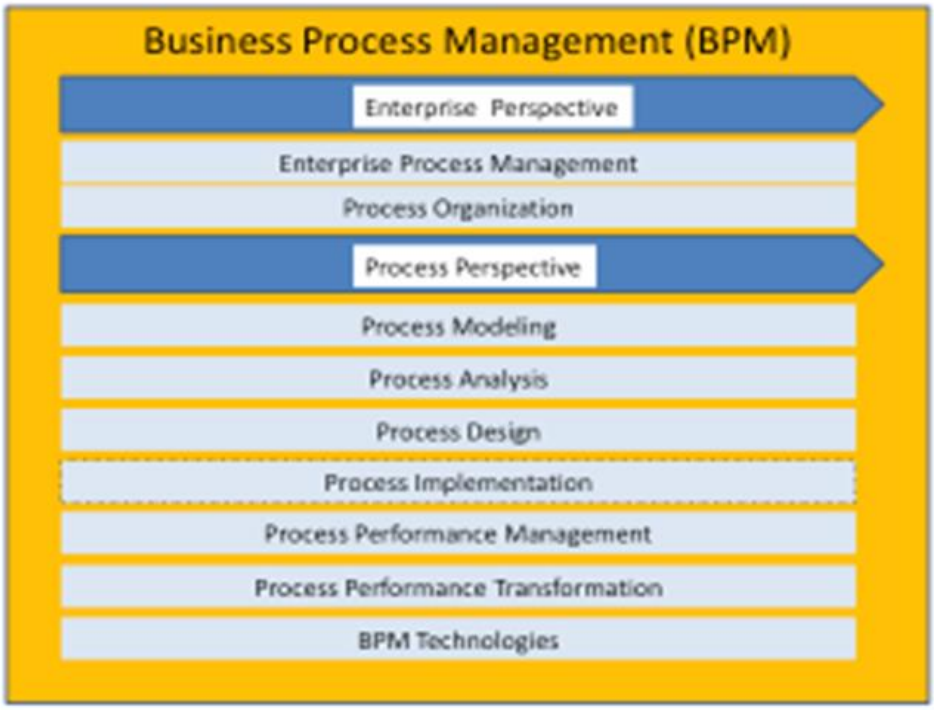


Figure 2.1 Core Areas of BPM and CBOK Organization

2.3 Why BPM Matters

There are many reasons why BPM matters to businesses even when senior leaders may not be as process oriented as others. The reasons are usually developed from using strategic analysis techniques or frameworks for understanding the drivers of change. The two types of drivers are in the context of the organization and comprise a litany of drivers both internal and external to the organization.

2.4 The BPM Professional Space

By *professional space*, we mean all the internal and external factors that influence decisions surrounding business process management. For BPM practitioners, the BPM professional space represents the scope of knowledge and can be analogous to the internal and external drivers. The BPM professional space is comprised of nine components, as shown in Figure 2.2.

External Environment. In Figure 2.2, the box on the left represents the external environment, made up of the enterprise's relevant environment, BPM practice influences, and BPM professional development programs. The *enterprise's relevant environment* includes competitors, industry associations, and regulators. *BPM practice influencers* include professional associations, rule-making institutions, and technology vendors. *BPM professional development programs* include common body of knowledge publications, research projects, education programs, and professional certification. The ABPMP is

strongly committed to supporting programs that promote BPM professional practices and professional development.

Enterprise (Internal) Environment. The middle box in Figure 2.2 shows the next five components, which are internal to the enterprise: business strategy and governance; BPM professional practices; business processes; applications, data, and IT platforms; and values, beliefs, leadership, and culture. *Business strategy and governance* refers to guidelines for management of an organization. *BPM professional practices* is the management of the organization's business processes (*process management*). *Business processes* are the formalized operational standards of an organization, both internal and external. *Applications, data, and IT platforms* are technology used to support business processes. *Values, beliefs, leadership, and culture* are factors unique to an organization that influence how employees and management behave.

Extended Enterprise Environment. The box on the right in Figure 2.2 depicts the *extended enterprise*, with influences both internal and external. These are business processes that are outsourced. Although executed in an external environment, they are extensions of the enterprise's business processes.

The key point is that influences on BPM Professionals extend outside the organization and must be considered as part of a holistic view of its business processes.

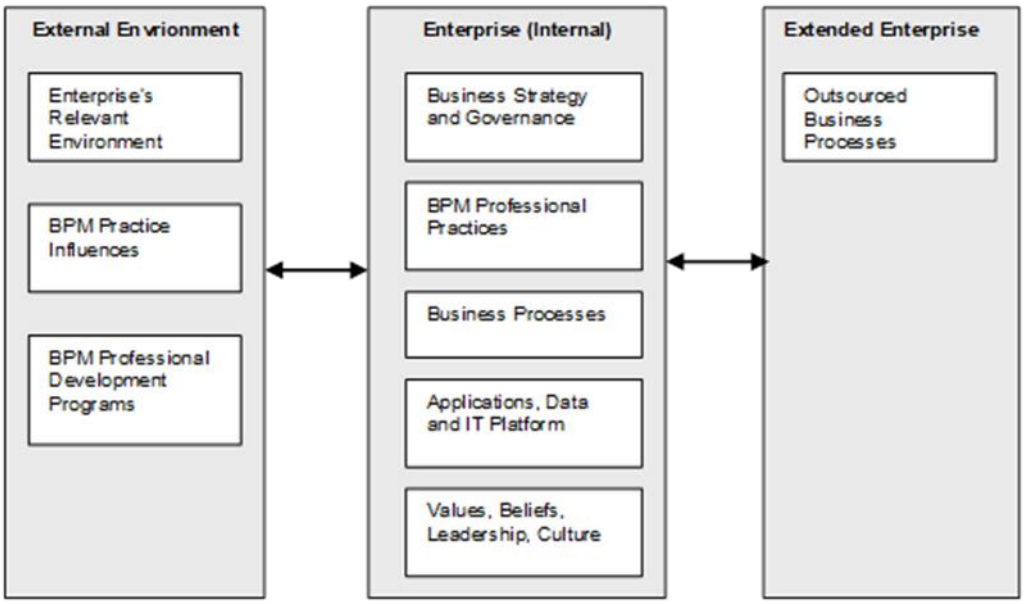


Figure 2.2: BPM Professional Space

3 Business Process Management

Chapter 3 delves into business process management.

3.1 What Is BPM?

The following sections answer the question, what is BPM?

3.1.1 Scope of BPM Initiatives

BPM provides a means to focus on results as well as courses of action. Figure 3.1 illustrates the scope of BPM initiatives.

Business Process Management (BPM) Scope		
Business Process Improvement	**Enterprise Process Management**	**Continuous Improvement**
Singular initiative (project driven) • Selection, Analysis • Design and Implementation of a particular process in order to improve the alignment and performance	• Application of BPM Principles and Methods to cross functional processes aligning to strategy • Includes governance, portfolio and architecture management	**Sustained feedback control system** to monitor performance of processes
Applied methods: • BPM Life Cycle • Lean Six Sigma • TQM • Process Engineering • Performance improvement • ABC	**Process Management Maturity Level** assessment and management to achieve standard level of a process managed organization and process maturity	

Figure 3.1: Scope of BPM Initiatives

Initiatives can be limited in scope, such as a project that targets business process improvement (BPI). Outcomes can be achieved by applying the BPM life cycle as described in this guide or by applying other methodologies like Lean Management or Six Sigma.

> ***Business process improvement (BPI)*** *is a singular initiative or project to improve the alignment and performance of a particular process with the organizational strategy and customer expectations. BPI includes the selection, analysis, design, and implementation of the (improved) process.*

BPM is also a holistic system that can generate outcomes of initiatives or projects. This result, called Enterprise Process Management (EPM), includes the strategy, values and culture, structures and roles, and a whole set of end-to-end processes with their associated goals and indicators, IT, and people. The degree of progress reached can be assessed as a *process management maturity level.*

Enterprise Process Management *(EPM) is the application of BPM principles, methods, and processes to an individual enterprise. EPM (a) assures the alignment of the portfolio and architecture of end-to-end processes with the organization's strategy and resources and (b) provides a governance model for the management and evaluation of BPM initiatives.*

BPM can also be seen as a *continuous refinement*, which can be achieved by the application of a day-to-day feedback control system to improve the quality of single processes and the Enterprise Process Management system.

Business process continuous improvement *is the sustained approach to monitor process performance to ensure processes are more efficient and effective by applying a concurrent and responsive feedback control system.*

3.1.2 Definition

Business Process Management is defined below. It is also a management discipline that treats business processes as assets. It presumes that organizational objectives can be achieved through the definition, engineering, control, and dedication to continuous improvement of the organization's major cross-functional business processes.

Business Process Management (BPM) *is a disciplined management approach to identify, design, execute, document, measure, monitor, and control both automated and non-automated business processes to achieve consistent, targeted results aligned with an organization's strategic goals. BPM involves the deliberate, collaborative and increasingly technology-aided definition, improvement, innovation, and management of end-to-end business processes that drive business results, create value for customers, and enable an organization to meet its business objectives with more agility.*

3.1.3 Core Principles of Business Process Management

The following are core principles of Business Process Management that are central to the practice and should be front of mind throughout one's BPM practice.

- Business change is a performance-driven management discipline
- Business change must involve all relevant stakeholders involved in the process
- Business process change must be approached from the outside in (customer-driven)
- Business processes must be managed holistically within any organization
- Business change must be linked to the stakeholder criteria
- Business process change must be aligned to the corporate strategy and the goals of the operational plan metrics
- The organization must segment the primary, cross-functional processes that deliver value to the customer

- Business change is about people as much as process
- Business Process Management is a journey, not a destination
- Business processes must be managed continuously in a life cycle model

3.1.4 How Organizations Should Approach Business Change

Just as strategic planning should be an annual cycle in any organization, so should the approach be to business (process) change. While there are many BPM life cycles in use today, what's more important is that BPM practitioners use a life cycle that follows the principles of Business Process Management.

3.1.5 The BPM Life Cycle Framework

The management practice of BPM follows a process or *life cycle* of integrated BPM phased activities. Most life cycles can be summarized by an iterative, phased set of activities that include:

(1) Alignment to strategy and goals
(2) Architect changes
(3) Develop initiatives
(4) Implement changes
(5) Measure success

Continuous improvement is part of the last phase. As a BPM practitioner cascades through the BPM life cycle, as illustrated in Figure 3.2, business processes are enabled or constrained by a variety of factors including the four primary factors of values, beliefs, leadership, and culture.



Figure 3.2 Five Phases of BPM Life Cycle

3.1.5.1 *Phase 1: Alignment to Strategy and Goals*

The BPM life cycle begins with developing a process-driven strategy and plan for the organization. This phase starts with an understanding of organizational strategies and goals that are designed to ensure a compelling value proposition for customers. The strategic plan provides structure and direction for continued customer-centric process management. It lays a foundation for a holistic BPM approach to ensure the alignment with organizational strategy and goals with the integration of strategy, people, processes, and systems across functional boundaries. This phase sets the strategy and direction for aligning process and process capability to the organization's strategy. It also identifies and aligns processes to customer objectives. Critical to this phase is determining the process in focus for change and finally to align those process metrics to the goals of the organization. Ancillary activities include

identifying appropriate BPM Center of Excellence (CoE) organizational roles and responsibilities, executive sponsorship, and expected resource commitments.

3.1.5.2 *Phase 2: Architect Changes*

During phase 2, the work of process modeling, process analysis, process design, and Process Performance Measurement occurs. Phase 2 uses methodologies discussed in this *BPM CBOK Guide* to identify current major, cross-functional organizational processes in the context of the desired goals and objectives. Practitioners use analysis to assimilate information from strategic plans, process models, performance measurements, changes in the environment, and other factors in order to fully understand the business process priorities to be implemented in the organization. All design activities focus on how the new roles will deliver value to customers.

3.1.5.3 *Phase 3: Develop Initiatives*

Phase 3 is where all of the plans are developed for implementation. The guide does not cover how to develop these initiatives, but does give a brief description of the following plans.

- Process training plan
- Change management plan
- Project plan
- Technology change plan
- Benefits realization plan

3.1.5.4 *Phase 4: Implement Changes*

During phase 4 the organization implements all of the plans from phase 3, coordinated and managed by the program sponsor and project manager. This phase requires a structured project implementation schedule for each task and activity by phase with dependencies, predecessors, and so on. The technology *Go-Live* is part of this phase, along with technology and process stabilization. Since the BPM CBOK Guide is not prescriptive, it does not cover how-to topics like implementation.

3.1.5.5 *Phase 5: Measure Success*

Phase 5 includes realization of benefits, which are measured against projected benefits from the original plan. It also implements the permanent Enterprise Process Management and governance model for the organization. It includes continuous measuring and monitoring of business processes and of technology. All business process, change management, benefits realization, and technology plans are stored in the process and document repositories. An ongoing continuous improvement plan is implemented with the Process Owner taking over once the overall initiative reaches project closure.

Alignment of Knowledge Areas to BPM Life Cycle Phases

Phase 1: New section that focuses on aligning Process to Strategy and Goals
Phase 2: Process Modeling, Process Analysis, Process Design, Process Performance Measurement, Business Process Transformation, Technology and Transformation
Phase 3: Process Transformation, Process Organization
Phase 4: This is new section based on BPM Life Cycle and covers Organizational Design, Job training, Technology go-live and stabilization

Continuous process improvement *is an approach in which BPM practitioners continuously evaluate the performance of the business processes, and if the results fall below expectations, start the BPM life cycle again.*

3.1.6 Types of Processes

There are three different types of end-to-end business processes:

- Primary processes (often referred to as core processes)
- Support processes
- Management processes

In most businesses, primary processes make up twenty percent of business activities, while support processes make up seventy percent, and management processes represent ten percent.

3.1.6.1 *Primary Processes (20%)*

Primary processes are end-to-end, cross-functional processes that directly deliver value to customers. Primary processes are often referred to as core processes, as they represent the essential activities an organization performs to fulfill its mission. These processes make up a *value chain*, where each step adds value to the preceding step as measured by its contribution to the creation or delivery of a product or service, ultimately delivering value to customers.

Value chains are comprised of what Michael Porter described as “primary” activities and “supporting” activities in *Competitive Advantage* (1985). The *enterprise-wide business process value chain* is a way of looking at the chain of activities (processes) that provides value to the customer. Each activity has its own performance objectives linked to its parent business process. Primary processes can move across functional organizations, across departments, or even between enterprises and provide a complete end-to-end view of value creation. Primary activities are those involved in the physical creation of the product or service, marketing and transfer to the buyer, and after-sale support. Primary activities are referred to as *value-adding*.

3.1.6.2 *Support Processes (70%)*

Support processes are designed to support primary processes, often by managing resources and/or infrastructure required by primary processes. The primary difference between support and primary processes is that support processes do not directly deliver value to customers, while primary processes do. Common examples of support processes include information technology management, facilities or capacity management, and human resource management. Each of these support processes may involve a resource life cycle and are often tightly associated with functional areas. However, support processes can and often do cross-functional boundaries. For example, capacity management, the process of managing capacity, does not directly deliver value to customers, but does support an organization's ability to deliver products and services. Capacity management often involves a number of cross-functional activities, from planning to procurement, engineering and design, construction, and the

process of putting capacity into production. Each of these activities could include cross-functional teams with representatives from finance, procurement, engineering, manufacturing, information technology, and other functional organizations.

The fact that support processes do not directly deliver value to customers does not mean that they are unimportant to an organization. Support processes can be critical and strategic to organizations as they directly influence the ability of an organization to effectively execute primary processes.

3.1.6.3 *Management Processes (10%)*

Management processes are used to measure, monitor, and control business activities. Management processes ensure that a primary or supporting process meets operational, financial, regulatory, and legal goals. Management processes do not directly add value to customers, but are necessary in order to ensure the organization operates effectively and efficiently.

3.1.7 Types of Activities

Types of activities that are part of business processes include value-adding activities, handoff activities, and control activities.

3.1.7.1 *Value Adding*

Value-adding activities are those that contribute to the process output in a positive way. For example, contacting the customer several days after servicing their car to check that they are satisfied adds value to the Service Vehicle process, both by measuring customer satisfaction and by enhancing the company image as a caring and concerned service provider.

3.1.7.2 *Handoff*

Handoff activities pass control of the process to another department or organization. Transferring a customer to another department after determining the appropriate group to resolve their issue is an example of a handoff activity.

3.1.7.3 *Controls and Control Activities*

Control activities assure that the processes behave within desired tolerances. Controls help ensure processes achieve desired goals and adhere to standards, legal, and/or regulatory requirements. Controls identify exceptions and can trigger exception processes. They can even identify dangerous conditions so they can be addressed through intervention.

A *control activity* is a specific validity checkpoint in a process. Control activities can prevent, detect, or correct undesirable conditions or change the flow of a process to ensure that process goals are met. Control activities typically involve the application of rules and measures of conditions that will call for automated or manual intervention.

The design and application of control activities has been applied extensively to finance, accounting, manufacturing, operations, and virtually all important aspects of an enterprise. A key element of process management is the identification and definition of computing financial and operational controls.

Achieving successful adherence to these controls requires the design, testing, implementation, and monitoring of control activities.

Understanding the need for controls, and those activities within the process that support and enforce controls, is an important contribution of the logic and methods of process management. Quite often, management and auditors design controls to address legal and regulatory requirements without a complete understanding of the end-to-end processes being controlled. Without a process management framework, the list of potential controls designed for risk reduction can be excessive and very difficult, if not impossible, to manage.

3.1.8 BPM Is a Management Discipline

Business Process Management, as a management discipline, carries within it the concept of *governance*. Generically defined, governance is a structured approach to decision making and the means by which decisions are implemented (or not implemented). When applied to business processes, governance implies:

- Structured decision making regarding how an organization functions with respect to the delivery of value to customers
- A structured approach to implementing changes in the way an organization functions with respect to the delivery of value to customers

The cross-functional nature of managing business processes creates a completely new need for specialized roles to support enterprise governance. In traditional, functionally-managed organizations, strategic intent is pushed into business functions at a business unit level, and structured decision making is constrained within that organizational silo (see Figure 3.3). As a result, inefficiencies, poor performance, and breakdowns most often occur during the handoffs between functional organizations. Gaps then become apparent because functional managers are measured and evaluated for their performance in optimizing their siloed functions, rather than the performance of the cross-functional processes. A void in responsibility for optimizing the handoffs between functions becomes problematic.

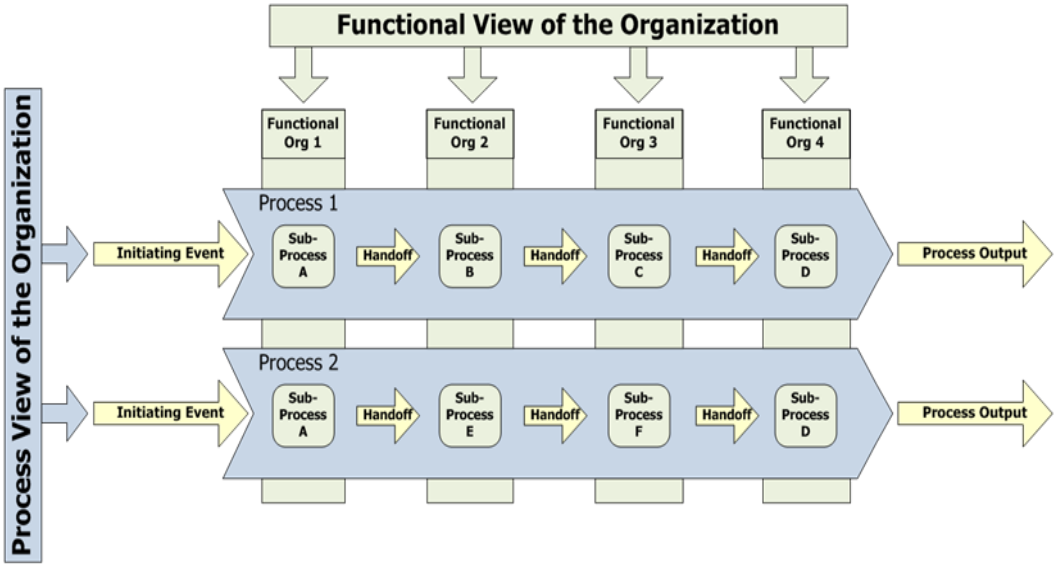


Figure 3.3 Silos in Functionally-Managed Organizations

A Business Process Management implementation typically introduces new roles into the organization with responsibilities for managing processes end-to-end across functional boundaries as a remedy to address the issue of process inefficiencies, breakdowns, and communication gaps between functions. This is prescriptive in BPM and is critical in understanding the labels attached to process-centric roles and the role responsibilities associated with the processes. These new roles and responsibilities exist because of the business process orientation instead of functional resource management.

It is common that a single individual representing a single position in the organizational functional hierarchy will have multiple roles: one for their business function and another in the management of the cross-functional business processes.

While the role titles may vary between companies, for this discussion we will look at roles and responsibilities of the:

- Process Owner
- Process Leader
- Process Steward
- Process Analyst
- Process Governor

3.1.8.1 *Process Owner*

The Process Owner is a centerpiece role in a Business Process Management implementation and is assigned overall responsibility for the end-to-end management of one or more business processes. Specifically, this means that the Process Owner is responsible for ensuring the process meets established performance expectations (for both effectiveness and efficiency). For example, in Figure 3.4, a performance target cycle time of 100 days has been set for a specific business process. The Process

Owner is responsible for ensuring that the process is designed, deployed, monitored, and controlled in a manner that meets this target for every process instance.

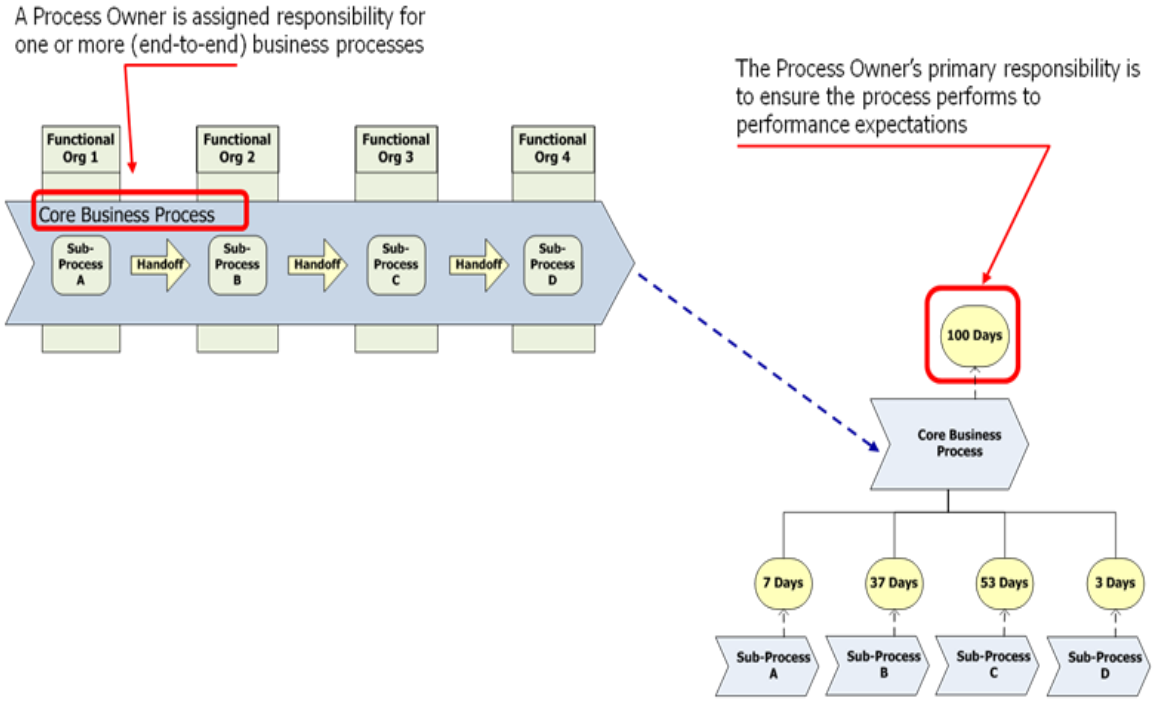


Figure 3.4 Process Owner Assigned a Process with 100 Day Target Cycle Time

In order to meet these responsibilities, a Process Owner typically:

- Engages a team of stakeholders to define business process context and ensure alignment with strategic objectives
- Engages a team of stakeholders and SMEs to ensure business process design meets expectations within its defined organizational context
- Serves as point of contact for process-related questions
- Ensures understanding of how people and systems are engaged to support process execution
- Plays active stakeholder role in business and technology initiatives that impact the process
- Facilitates business process adoption
- Monitors and reports process performance data
- Proposes a corrective course of action if process performance is not as expected
- Escalates instances of significant process performance breaches requiring attention
- Leads a team to assess, prioritize, and implement requests for process change
- Collaborates with other Process Owners to ensure alignment

With respect to organizational positioning of the Process Owner role, there are fundamentally two approaches to implementation, *functionally-aligned* and *non-functionally aligned* process ownership.

Functionally-Aligned Process Ownership

In the functionally-aligned implementation approach, Process Owners report to heads of functional organizations. In cases where a business process transcends organizational boundaries (most do), there are two options for the responsibilities (and accountability) of process ownership:

- A single Process Owner is assigned even though some process participants report to other functional organizations
- Multiple Process Owners are assigned the responsibility for process ownership

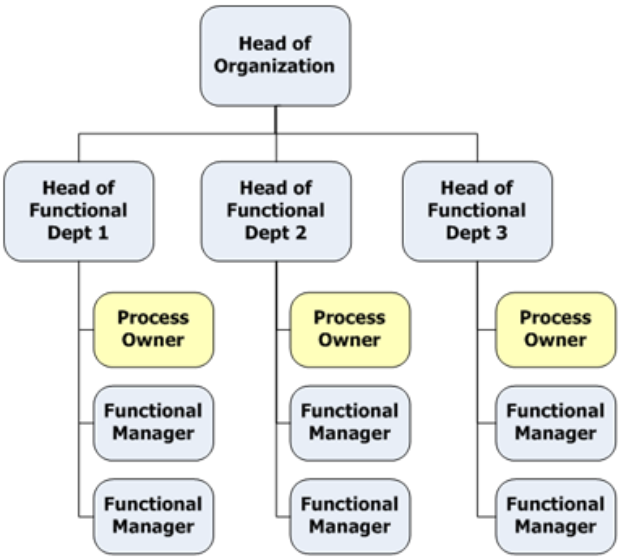


Figure 3.5 Organizational Structure in Functionally-Aligned Process Ownership

The pros of adopting a functionally-aligned process ownership approach are that it is less threatening to the existing power structure and more familiar to operations staff. Therefore, functionally-aligned process ownership has much less chance of being summarily rejected at introduction by the organization. For these reasons, many organizations choose to accept, in the short term, that this approach is less effective and view functionally-aligned process ownership as a baby step to the more effective (but harder to implement) approach of non-functionally aligned process ownership.

Non-Functionally Aligned Process Ownership

In the non-functionally aligned implementation approach, Process Owners report directly to the head of the organization (or to an organizational structure directly under the head). In this case, Process Owners are peers to the heads of functional organizations in the organizational hierarchy.

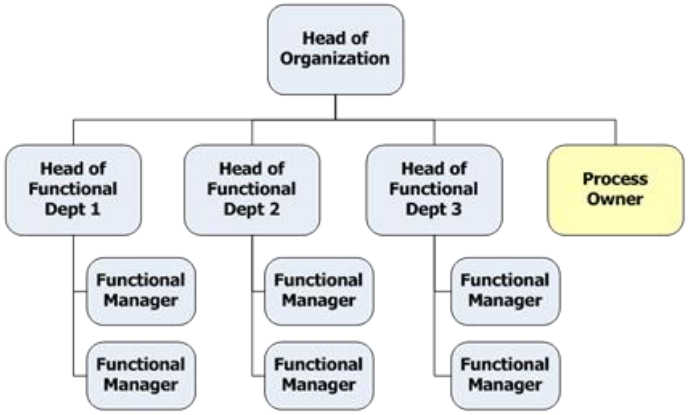


Figure 3.6 Organizational Structure in Functionally-Aligned Process Ownership

The pros of this approach are that the Process Owner is in an appropriate position in the organizational hierarchy to address cross-functional handoff issues and that there is a clear distinction between the responsibilities of a Process Owner and those of functional management.

The challenge of this approach is that it significantly changes the traditional power structure within an organization. There is a high potential for initial resistance (typically from functional managers), sometimes requiring extreme intervention from executive leadership to get the governance model off the ground.

There are inherent weaknesses in both models. In functionally-aligned ownership, there is a danger that process participants from other functional organizations may not recognize Process Owner authority and scope of management, and similarly that Process Owners are less likely to take responsibility for issues stemming from other functions. The weakness in the second model is that Process Ownership is shared across functions. This is really no different than traditional functional management structures and introduces the same host of problems, specifically a lack of authority with respect to management of the handoffs between functions.

3.1.8.2 *Process Leader*

The role of the Process Leader is played by members of the organization's executive leadership team and may or may not involve representatives of the process ownership function.

In organizations where a Business Process Management discipline exists, the typical responsibilities of the Executive Leadership Team members remain intact. For example, leaders still establish strategic direction and develop the organization's vision, mission, and core values.

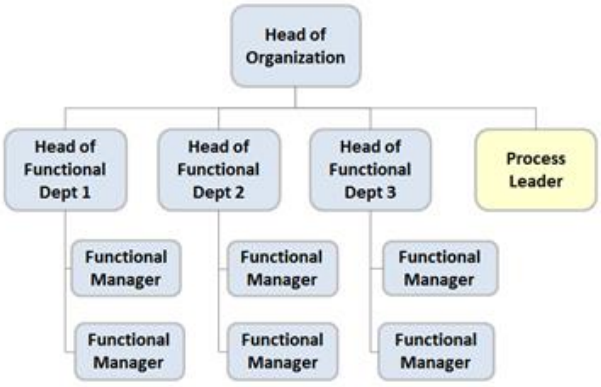


Figure 3.7 Organization Chart Showing Process Leader

Additional responsibilities associated with the role of Process Leader might include:

- Defining the vision and strategy for Business Process Management and sponsoring its implementation
- Ensuring that process performance objectives are established in alignment with strategic direction

- Confirming that process change recommendations and prioritizations are in alignment with strategic intent

3.1.8.3 *Process Steward*

The role of Process Steward is played by members of the organization's functional management — that is, the managers of operations staff who execute activities within an end-to-end business process.

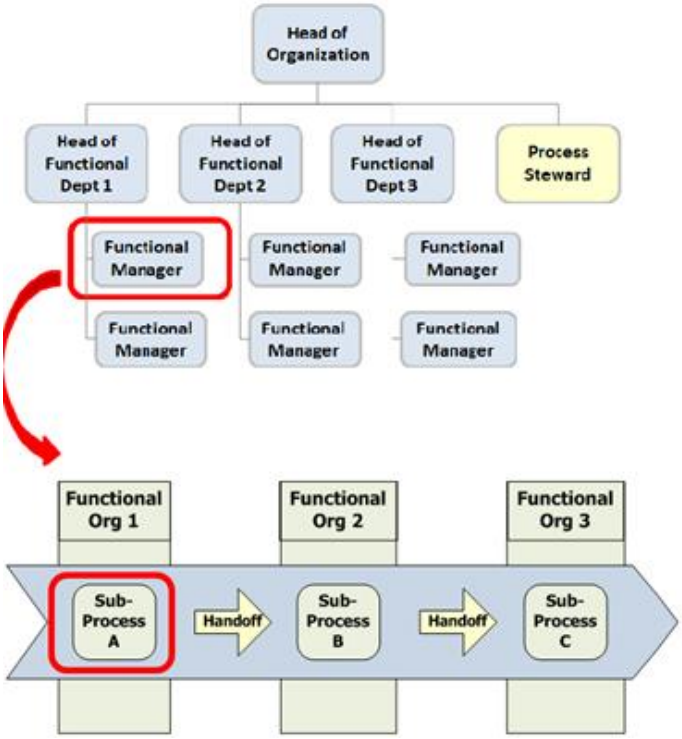


Figure 3.8 Organization Chart Showing Process Steward

In organizations where a Business Process Management discipline is implemented, typical responsibilities of the Functional Management Team members include:

- Developing knowledge and expertise within the functional discipline
- Attracting and retaining top talent within the functional discipline
- Structuring and developing functional team role descriptions and responsibilities
- Defining and maintaining operational-level procedures

These traditional Functional Manager responsibilities remain intact within organizations where a Business Process Management discipline is implemented.

Additional responsibilities associated with the role of Process Steward might include:

- Ensuring that operational-level procedures align with requirements of overarching business processes that the function supports.
- Ensuring that operations staff are aware of expectations with respect to supporting overarching business processes. For example, performance expectations, expected quality of the output(s) produced by the function, escalation paths, and circumstances under which escalation is desired.

- Gathering and submitting feedback and suggestions for process improvement to the Process Owner.
- Membership on the team (led by Process Owner) that assesses and prioritizes process change requests.
- Sharing information with the Process Owner regarding functional-level performance that is relevant to the overarching business process.

3.1.8.4 *Process Analyst*

In small Business Process Management implementations, the Process Analyst can have responsibilities across all phases of the Business Process life cycle. In larger implementations, Process Analysts might specialize in one or two key aspects of the discipline.

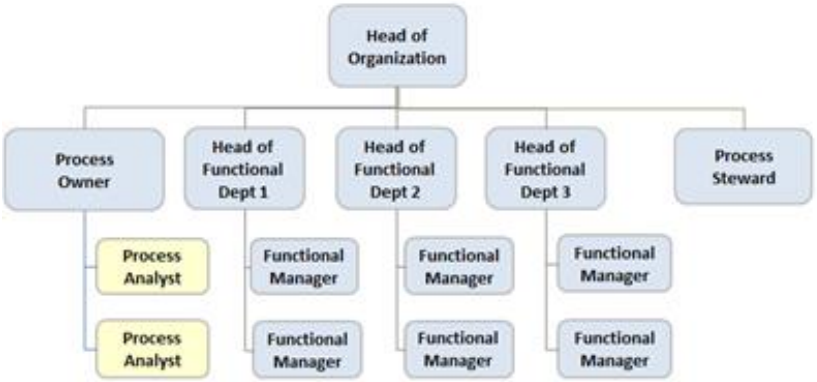


Figure 3.9 Organization Chart Showing Process Analyst

A sampling of typical responsibilities includes:

- End-to-end design of the organization's business processes (under direction of the Process Owner and with input from functional SMEs)
- Maintenance of the process model repository
- Collaboration with the Process Owner and Stewards to diagnose problems and propose solutions
- Performing analyses as requested by the Process Owner and/or Process Stewards (for example performance analysis, impact analysis, and process simulation)
- Typically, membership on the team that assesses and prioritizes requests for process change
- Typically, membership on process change implementation teams

3.1.8.5 *Process Governor*

The role of the Process Governor is critical in driving process maturation through standardization in the practice and use of BPM methodologies and tools. This role is less focused on the content of the organization's processes than on how that content is documented and managed.

The role of Process Governor can be played by the same person who is the Process Owner in small BPM implementations and when the Process Owner is functionally neutral. However, in implementations

where the Process Owner is functionally aligned, it is usually desirable to have a separate role of Process Governor (reporting to the head of the organization).

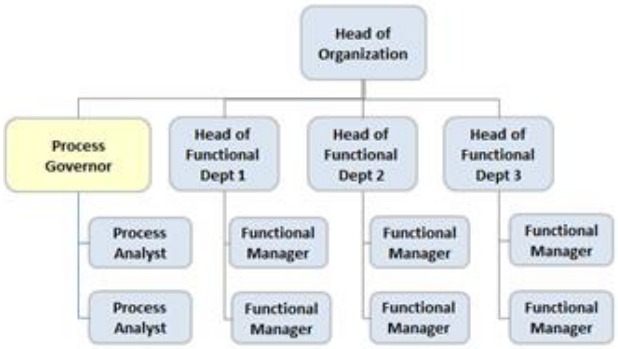


Figure 3.10 Organization Chart Showing Process Governor

Typical responsibilities of a Process Governor include:

- Defining Business Process Management principles, practices, and standards
- Ensuring that Business Process Management principles, practices, and standards are scalable across the current and expected future scope of the Business Process Management implementation
- Providing guidance, mentorship, and training on best practices and standards, and enforcing compliance with them

3.1.9 BPM Links Strategy to Execution

Business and digital transformation is much broader than organizational and business unit improvements. It requires a deep understanding of the end-to-end interactions between an organization and its customers. Current best practices suggest that organizations begin business and digital transformation with physical processes (the value chains). Processes can subsequently be digitized by applying the appropriate technologies, organizational restructuring/reskilling, and culture changes through collaborative teams. Process transformations can achieve, in some cases, twelve-fold improvements in efficiency, effectiveness, cost reductions, and customer satisfaction.

Organizations must master the ability to continuously adapt to survive and thrive in the increasingly competitive and digital world of business. A customer-centric, performance-based culture that leverages existing talent can help businesses achieve this adaptability (Mitchel, Ray, and van Ark 2014). Beyond culture, an organization must have a good strategy and know-how to execute it. But in many organizations, execution of strategy is the key challenge. Only 13% of organizations meet their yearly strategic goals (Cantara 2015). That means 87% of companies fail to execute their business strategy.

To overcome this challenge, more and more leaders turn to BPM to create a process-driven organization that can effectively execute business strategies. However, many businesses are still unsuccessful because they use only a few aspects of BPM. To be effective, Dr. Kirchmer proposes leaders follow a

holistic approach to business process management that identifies all process components needed to achieve strategies specific to the organization. He calls this holistic approach a *BPM-Discipline* (Kirchmer 2015) (Franz and Kirchmer 2012).

BPM-Discipline is about moving strategy into execution, quickly and with low risk. This approach especially enforces a customer and performance focus since the stated goal of a business process is to deliver value for customers. Using emerging technologies in a way that has a real positive business impact further enhances the customer and performance focus. A key component of a BPM-Discipline is a structured approach to designing processes that are *value-driven* and focused on realizing the business strategy of an organization (Rummler, Ramias, and Rummler 2010) (Burlton 2010).

The Hoshin Kanri management approach is sometimes mentioned in relation to BPM-Discipline. This is a seven-step procedure used in strategic planning. Strategic goals are communicated throughout the organization and then turned into action (Jackson 2006) (Wikipedia 2017). A key component of Hoshin Kanri is the *Policy Deployment Matrix* or *X Matrix* that is used to define specific actions linked to the strategy and related to appropriate metrics. This approach does a good job of operationalizing the strategy through a hierarchic breakdown. However, the actions are not placed in the context of an end-to-end process. Instead, the actions become part of a more general continuous improvement approach. The approach is limited because progress in one area often leads to issues in another. However, by expanding on Hoshin Kanri, we can design an approach to pragmatic and systematic strategy execution as part of a value-driven BPM-Discipline.

This section presents an approach for business process design and implementation that meets the requirements of strategy execution (Kirchmer 2014). It is both focused on executing the strategy of an organization while being as resource efficient as possible. Typical results of this approach, embedded in a BPM-Discipline, are transparency over an organization's processes that enables the achievement of quality and efficiency; agility and compliance; external integration and internal alignment; as well as innovation and conservation. Figure 3.11 shows the BPM-Digital Value-Framework with categories of values delivered through a BPM-Discipline (Kirchmer 2015) (Kirchmer and Franz 2014b).

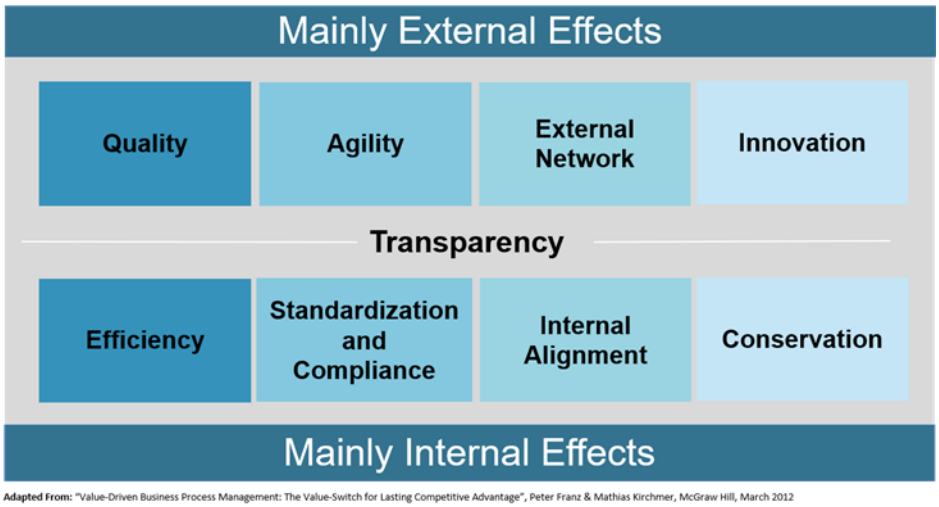


Figure 3.11 The BPM-Digital Value -Framework

Research has shown that organizations compete using only about 5% of their processes. That is, only 5% of what they offer customers is truly different from their competitors. A further 15% are important core processes that support the competitive advantage (LEADing 2014) (Franz and Kirchmer 2012). This means that 80% of all business processes are routine processes that can be carried out using industry standards or common industry practices. An industry average performance is sufficient, and significant innovation in routine processes usually takes focus away from the differentiating core. Sophisticated improvement approaches or even innovation and digitalization initiatives, targeting higher performance, don't deliver any real additional business value on the 80% that are commodity processes. Hence, process innovation and optimization initiatives should focus mainly on the 20% high-impact processes, while other business processes can be designed and implemented using existing industry common practices. This focused approach results in highly organization-specific business processes for those that deliver competitive advantage.

Targeting value systematically requires the appropriate segmentation of processes as the basis for a differentiated design and implementation approach. Process models, developed during the process design, need to reflect the requirements of those different process segments with an understanding of their importance in enabling the strategy of the organization. An improvement approach then needs to be chosen with the appropriate level of sophistication. The subsequent process implementation, including the appropriate software support, is executed according to the process design based on the characteristics of the identified process segmentation. Value-driven design often prescribes different approaches to procure the required, enabling software. Highly organization-specific processes often require an individual (or customized) development of software. Processes designed based on industry standards lead, in most cases, to the use of standard software packages, adapted as little as possible.

A value-driven approach to design and implementation of processes enables organizations to use resources where they provide the best value during improvement initiatives. As an example, the people who are highly qualified in applying sophisticated process improvement methods focus their time on

high-value areas. They can systematically target value as well as reduce the risk of project failure (Kirchmer 2013). They focus on moving the organization to the next level of performance, including the right degree of digitalization. This approach requires, in many cases, an *enlightened* Chief Information Officer (CIO) who moves away from being a technical expert to becoming a driver of innovation and performance (Scheer 2013). The business value focus allows such a CIO to transition into a *Chief Process Officer* (CPO) (Franz and Kirchmer 2012) (Kirchmer and Franz 2014a).

The BPM approach has been developed based on practical experience in large and mid-size organizations, in the USA, South America, Japan, India, and Europe. It has been combined with academic research regarding value-driven design and implementation methodologies (see for example LEADing, 2014). The resulting findings and recommendations lay the basis for a value-driven digital transformation, providing the best performance through systematic process management (Kirchmer 2019).

3.1.9.1 *Segmenting Business Processes for Strategy Execution*

A business strategy needs to be operationalized in order to use it to drive process design and implementation. Some would call this creating a *strategic execution plan*. The first step is to derive strategic *value-drivers* from the organization's strategy. Value-drivers are simple statements that describe necessary achievements required to make the strategy happen. Key performance indicators (KPIs) are used to measure success — the degree to which value-driven process design has been realized. Segmenting processes into high impact and commodity processes requires a business process assessment. The assessment is based on the level of impact each business process has on strategic value drivers. (Franz and Kirchmer 2012). This process assessment is the key tool to align business strategy with process design and implementation. It enables the desired value-driven approach and is a core part of a BPM-Discipline, which focuses on transferring strategy into execution.

Value Drivers

The value drivers are derived from the business strategy of the organization using value-driver tree models (value-driver trees). This modeling is a way of transferring the strategic intent of an organization into operational, value-driven business targets. An excerpt of an example value-driver tree is shown in Figure 3.12. The value-drivers can be further weighted to focus segmentation and subsequent analysis of the most important business objectives.

In practice, a three-step approach to developing a value-driver tree that includes business priority, goals, and value drivers has proven to be most successful, as depicted in Figure 3.12. Business priority, shown in column one, lays out the overall direction the organization is taking. Goals are the key components of a business priority, shown in the second column. Value-drivers are the operational achievements that make each goal happen, shown in column three.

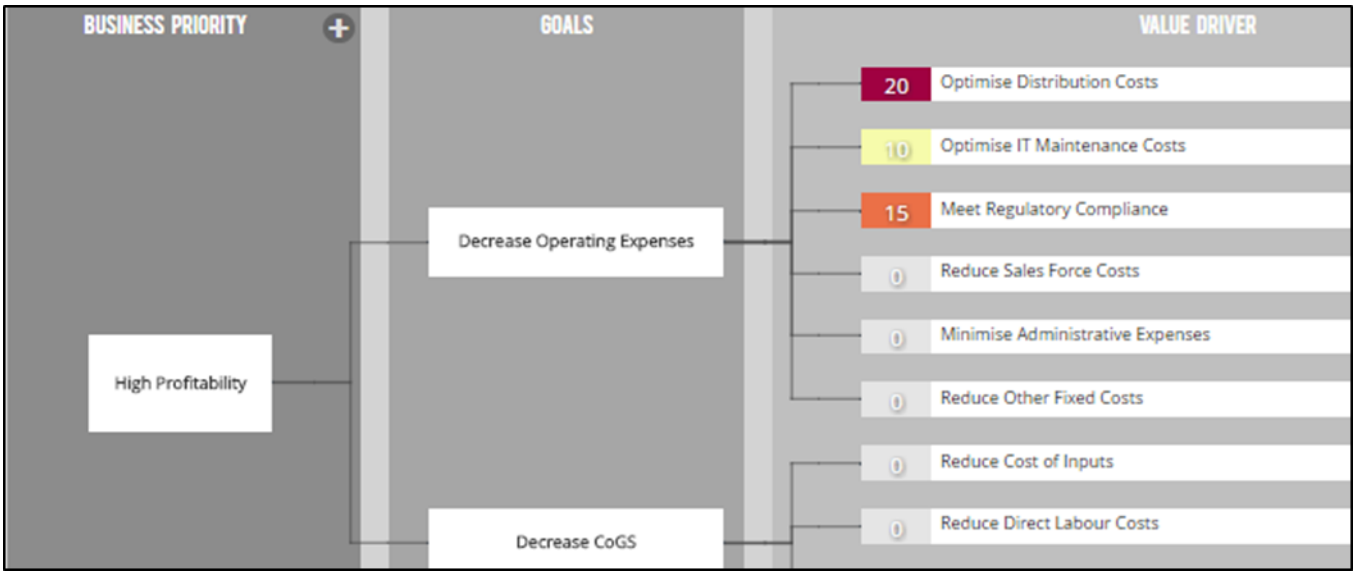


Figure 3.12 Value-Driver Tree (Excerpt)

Process Impact

After creating a value-driver tree, business processes of an organization are evaluated based on their total assessed impact on the specific value-drivers. The result reveals two segments of business processes: high-impact processes and commodity processes. High-impact processes are the ones that are key to making the business strategy happen: the *competitive* processes and *supporting core* processes. High-impact processes are the most important link of business strategy to execution. *Commodity processes* are those that do not drive value but are necessary to the organization. Segmentation of business processes is visualized in Figure 3.13. High-impact processes are shown in red and commodity processes in green.

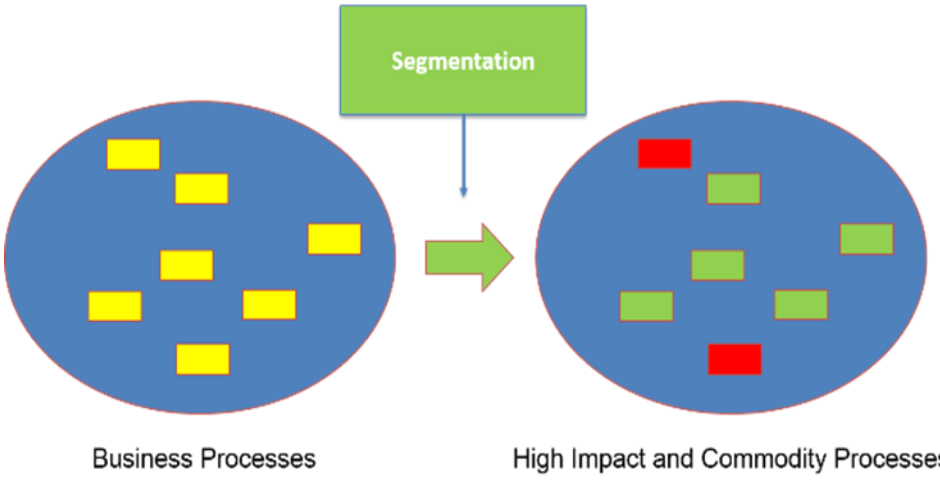


Figure 3.13 High-Impact and Commodity Processes

The value-drivers are weighted according to their importance. To reflect minor changes and adjustments in strategy, adjust one of the weights. Larger strategy changes warrant changing, removing, or adding

value-drivers. Updating value-drivers and their weights enables an agile adjustment of process priorities to respond to revised strategies, reflecting the ever-changing business environment.

Impact Assessment

For each process, it is necessary to assign a weight that corresponds to its impact on each value driver. Weights include: no (0), low (1), medium (3), or high (6). Then process impact weight is multiplied by the weight of the appropriate value-driver to calculate the total of all impacts of a process. This impact assessment is calculated in a process assessment matrix. An example of a *process impact assessment* (PIA), created using the BPM-D Digital Transformation Management (DTM) Application, is shown in Figure 3.14 (Kirchmer, Franz, and Gusain 2018).

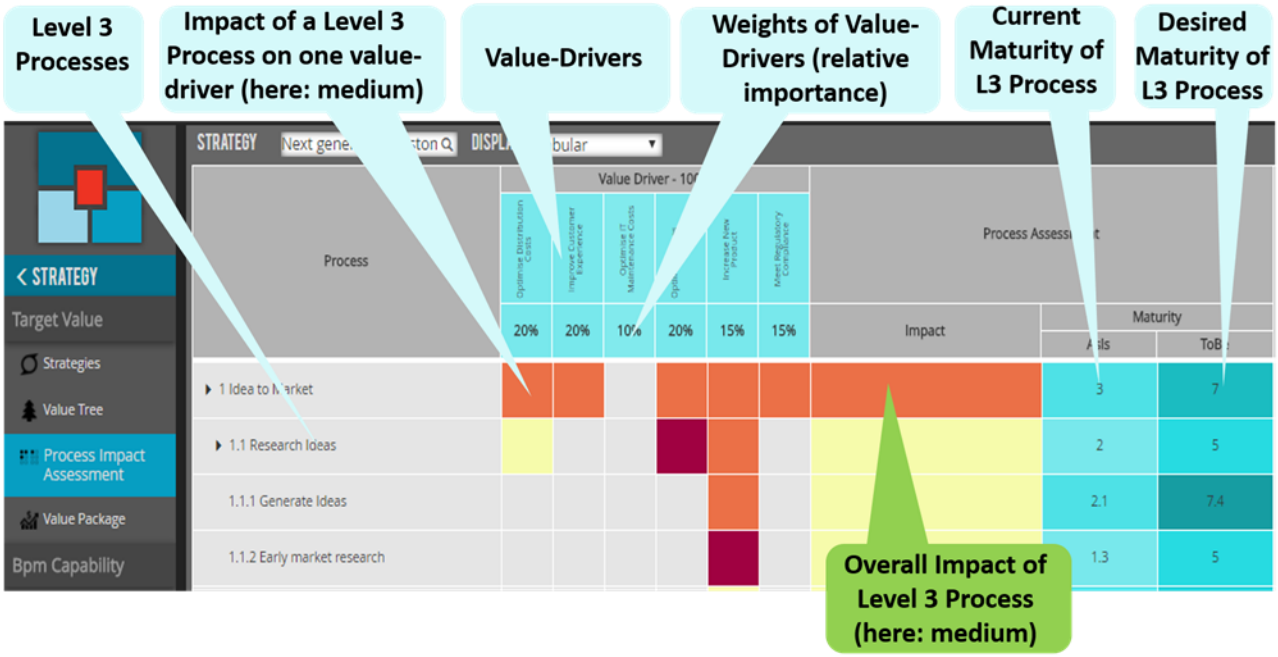


Figure 3.14 Process Impact Assessment (Excerpt)

The next step is to evaluate high-impact processes based on general industry practices, for example through benchmarks or purely qualitative evaluations. In that way, you identify the high-impact, *high-opportunity* business processes. These are the processes where improvements have the biggest value potential since the process has a high impact on the strategy, but it currently performs only in or even under the industry average.

Practice experience, with different companies, has shown that the processes should be analyzed on a level of detail so that 150–200 process definitions describe the entire organization. This is often referred to as *level 3* (L3). This level is detailed enough to obtain differentiated results but high level enough to avoid excessive work efforts and getting *lost in the weeds*, so to speak. Using the results of the process impact assessment, the 20% of processes that are classified as high impact can be identified. The others are considered the commodity processes.

In practice, there is often a grey area of processes that could be in either group. Hence there may be slightly more or less than 20% of the processes in the high impact segment. This issue has to be resolved on a case-by-case basis, reflecting the specific situation of an organization, its business strategy, and the overall business environment in which it works. The absolute level is not important, as the level of improvement is, based on experience, normally driven by the level of process expertise available and the appetite it has for investment.

3.1.9.2 *Strategy-Driven Design and Implementation*

The high-impact, high-opportunity processes are subject to detailed process innovation and optimization activities, focusing on the previously identified value-drivers (Kirchmer 2017). The degree of achievement is measured through KPIs that relate to the identified value-drivers. Checking quality of a process design through KPIs can be used in Agile as well as in top-down waterfall design approaches. Depending on the specific process and the culture of the organization, either approaches or a combination of both can be relevant (Morris 2014). The design approach uses formal modeling methods like Event-driven process chains (EPC) or Business Process Modeling Notation (BPMN) to facilitate the integration of process design and implementation.

Product and market-oriented design approaches have been proven effective since they link processes with their value-drivers to the offerings the customer is looking for (Kirchmer 1999b). Product and market-oriented design supports integrated product (offering) and process innovation. Such an approach is especially important for the processes that are highly relevant for the strategic positioning of an organization, hence the top 5%. In order to identify these business processes, another segmentation of the high-impact processes is required: distinguishing between strategic and non-strategic high-impact processes. The focus is on high-impact strategic processes (Franz and Kirchmer 2012).

New technologies, especially information technologies (IT), relevant for a specific process, have to be evaluated in the same business-driven way. You can, for example, model different processes scenarios representing various degrees of automation. The best scenario is chosen based on the expected value of the relevant KPIs compared to the level of investment (and complexity) required to introduce a technology.

For all high-impact processes, techniques like process model-based simulations and animations are helpful to identify the most appropriate design solutions based on KPIs. Often, even the transparency created through these information models is sufficient by itself to discover relevant improvement or even innovation opportunities.

Traditional improvement methods like Lean or Six Sigma can be applied in selected cases (George 2010). However, these are generally not approaches that support focused innovation or a full-blown optimization of processes, including automation opportunities. Hence, they are more targeted to bringing less strategic, people-intense processes to better efficiency, in most cases resulting in cost or time reductions.

The starting points for the design of the 80% commodity processes are industry or functional reference models. These models are available through industry organizations or consulting and software companies (Kirchmer 2017). In many cases, they are already developed using standard modeling methods. The industry common practices reflected in those models are adjusted to the specific organization only when absolutely necessary, for example, due to legal requirements in country subsidiaries or specific logistics requirements of the product.

The process design work focuses on *making the industry standard happen*. If process areas are identified where the industry standard cannot be applied, for example, due to product specifics, only those areas will be designed in an organization-specific way, keeping the adjustments as close to the industry standard as possible. Process solutions can often be found through a simple application of traditional improvement methods like Lean and Six Sigma, since a focus on only efficiency is justified for most commodity processes. Keep in mind that, in general, it is not worth improving commodity processes above industry-average performance.

This strategy-driven process design approach is visualized in Figure 3.15. It shows that reference models can be used as an input for design of high-impact processes. However, reference models are just one component of compiling all information required for real innovative and optimized solutions for the KPIs and related value-drivers.

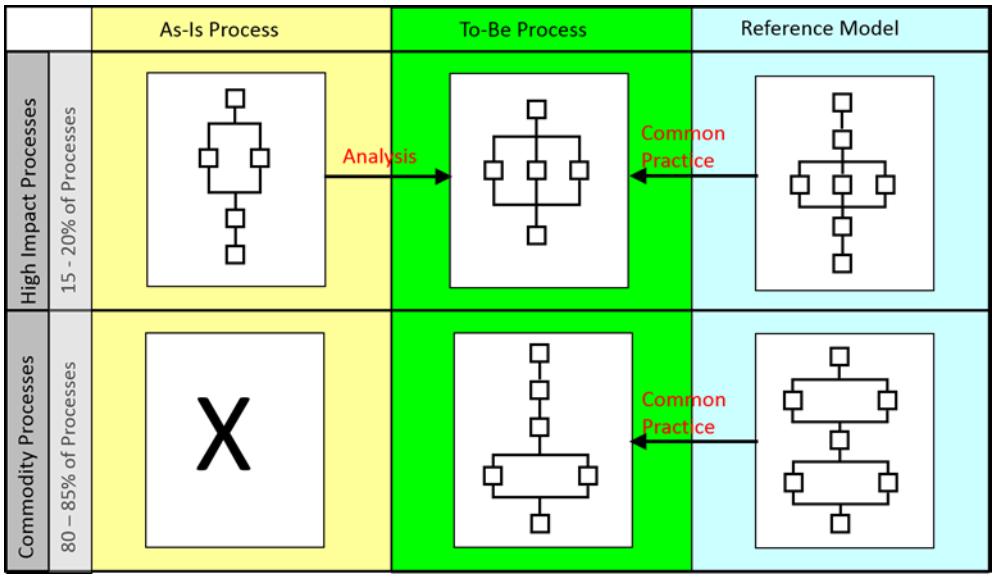


Figure 3.15 Value-Driven Process Design Approach

Both high-impact and commodity processes are part of overlying end-to-end business processes. Process interfaces in the underlying detailed processes reflect this overall context and make sure that the various process components or sub-processes fit together. Hence, during the process improvement work, cause-and-effect considerations have to take place in order to avoid fixing issues in one area while creating new ones in other processes.

The organization-specific process models for high-impact business processes are generally implemented through people and highly flexible next-generation process automation technologies. Such implementations require the right level of change management. In most cases, the implementation also requires the development of specific application software components. The process models, reflecting the optimized KPIs in support of the relevant value-drivers, are the starting point for the more detailed modeling of the underlying software. They enable a consistent, strategy-driven process implementation and automation. At this point, the modeling method can change. For example, Unified Modeling Language (UML) can be used to reflect the desired software structure to support the high-impact processes. The workflow engine, of next-generation process automation, can also be configured based on those models. This, depending on the underlying modeling repository and execution technology, could even be done automatically or semi-automatically. The integration between process modeling and execution tools can be extremely beneficial in this situation, especially since it enables the flexible value-driven adjustment of processes.

The overall architecture of such next-generation process automation environments is often referred to as *service-oriented architecture* (SOA). In such an architecture the *execution software* and the *process logic* (workflow) are separated (Kirchmer 2017) (Slama and Nelius 2011). Hence, the developed process models can, on one hand, be used to configure the workflow and on the other hand, be used to develop the software services that are not available in existing libraries. Existing software services may include detailed process reference models that can be re-used in the process design.

One of the key advantages of this architecture is the high degree of flexibility in adjusting process flows and functionality. This flexibility can be crucial for an organization looking for agility and adaptability. The main disadvantages are the effort required in providing the appropriate governance for running such an environment and the information modeling efforts required in the building phase.

The process models of the commodity processes are used to select or at least evaluate pre-selected traditional software packages like enterprise resource planning (ERP) systems, supply chain management (SCM), or customer relationship management (CRM) systems. These systems can become part of the overall next-generation architecture, representing one software component. Then those models developed during the process design are used to drive a process-oriented implementation of the software packages across the various organizational units involved in the business processes in scope (Kirchmer 1999). Ideally, the industry-specific software reference models are already used as an input during the process design. This means one procures the reference models to be used from the software vendor. If this is possible you benefit from the business content of the software and minimize design and modeling efforts. Using other industry reference models (different from the software-based model) may lead to design adjustments and extensive re-work once the software is selected.

In a traditional software environment, process definition and software functionality are linked in a static way. The software more or less dictates how a process has to be executed (allowing only pre-defined variants through the software configuration). Static design is fine for commodity processes but often causes issues in strategic, high-impact processes that need to be organization specific. Consequently, strategic processes typically require customized software. In some cases, it is possible to develop add-on

software to support high-impact processes and integrate it into the larger software package like an ERP system.

Advantages and disadvantages are the opposite of the earlier description for next-generation process automation approaches. Hence, in practice, a combination of both implementation technologies and approaches is, in most cases, the solution that delivers the best value.

The process-interfaces in the different process models guide software integration. This can be supported from a technology point of view through appropriate enterprise application integration environments, which are usually included in SOA environments. Such software tools or middleware tools reduce the efforts for interface development to a necessary minimum. Efficient use of the tools is driven through the appropriate process models, specifically the integration of the various process components.

The implementation of processes includes, as a main component, the preparation of the involved people for the new work environment. They have to learn new manual processes and how to use the automation technologies in the specific process context. The necessary change management is carried out using the same process design that was used to drive the development and configuration of the IT components. Information, communication, and training are supported through the information models of the process design (Kirchmer 2017) (Franz and Kirchmer 2012). The integrated implementation of people and IT-based processes leads to a *digital organization* that really delivers additional business value to support business strategy.

Implementation of business processes can be based on an Agile approach by developing several intermediate prototypes or by using a top-down waterfall approach. In most cases, a combination of both methods works best. Combining waterfall and Agile limits the number of development cycles created by Agile and avoids getting stuck on the way in a top-down waterfall approach (Morris 2014).

The result is end-to-end business processes based on value-driven process design and appropriately integrated automation. The approaches provide the necessary flexibility where it delivers real business value and the required efficiency where possible.

Transformation is a strategic-level activity. It is an action that must take a long-term view of the organization and must align not only to strategy of the organization, but also to both current and anticipated IT business capabilities as defined by Business Architects.

The role of the Business Architect is to align business capabilities to business processes and their evolution to strategy. They then define how the organization needs to change and the timing of the changes (see Figure 3.16).

This shows what the organization needs to do to deliver strategic vision and the way the capabilities will evolve over time to support the delivery of strategy. Because business capabilities relate to business functions like sales or manufacturing, they tie to process through subprocesses (which combine to form functions).

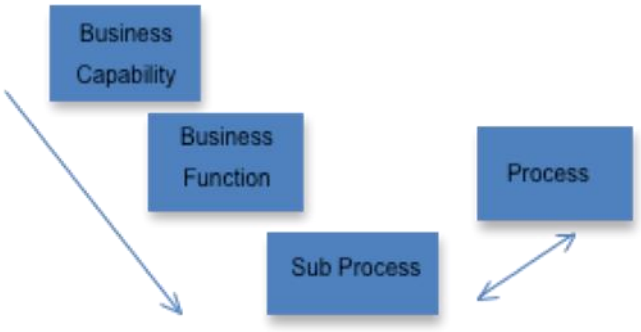


Figure 3.16 Business Capability Decomposition

Business functions are made of multiple subprocesses and include parts from multiple processes. Due to these interdependencies, a process often supports several business functions. Because of this structure, decomposing business capabilities also provides a way to identify how subprocesses, and therefore processes, will need to change to support strategy. This linking of strategy to process transformation to business capabilities is reflected in the technology solution and its ability to support strategy and evolve as the strategy evolves.

3.1.9.3 *BPM-Discipline to Sustain Strategic Value*

Once business processes have been designed and implemented targeting strategic business value, these results need to be sustained. You have to *control* and re-evaluate your business processes, especially the high-impact processes, to see if the KPIs remain in an acceptable range and adjust the design or implementation if necessary. Processes must also reflect changes in business strategy. Therefore, the value-driven design and implementation approach needs to be part of the larger BPM-Discipline, the management discipline focused on moving strategy to execution, quickly and at low risk. This BPM-Discipline is established through an appropriate *process of process management*, that manages the life cycle of each business process to keep it on track (Kirchmer and Franz 2014b) (Franz and Kirchmer 2012). This BPM-Discipline is visualized in Figure 3.17.



Figure 3.17 The BPM Life Cycle Framework: Management Discipline to Move Strategy into Execution

Providing appropriate process governance is especially important to make a BPM-Discipline reality and keep processes focused on creating value. Defining process ownership, accountability and responsibility, as well as a mechanism to make decisions and execute resulting actions across organizational boundaries are critical activities (Kirchmer and Hofmann 2013). In many successful organizations, the process of process management is owned and focused on strategic value by a Chief Processes Officer (CPO) and operationally managed by a BPM CoE with various operational roles (Franz and Kirchmer 2012) (Kirchmer and Franz 2014a). Business processes require roles like Process Owners and supporting operative roles to be kept on target over time. These roles can be decentralized in business units or centralized, project based or permanent, in house or outsourced.

The approach of strategy-driven business process design and implementation allows an organization to move its business strategy systematically into execution. It aligns the modeling and implementation efforts with the strategic direction of the organization.

First experiences with real live companies showed that this approach helps to dramatically reduce process design and implementation times due to the efficient handling of commodity processes. Companies estimated that they realized more than 50% savings in time and effort. A BPM-Discipline also enables real strategic advantage through the innovation and optimization of high-impact process areas based on the KPIs and the related strategic value-drivers.

3.1.9.4 *Executive Commitment*

Business and digital transformation will change fundamentally the way business is conducted; however, it will also fundamentally change the culture of the entire organization, which is why it requires a long-term commitment by the executive management team. Requirements include a commitment from all executives and their direct reports, time to facilitate culture change, upskilling resources, appropriate funding for all of the above, and finally, stakeholder support (including suppliers and customers). In addition, political problems and conflicting priorities will arise as the project is performed. The executive sponsor must have the authority to resolve these conflicts or have access to those who can.

Transformation will also require that the magnitude of changes must be backed by management at all levels — including the two levels below the executive level, which will need to define the new culture and determine how to measure and enforce performance.

BPM Knowledge, Skills, and Competencies

The following sections of the *BPM CBOK Guide* cover the baseline skills and competencies for a BPM Professional:

- Business process modeling
- Business process analysis
- Business process design
- Process Performance Measurement

Phase 1: Aligning Processes to Strategy and Goals

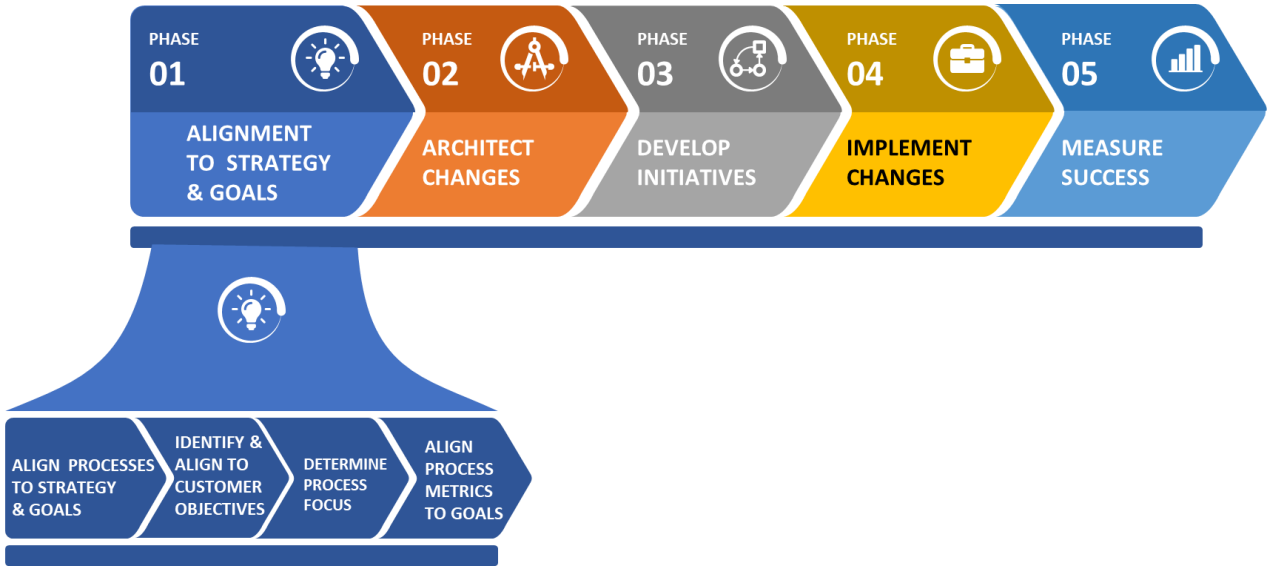


Figure 3.18 Phase 1 of the BPM Life Cycle

3.1.10 Drivers of Business Change

What are the drivers of business change? Fortunately, there are several strategic analysis frameworks organizations can use to help develop relevant answers. There are internal and external drivers of business change and we will elaborate on two of the most commonly used, providing some examples using the airline industry. What is important to understand is that companies either produce a product (physical or digital) or provide a service (physical or digital). An example of a physical product is a CD or DVD, and the corresponding digital product is a download or streaming option of that music or movie. An example of a physical service is housekeeping for your home. A digital service example is a home alarm system monitoring service.

3.1.11 Internal

Internal drivers of business change are factors controlled by the organization. To begin aligning business goals to strategy, most BPM practitioners start with identifying internal drivers.

3.1.11.1 *Strategy Maps*

One technique is the strategy map, which is a diagram that shows your organization's strategy on a single page. The strategy map is usually associated with the *balanced scorecard*, which is a management system. While we won't go into detail about the balanced scorecard, the strategy map has been adapted to other frameworks, like Operational Excellence, for developing strategy. Figure 3.19 shows a generic example of a strategy map.

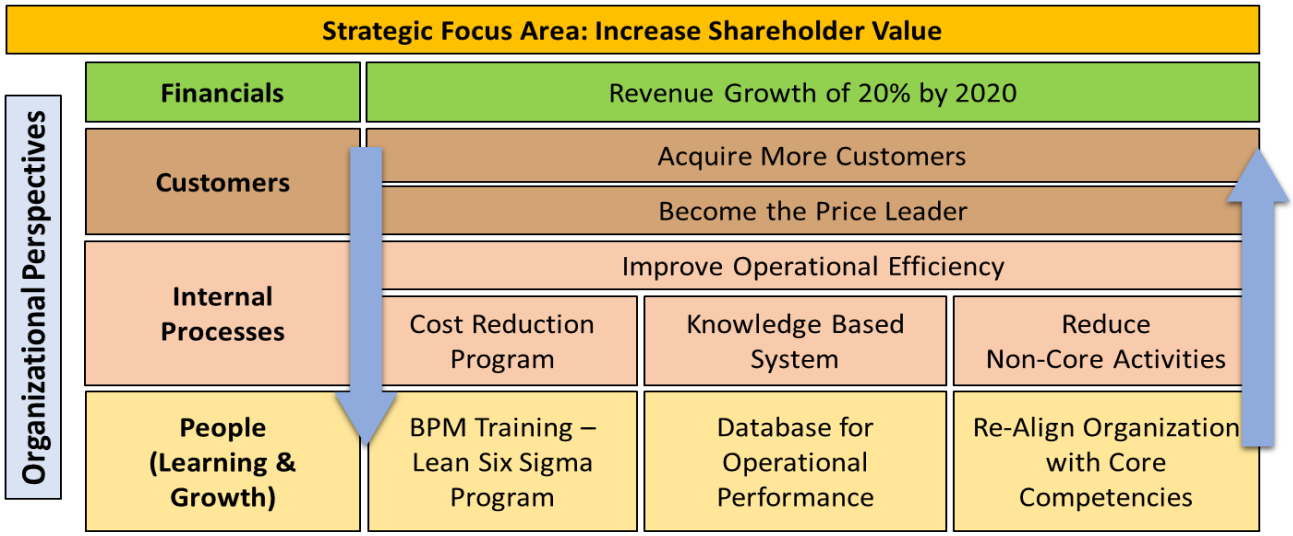


Figure 3.19 Strategy Map for Operational Excellence

3.1.11.2 *Porter's Value Chain Analysis*

Another framework that many organizations use is Michael Porter's *value chain* analysis that was originally identified in his book *Competitive Advantage* (1985). Michael Porter introduced a generic value chain model that describes a sequence of five primary activities and several support activities that are common to most organizations. Since his introduction of these concepts, they have become adaptable to all organizations.

While both frameworks are useful, they have one thing in common — the core of the frameworks is the *business process*. Porter's frameworks tend to be used more often and will be the primary framework used here. The value chain framework is illustrated in Figure 3.20.

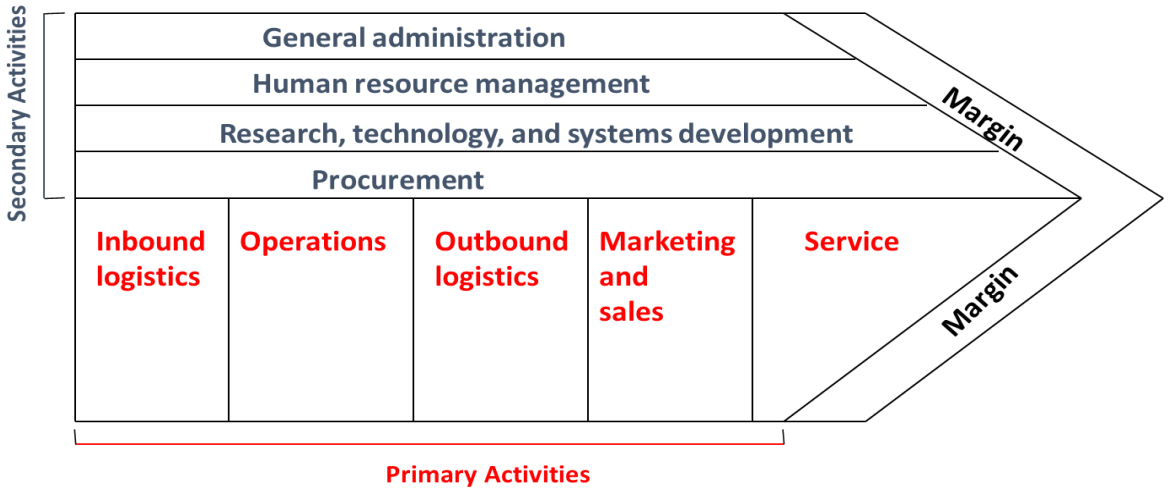


Figure 3.20 Porter's Value Chain Framework

To the process analysis professional, it is easy to see the relationship of the value chain to standard process management principles. The value chain is driven by activities related to inputs and outputs. Inputs are the resources used by the organization, while outputs are the products and services produced. Organizations engage in hundreds, even thousands, of activities in the process of converting inputs to outputs. These activities can be classified generally as either primary or support activities that all businesses must undertake in some form.

According to Porter, the primary activities are:

- **Inbound logistics.** All activities required to receive, store, and disseminate inputs. Involves relationships with suppliers.
- **Operations.** All activities required to transform inputs into outputs.
- **Outbound logistics.** All activities required to collect, store, and distribute output.
- **Marketing and sales.** Activities that inform buyers about products and services, induce buyers to purchase them, and facilitate their purchase.
- **Service and support.** All activities required to keep the product or service working effectively for the buyer after it is sold and delivered.

Porter further defines supporting activities that influence the value chain:

- **Procurement.** Acquisition of inputs for the organization.
- **Human resource management.** All activities involved in recruiting, hiring, training, developing, compensating, and (if necessary) dismissing or laying off personnel.
- **Technological development.** Equipment, hardware, software, procedures, and technical knowledge brought to bear on transformation of inputs into outputs.
- **Infrastructure.** Serves the organization's needs and ties its parts together. Consists of functions or departments such as accounting, legal, finance, planning, public affairs, government relations, quality assurance, and general management.

Porter's value chain framework views the organization as a sequential process of value-creating activities and attempts to map out how an organization creates value for customers by examining the contributions of different activities within the organization to that value. A *value chain analysis* enables a macro view of the process that includes all internal and external stakeholders (suppliers, vendors, customers). This view helps identify issues (weaknesses) in the process that might occur upstream or downstream from the actual process itself. Examples of issues in the manufacturing industry are clear. If a manufacturer cannot get materials from a supplier routinely on time, it does not matter how good the process is; the outcome will always be a late product. Looking at this view enables the analyst to understand relationships between inputs and the performance of the process (Porter 1985).

Overall, Porter's value chain is a great framework to examine the internal organization. It provides a structured approach of assessing wherein the organization true value is created and where costs can be reduced to boost margins. It also allows an organization to improve communication between departments. In most cases (not all) internal drivers are a response to external drivers.

3.1.12 External

External drivers are factors that fall outside the direct control of the organization, such as competition.

3.1.12.1 *Porter's Five Forces*

Porter's five forces is a framework used to analyze the level of competition within an industry. It is especially useful when starting a new business or when entering a new industry sector. According to this framework, competitiveness does not come only from competitors. Rather, the state of competition in an industry depends on five basic forces:

- Threat of new entrants
- Bargaining power of suppliers
- Bargaining power of buyers
- Threat of substitute products or services
- Existing industry rivalry

The collective strength of these forces determines the profit potential of an industry and thus its attractiveness. If the Five Forces are intense (airline industry), almost no organization in the industry earns attractive returns on investments. If the forces are mild (soft drink industry), there is room for higher returns. The section that follows uses examples from the airline industry to illustrate the forces in action.



Figure 3.21 Porter's Five Forces Model

New Entrants

New entrants in an industry bring new capacity and the desire to gain market share. The seriousness of the threat depends on the barriers to enter a certain industry. The higher these barriers to entry, the smaller the threat for existing players. Examples of barriers to entry are the need for economies of scale, high customer loyalty for existing brands, large capital requirements (for example large investments in marketing or R&D), the need for cumulative experience, government policies, and limited access to distribution channels.

Example

The threat of new entrants in the airline industry can be considered as low to medium. It takes large upfront investments to start an airline company (for example purchasing aircraft). Moreover, new entrants need licenses, insurances, distribution channels, and other qualifications that are not easy to obtain when you are new to the industry (for example access to flight routes). Furthermore, it can be expected that existing players have built up a large base of experience over the years to cut costs and increase service levels. A new entrant is likely to not have this kind of expertise, therefore creating a competitive disadvantage right from the start. However, due to the liberalization of market access and the availability of leasing options and external finance from banks, investors, and aircraft manufacturers, new doors are opening for potential entrants. Even though it doesn't sound very attractive for companies to enter the airline industry, it is *not* impossible. Many low-cost carriers like Southwest Airlines, RyanAir, and EasyJet have successfully entered the industry over the years by introducing innovative cost-cutting business models, thereby shaking up original players like American Airlines, Delta Air Lines, and KLM.

Bargaining Power of Suppliers

The bargaining power of suppliers is also known as the *market of inputs*. This force analyzes how much power and control an organization's supplier has over the potential to raise its prices or to reduce the quality of purchased goods or services, which in turn would lower an industry's profitability potential. The concentration of suppliers and the availability of substitute suppliers are important factors in determining supplier power. The fewer there are, the more power they have. Businesses are in a better position when there is a multitude of suppliers. Sources of supplier power also include the switching costs of companies in the industry, the presence of available substitutes, the strength of their distribution channels, and the uniqueness or level of differentiation in the product or service the supplier is delivering.

Example

The bargaining power of suppliers in the airline industry can be considered very high. When looking at the major inputs that airline companies need, we see that they are especially dependent on fuel and aircraft. These inputs are very much affected by the external environment over which the airline companies themselves have little control. The price of aviation fuel is subject to the fluctuations in the global market for oil, which can change wildly because of geopolitical and other factors. In terms of aircraft, only two major suppliers exist: Boeing and Airbus. Boeing and Airbus, therefore, have substantial bargaining power and control over the prices they charge.

Bargaining Power of Buyers

The bargaining power of buyers is also called the *market of outputs*. This force analyzes to what extent the customers are able to put the organization under pressure, which also affects customer sensitivity to price changes. When a product or service has few customers who have many alternate purchase options, customers have considerable power. When it is easy for customers to switch from one company to another, their buying power increases. In contrast, buying power is low when customers purchase products in small amounts, act independently, and when the seller's product is very different from any of its competitors. The Internet has allowed customers to become more informed, and therefore more empowered. Customers can easily compare prices online, get information about a wide variety of products, and get access to product or service offers from other companies instantly. Companies can take measures to reduce the power of buyers. Example measures include implementing loyalty programs and differentiating products and services from competitors.

Example

Bargaining power of buyers in the airline industry is high. Customers are able to check prices of different airline companies quickly through price comparison websites such as Skyscanner and Expedia. In addition, there aren't any switching costs involved in the process. Customers fly with different carriers to and from their destinations simply to lower the cost. Brand loyalty is not very high. Some airline companies are trying to increase loyalty with frequent flyer programs aimed at rewarding repeat customers.

Threat of Substitute Products

Customers often switch to alternate products that are not direct competitors but serve the same needs. To find such potential competitors, one should look beyond similar products that are branded differently. Instead, every product that serves a similar need for customers is a potential competitor. Energy drinks like Redbull are not usually considered competitors of coffee brands such as Nespresso or Starbucks. However, since both coffee and energy drink fulfill a similar need (staying awake and increasing energy), customers might switch from coffee to energy drinks or the reverse based on price sensitivity or other factors. Substitute products ultimately affect profitability and should be taken into account when evaluating the industry's attractiveness.

Example

In the airline industry, the general need of customers is travel. Certainly, customers have many travel alternatives. Depending on urgency and distance, customers can take a train or go by car. Especially in Asia, more and more people take high-speed trains, such as bullet trains and maglev trains. Elon Musk's Hyperloop concept, in which passengers travel in capsules through a vacuum tube at speeds up to 1200 kilometers per hour, could pose serious future competition to airlines. When travel alternatives are viewed together, the threat of substitutes in the airline industry can be considered at least medium to high.

Rivalry Among Existing Competitors

This last force of Porter's Five Forces examines how intense the current competition is in the marketplace, which is determined by the number of existing competitors and what each competitor is capable of doing. Rivalry is high when there are a lot of competitors that are roughly equal in size and power, when the industry is growing slowly, and when consumers can easily switch to a competitor's offering for little cost. A good indicator of competitive rivalry is the concentration ratio of an industry. The lower this ration, the more intense rivalry will probably be. When rivalry is high, competitors are likely to actively engage in advertising and price wars, which can hurt an organization's bottom line. In addition, rivalry will be more intense when barriers to exit are high, forcing companies to remain in the industry even though profit margins are declining. These barriers to exit can be factors like long-term loan agreements and high fixed costs.

Example

The airline industry in the United States is extremely competitive for a number of reasons, including the entry of low-cost carriers, tight regulation and safety focus leading to high fixed costs and high barriers to exit, and stagnant growth. Customers can switch airlines for little cost and many airlines are similar in size (see graph below), which leads to extra fierce competition. Considering all factors, rivalry in the airline industry is high.

Porter's Five Forces

Following is a more thorough list of Porter's Five Forces factors.

Threat of New Entrants

- Economies of scale
- Product differentiation

- Brand identity/loyalty
- Access to distribution channels
- Capital requirements
- Access to the latest technology
- Access to necessary inputs
- Absolute cost advantages
- Experience and learning effects
- Government policies
- Switching costs
- Expected retaliation from existing players

Bargaining Power of Suppliers

- Number of suppliers
- Size of suppliers
- Supplier concentration
- Availability of substitutes for the supplier's products
- Uniqueness of supplier's products or services (differentiation)
- Switching cost for supplier's products
- Supplier's threat of forward integration
- Industry threat of backward integration
- Supplier's contribution to quality or service of the industry products
- Importance of volume to supplier
- Total industry cost contributed by suppliers
- Importance of the industry to supplier's profit

Bargaining Power of Buyers

- Buyer volume (number of customers)
- Size of each buyer's order
- Buyer concentration
- Buyer's ability to substitute
- Buyer's switching costs
- Buyer's information availability
- Buyer's threat of backward integration
- Industry threat of forward integration
- Price sensitivity

Threat of Substitute Products or Services

- Number of substitute products available
- Buyer's propensity to substitute
- Relative price performance of substitutes
- Perceived level of product differentiation
- Switching costs
- Substitute producer's profitability and aggressiveness

Rivalry Among Existing Competitors

- Number of competitors
- Diversity of competitors
- Industry concentration and balance
- Industry growth
- Industry life cycle

- Quality differences
- Product differentiation
- Brand identity/loyalty
- Switching costs
- Intermittent overcapacity
- Informational complexity
- Barriers to exit

Porter's Five Forces is still one of the most used frameworks for strategy development and is likely to remain that way in the near future. Porter's Five Forces is a good starting point to evaluate any industry, but should not be used in isolation. Businesses should use Porter's Five Forces in combination with a value chain analysis or a strategy map.

3.1.12.2 *SWOT*

SWOT stands for strengths, weaknesses, opportunities, and threats.

Strengths and weaknesses are internal to your organization — things that you have some control over and can change. Examples include who is on your team, your patents and intellectual property, and your location.

Opportunities and threats are external — things that are going on outside your organization, in the larger market. You can take advantage of opportunities and protect against threats, but you can't change them. Examples include competitors, prices of raw materials, and customer shopping trends. A SWOT analysis organizes your top strengths, weaknesses, opportunities, and threats into an organized list and is usually presented in a simple two-by-two grid.

Strengths (internal, positive factors) **Strengths describe the positive attributes, tangible and intangible, of your organization. These are within your control.**	**Weaknesses (internal, negative factors)** **Weaknesses are aspects of your business that detract from the value you offer or place you at a competitive disadvantage.**
• 1 • 2 • 3	• 1 • 2 • 3
Opportunities (external, positive factors) **Opportunities are external attractive factors that represent reasons for your business to exist and prosper**	**Threats (external, negative factors)** **Threats are external factors beyond your control that could put your business at risk. You may benefit from having contingency plans for them.**
• 1 • 2 • 3	• 1 • 2 • 3

Figure 3.22 SWOT Grid

SWOT Analysis

The section that follows contains some questions that you can ask about your organization during a SWOT analysis.

Strengths

Strengths are internal, positive attributes of your organization. Strengths are within your control.

- What business processes are successful?
- What assets do you have in your team, such as knowledge, education, network, skills, and reputation?
- What physical assets do you have, such as customers, equipment, technology, cash, and patents?
- What competitive advantages do you have over your competition?

Weaknesses

Weaknesses are negative factors that detract from your strengths. Weaknesses are things to improve on to be competitive.

- Are there things that your organization needs to be competitive?
- What business processes need improvement?
- Are there tangible assets that your organization needs, such as money or equipment?
- Are there gaps in your team?
- Is your location ideal for your success?

Opportunities

Opportunities are external factors in your business environment that are likely to contribute to your success.

- Is your market growing and are there trends that will encourage people to buy more of what you are selling?
- Are there upcoming events that your organization may be able to take advantage of to grow the business?
- Are there upcoming changes to regulations that might affect your organization positively?
- If your business is up and running, do customers think highly of you?

Threats

Threats are external factors that you have no control over. Businesses typically develop contingency plans for dealing with potential threats.

- Do you have potential competitors who may enter your market?
- Will suppliers always be able to supply the raw materials you need at the prices you need?
- Could future developments in technology change how you do business?
- Is consumer behavior changing in a way that could negatively affect your business?
- Are there market trends that could become a threat?

With your SWOT analysis complete, you're ready to convert it into real strategy. After all, the exercise is about producing a strategy that you can work on during the next few months.

The first step is to figure out how you can use business strengths to take advantage of opportunities. Then, look at how these strengths can combat market threats.

SWOT Retooled

In an article titled, "Are Your Company's Strengths Really Weaknesses?" author and NYU professor, Adam Brandenburger, recommends retooling SWOT to include *others'* strengths and *others'* weaknesses — those of your competitors (2019). The logic behind this retooling is that an organization's core competencies can *harden* over time, becoming less agile and less flexible to change. The prevailing leadership who served during the last rise to success also harden, which can be a compounding constraint to an organization's agility. The leadership factors that may harden include values, skills, managerial systems, and technical systems. When the external environment inevitably changes, the prevailing leadership may be precisely the wrong team of people to lead the organization.

The idea that your competitor's strengths present an opportunity to you can be found in many industries. This complementary concept that a rival's perceived weakness may pose a serious threat to your organization was popularized by Harvard Business School's Clay Christensen in his famous *disruptive innovation* theory. If your organization is focused on its important customers. A competitor — perhaps a new entrant — invents a technology that's weaker on several dimensions but stronger on a couple that matter to a small subset of customers. Before you know it, you start losing mainstream customers who now value the new dimensions. This dynamic has been played out in many industries — traditional taxi cabs versus Uber and Lyft, or more recently, between traditional colleges and universities and online educators. Online courses have clear weaknesses: they offer students limited interaction and feedback and, often, no credentials. But online education is also open access and often free. Figure 3.23 illustrates the new SWOT analysis.

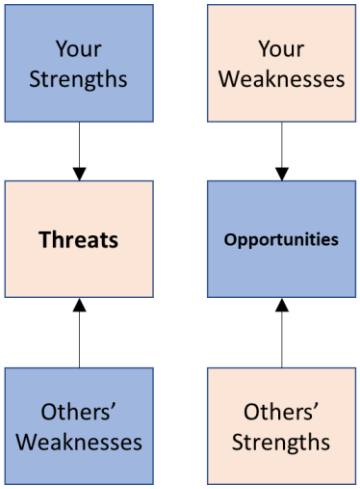


Figure 3.23 New SWOT Analysis from Adam Brandenburger (2019)

The lesson for incumbents in all industries is that initially weak-looking or unimportant-looking competitors may lull them into a false sense of security.

Phase 2: Architect Changes

In phase 1 the BPM Professional aligns processes with strategy. In phase 2, planning for change occurs.

4 Business Process Modeling

Business process modeling is the set of activities involved in creating representations of an existing or proposed business process. Modeling can provide an end-to-end perspective or a view of one portion of an organization's primary, supporting, or management processes.

Business process modeling requires a critical set of skills and techniques that enable people to understand, communicate, measure, and manage the primary components of business processes. For enterprises aware of the high value of their business processes, process modeling is the foundational activity for managing the enterprise.

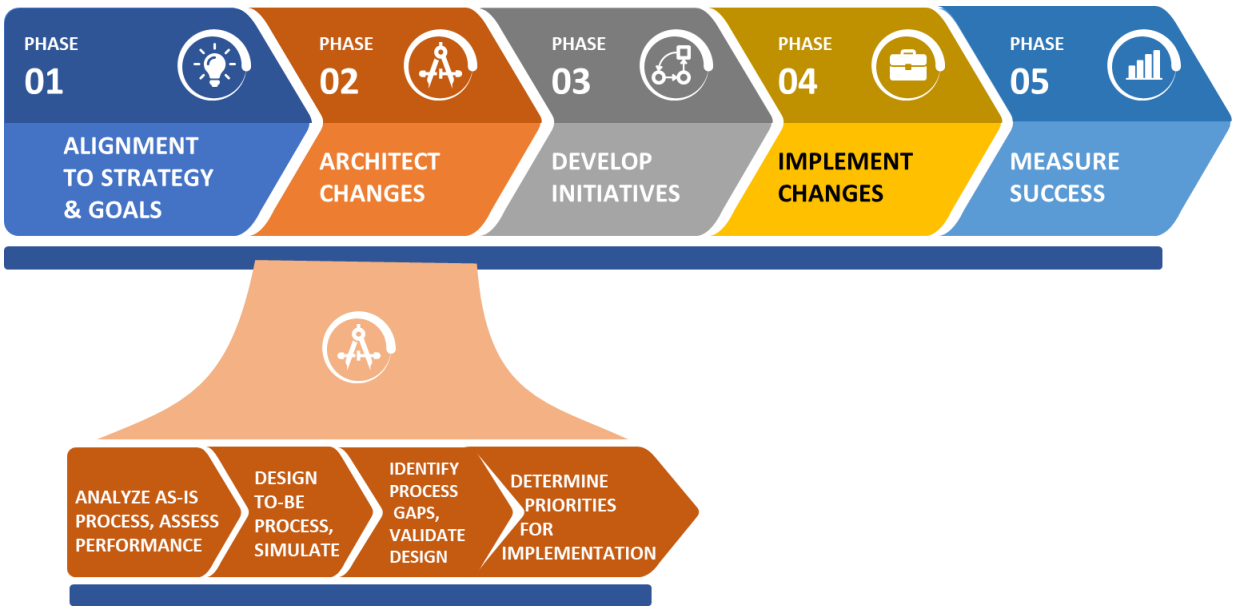


Figure 4.1 Phase 2 of the BPM Life Cycle

4.1.1 Use of Process Models

A *model* is a simplified representation of a thing, concept, or activity. Models can be mathematical, graphical, physical, narrative, or a combination of these. Models have a wide range of applications in business environments, including:

- Organizing (structuring)
- Discovery (learning)
- Forecasting (predicting)
- Measuring (quantifying)
- Explaining (teaching, demonstration)
- Verification (validation)
- Control (constraints, objectives)

Business processes can be expressed through modeling at many levels of detail, ranging from highly abstract to highly detailed. A fully developed business process model will typically represent several perspectives serving different purposes. Models usually show workflow, dependencies, and sequencing of activities. They provide a level of visualization to facilitate a detailed review and assessment of improvement opportunities of an organization's processes along with supporting the organization's mission.

4.1.2 Process Model Contents

A process model includes icons that represent workflow, data flow, events, decisions, gateways, and other elements of the process itself. A process model can contain illustrations and information about:

- The icons (representing the process elements) used in the illustrations
- The relationships among the icons
- The relationships of the icons to their environment
- How the icons represented behave or perform

4.1.3 Identifying a Process Model

A process model is a formal representation of business processes, not to be confused with more casual ways of depicting processes. When looking at a business illustration, use the following table to decide whether it represents a *process model* or a *process diagram/map*.

Is it a Model?		
	A Process Model	**A Process Diagram or Process Map**
1	Standardized notation convention	Notation ambiguous
2	As precise as needed	Precision lacking
3	More detailed	Less detailed
4	Icons are objectively defined and standardized	Icons (representing process components) made up or loosely defined
5	Icon relationships definite and explained in annotations, process model glossary, and process narratives	Relationships of icons portrayed visually
6	Can depict appropriate complexity	Limited to portrayal of simple ideas
7	Can grow, evolve, mature	One-time snapshot
8	Created with tool appropriate to the project	May be created with simple drawing tools
9	May provide manual or automated process simulation	Difficult to use for even the simplest manual simulation
10	Vertical and horizontal linking, showing relationships among processes and different process levels	Difficult to link with related diagram or map
11	Uses a repository of related models within a BPM system	Uses simple file storage with no inherent relationships
12	Appropriate for any level of process capture, analysis, and design	Appropriate for certain quick capture of ideas
13	Can be imported into a business process management system (BPMS)	Not suitable for import into a BPMS

4.1.3.1 *Static Versus Dynamic Models*

Static models represent a single state of a business process or certain elements of a business process. Static representations:

- Establish baselines
- Document configuration stages
- Depict certain future states based on assumptions of goals or risks of the process
- Manage change
- Drive the process toward a more advanced level of maturity

4.1.3.2 *Dynamic Models*

Models, or some elements of a model, can be constructed with dynamic features. Examples of dynamic models include those that are designed to allow interaction with a user or those that show the development of a trend over time.

4.1.3.3 *Dynamic Modeling Tools*

Most top-tier modeling tools provide dynamic interaction capabilities. In some cases, the most basic version of a modeling tool will have simulation capabilities appropriate for most modeling projects. As a modeling project progresses and requires more detailed analysis, you may need more advanced and even automated simulation capabilities. If so, consider obtaining the capabilities you need from the vendor of the tool you are using or as an add-on from a partner of the original vendor.

4.1.3.4 *Combining Static and Dynamic Models*

Often a modeling effort benefits from a mixture of static and dynamic models. For example, when considering a future process configuration (the “To-Be” process), by feeding sample data through a dynamic process model you can see how the actual process will perform. Conversely, cycling of a dynamic model can produce a desirable set of static “snapshots” to aid in further analysis.

4.2 Process Repository Components and Tools

BPM Professionals need a place to store and manage the elements that allow them to model business processes. In this section, we introduce the concept of a process *repository*.

4.2.1 Capturing Process Components

Process *components* specify the properties, behavior, purpose, and other elements of the business process. You can use modeling tools to capture and catalog process components and the information associated with each component to organize, analyze, and manage an organization’s portfolio (collection) of processes.

4.2.2 What Is a Repository?

In general, a repository is a place where things are stored. In our context, a business process modeling tool with a database or a Business Process Management Suite is called a *business process repository*. It is the place where business process models are stored and managed. In other words, it is the business

process warehouse of an organization and it keeps an inventory of information about how an enterprise operates.

In addition to creating graphical representations of business processes, a repository is for:

- Storing business process models and process artifacts for reuse
- Creating a centralized place for accessing process information
- Enabling multi-user access and collaboration
- Querying and reporting on stored content
- Checking consistency to ensure modeling standards are followed
- Allowing flexibility to show different aspects of business processes based on target audience

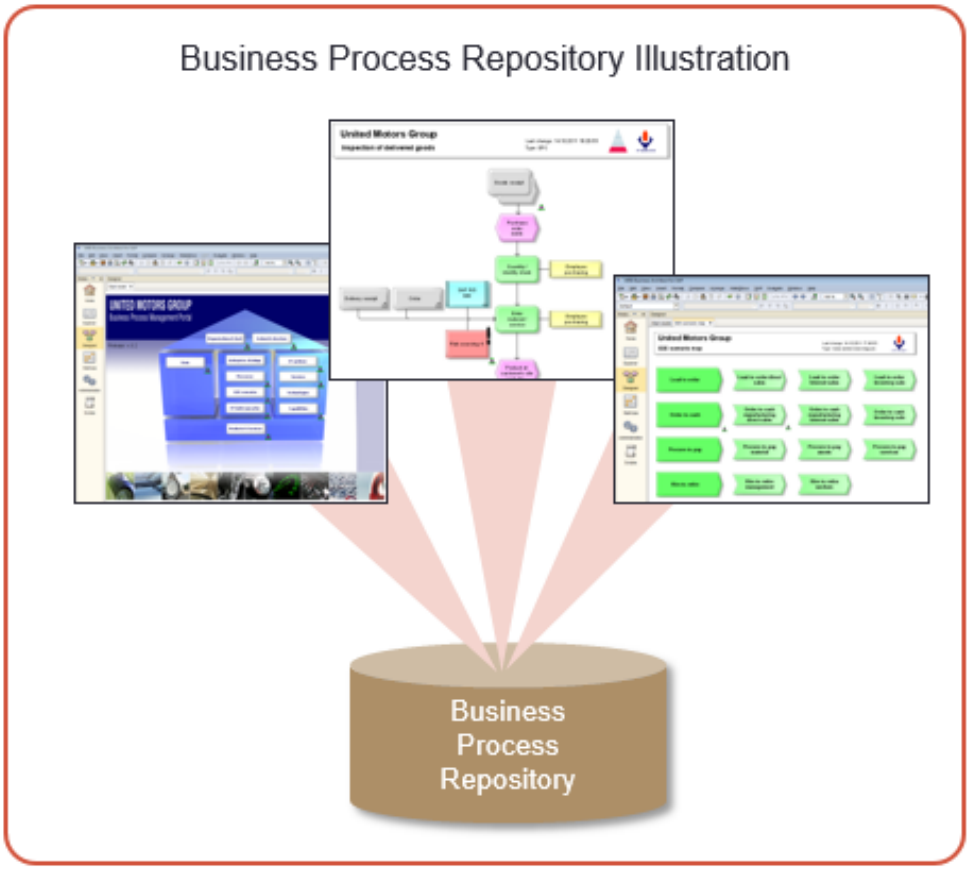


Figure 4.2 Business Process Repository

4.2.2.1 *Why Do Organizations Need a Process Repository?*

A process repository creates transparency for an organization, the key value of Business Process Management. This transparency helps to identify the organization's business processes, puts boundaries around them, and supports the management of a large number of business processes.

Business Process Management regards business processes as assets. In order to treat them as assets, business processes need to be made tangible and manageable. Capturing business processes in the form of process models and storing them in a process repository makes them tangible and manageable.

A process repository stores information on how an organization operates. When an organization needs to change a process, BPM Professionals can access existing business process models to make changes. Process repositories allow you to run business-driven use cases effectively and efficiently. So for major changes, like mergers and acquisitions, you can model the effects on your organization. Use cases are discussed in more detail later.

4.2.2.2 *Key Elements of Good Repository:*

A good business process repository is:

- **Centralized.** Used as a central location for storing information about how an organization runs its business.
- **Used to store artifacts.** Stores process artifacts such as process models, objects, relationships, attributes, business rules, performance measures, and so on that describe, at various levels of detail, how an organization executes its business processes.
- **Software enabled.** Implemented through a software product such as process modeling tools or Business Process Management Systems.
- **Systematic.** Object-oriented to store process knowledge in a systematic way, which allows individual process elements to be used throughout the repository to avoid redundancy and to enable the analysis of business process assets.
- **Integration ready.** Often integrates with document management systems, training solutions, or knowledge portals.
- **Governed.** Should be supported and managed by a well-defined governance structure and supporting processes and procedures.
- **Life cycle standard.** Its life cycle is defined by the following phases: strategy, design, build, maintenance, and operation.
- **Life cycle managed.** Should be managed throughout its entire life cycle, which includes activities such as creating process assets; storing and changing process information; and validating, releasing, and communicating process knowledge.
- **Initiative supporting.** Should be leveraged for different enterprise initiatives such as business transformation, process improvement, ERP implementations, software development, risk management, and IT portfolio management.

The sections that follow discuss a value-driven approach to the process repository, focusing on the desired outcomes. The five key pillars to designing a good repository are visualized in Figure 4.3.

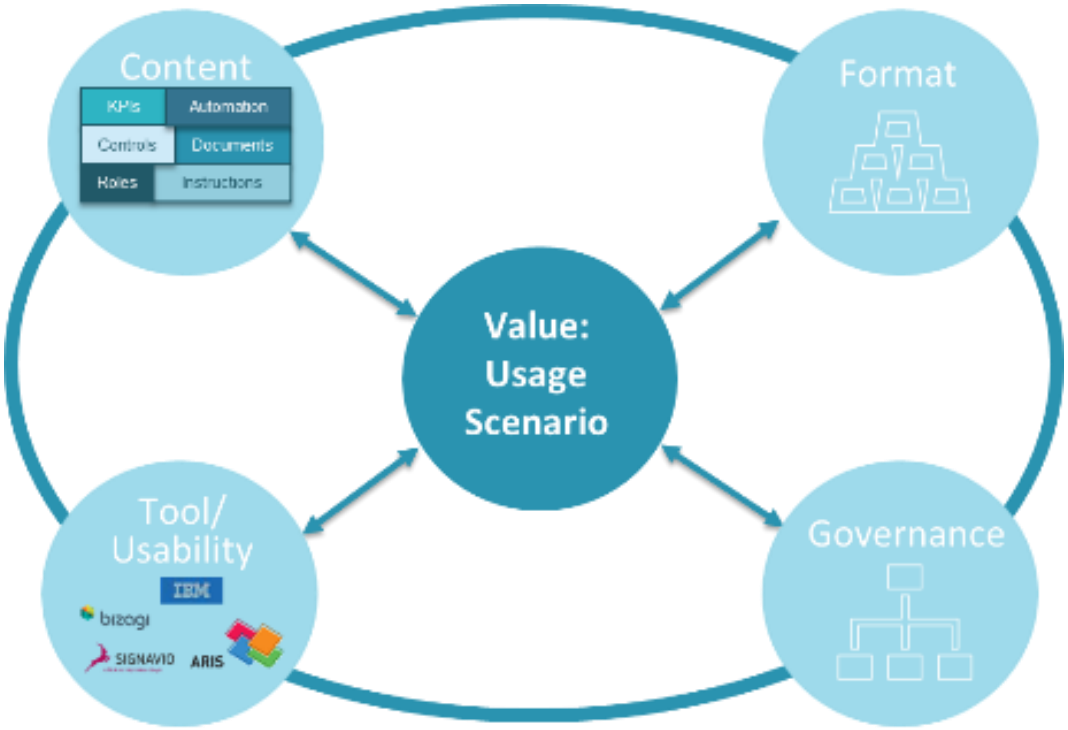


Figure 4.3 Key Pillars of a Good Process Repository

4.2.2.3 *Identify the Usage*

The key metric for a good repository is its usage. A good repository should not be measured by the number of models or the amount of information stored. A repository should be measured by:

- Percentage of people who use it
- Types of initiatives enabled
- Rate at which information is updated in it

When designing a repository, the key questions to ask are:

- How do you want to get value out of your process repository?
- What will you use the models for?
    - Improvement
    - Training
    - Collaboration with partners
    - Software development

These elements are described in detail in the *Identifying Outcome-Based Usage Scenarios* section.

4.2.2.4 *Scope the Content*

The content stored in a good repository is designed around the potential usage scenario. A repository should store process artifacts such as process models, objects, relationships, attributes, business rules, performance measures, and so on.

Wherever required, it should be integrated with other information systems like document management systems, training systems, knowledge portals, and so on.

A key design decision is what models to store in the repository. Generally, some information is stored outside the repository and simply referenced. Typical repositories house the following models:

- Process models
- Organizational models
- Technology models
- Decision models

The key to building content in a repository is to start by adding content that enables a usage scenario. This step is described in detail later in *Scoping the Right Process Knowledge Content*.

4.2.3 Defining a Standard Format

Using a standard format provides a strong structure to a repository. Many groups like Object Management Group (OMG), Institute of Electrical and Electronics Engineers Standards Association (IEEE-SA), and others provide standards like Business Process Modelling Notation (BPMN), ArchiMate, Value-Added Chain Diagram (VCD), Event-driven process chain (EPC), SIPOC diagram (suppliers, inputs, process, outputs, customers), Decision Modeling Notation (DMN), and entity relationship diagrams (ERD), to name just a few.

Key questions when defining a standard format:

(1) What level of detail is required?
(2) Which overall *architecture* do you use?
(3) How do you keep it simple for users to find and access the models?

Architectural elements are described in detail in *Defining Process Knowledge Architecture*.

4.2.3.1 *Select the Repository Management Tools*

What technology tools are necessary to manage the warehouse? Does this technology support the process of manufacturing and assembly appropriately? Is it *open* and hence easily integrated with implementation, execution, and control tools?

4.2.3.2 *Finalize the Process Repository Governance*

The warehousing of processes requires a robust governance structure around it. Typical repository governance activities include:

- Define who can:
    - View models
    - Modify models
    - Create new models
    - Approve models
- Create a process to create new models
- Define maintenance processes
- Define a process to *retire* models
- Define a quality assurance process, including the enforcement of modeling standards and guidelines (part of general maintenance)
- Define a process to measure value created through models (based on usage scenarios)

- Define hotline support
- Define version control
- Publish governance guidelines

Governance elements are described in detail in subsections of *Defining Process Knowledge Architecture*.

4.2.4 Identifying Outcome-Based Usage Scenarios

Business Process Management (BPM) requires capturing and documenting processes, in the format of process models, to create the required transparency. Documenting and reusing process information is a core concept for the implementation of a BPM-Discipline. A business process repository is a vehicle to store process information in a dynamic, easy to reuse, and consistent format (process models). The repository should be built up incrementally, with the areas that will provide the most value populated first. The repository can provide value in several ways. Typical usage scenarios of a repository include:

- Standardization of processes
- Process transformation
- Process improvement
- Process innovation
- Robotic process automation
- Workflow automation
- ERP roll-out
- Roll-out of best practices
- Process change management, for example, training
- Risk and compliance management
- Thirty-party collaboration
- Software development
- Simulation, for example for bottleneck analysis
- Post M&A integration
- Business strategy execution
- Operating model development
- BPM strategy

The key to achieving transparency is to define usage scenarios that are well described and outcome oriented. First, identify a specific usage scenario. For example, capture incident types and appropriate resolutions for Help Desk Assistants. Identify information to capture in a usage scenario, such as name, role scenario is designed for, goals, and outcome. Next, map out the usage scenario in a specified template (see Figure 4.4). Consider how to use the repository in the specific scenario and identify the expected value. The objective is to develop and maintain a set of value-based usage scenarios that:

- Include regular updates to the scenarios
- Define how to measure the value delivered
- Structure the collated process information within a repository

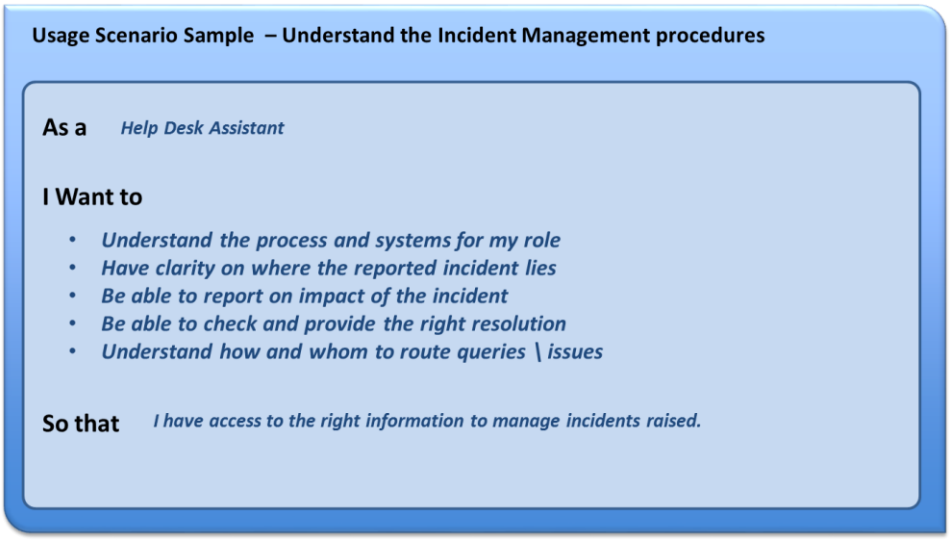


Figure 4.4 Sample Usage Scenario

4.2.5 Scoping the Right Process Knowledge Content

An enterprise repository provides the structure to capture all relevant knowledge about a business process from different views — people, process, and technology. However, a process is more than just a function in an organization. To understand the true nature of a process, assess each process from five dimensions (see Figure 4.5). Answer the following questions to capture all five dimensions:

(1) Who is involved in the process (organization)?
(2) What are the activities carried out (functions)?
(3) What information is needed or produced in the process (data)?
(4) Why do I need that process (deliverables)?
(5) Who is doing what, by means of which data, to produce which deliverables, and in which logical sequence (control)?

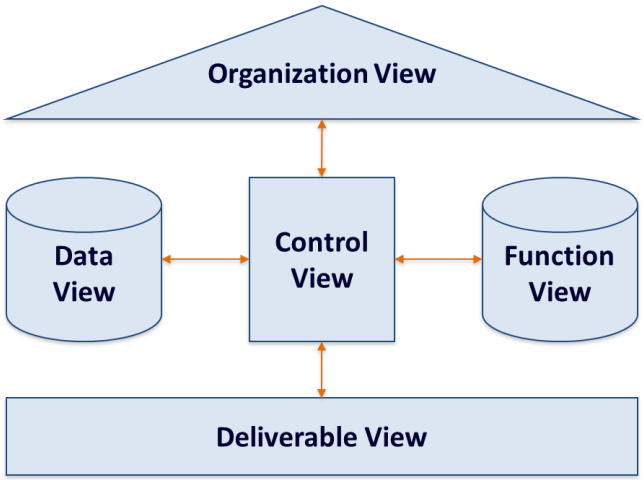


Figure 4.5 The ARIS Architecture By August-Willem Scheer

4.2.5.1 *How to Structure Content*

Processes involve information about people, technology, information, and control. The repository must capture this information in a structured way so that the information can be filed, referenced, and reused in various usage scenarios.

A usage scenario, if properly defined, provides a clear list of information required for execution. Process architects should be careful about two factors:

- Level to link information
- Location of information storage

Level

At what level of *process decomposition* should the information be linked? A typical process repository is broken down (decomposed) into various levels to structure information.

- **Level 1.** Highest level of process in the enterprise (such as supply management)
- **Level 2.** A group of processes (such as inventory management)
- **Level 3.** A process carried out (such as receiving goods)
- **Level 4.** Key events and tasks performed in the process (such as printing a receipt)

Typically, each node is split into five to eight subsequent levels. It is important to ensure all information captured is linked to the right level in the process decomposition.

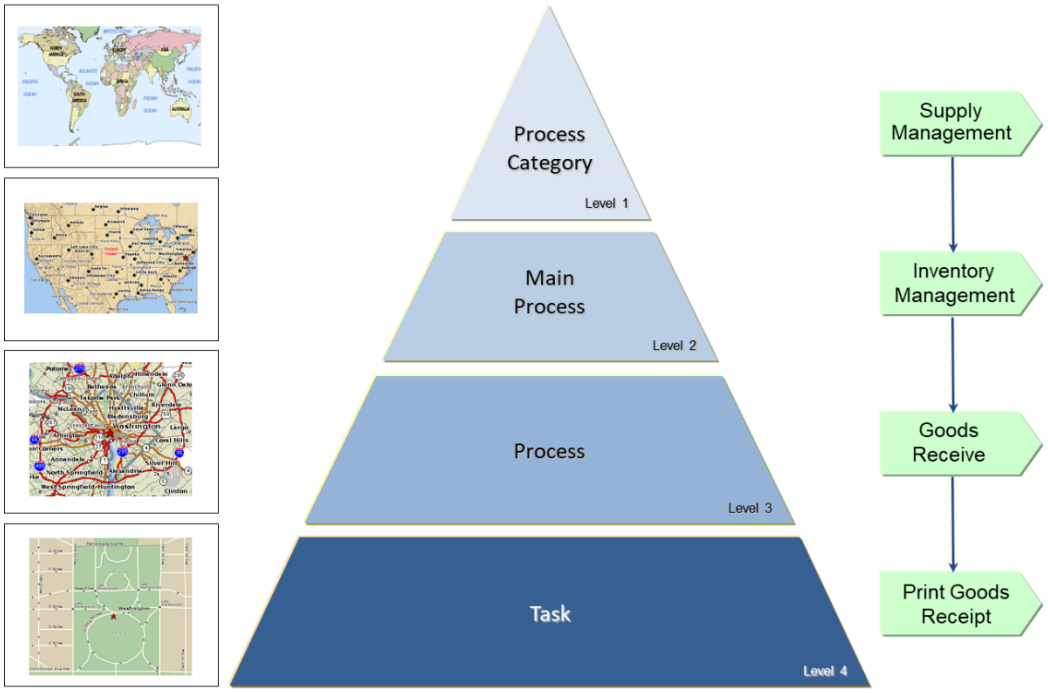


Figure 4.6 Process Decomposition

Location

Another decision to make is whether to store information inside the repository or outside. The process architecture should reference the existing document management system instead of replicating

information. Most repository tools can reference external data sources or web links. This integration should be carefully considered and used while capturing content into the repository. For example, policy documents can be linked to the repository structure, but stored in existing team sites and maintained by operational teams.

4.2.5.2 *Using Reference Models*

Reference models can be a powerful enabler for developing the repository content. Reference models are generalized knowledge, structured and documented in a manner that enables adaptability to specific situations.

The widely known industry reference models are SCOR and PCF.

SCOR. The Supply Chain Operations Reference model is the world's leading supply chain framework, linking business processes, performance metrics, practices, and people skills into a unified structure. See www.ascm.org.

PCF. Process Classification Framework from APQC creates a common language for organizations to communicate and define work processes comprehensively and without redundancies. Organizations are using it to support benchmarking, manage content, and perform other important performance management activities. See www.apqc.org.

Apart from SCOR and PCF, many software vendors provide their own software reference models. For example, SAP and consulting firms have developed industry reference models that can be leveraged to provide the right structure to your organization's process repository.

4.2.6 Defining Process Knowledge Architecture

Process repositories support Enterprise Architecture and enable easy and dynamic use of the process knowledge. A repository is structured to include the following content types: *people*, *process*, and *technology*. The key to creating an optimum repository is to define and agree on the key notation to be used (based on the identified usage scenarios) and ensure it is followed as a standard across the organization. The repository architecture should provide a critical link between process design and execution.

The architecture should cater to various usage scenarios. It needs to strike the right balance of art and science so that processes can be executed through people, with the relevant data elements, while leveraging technology for automated execution.

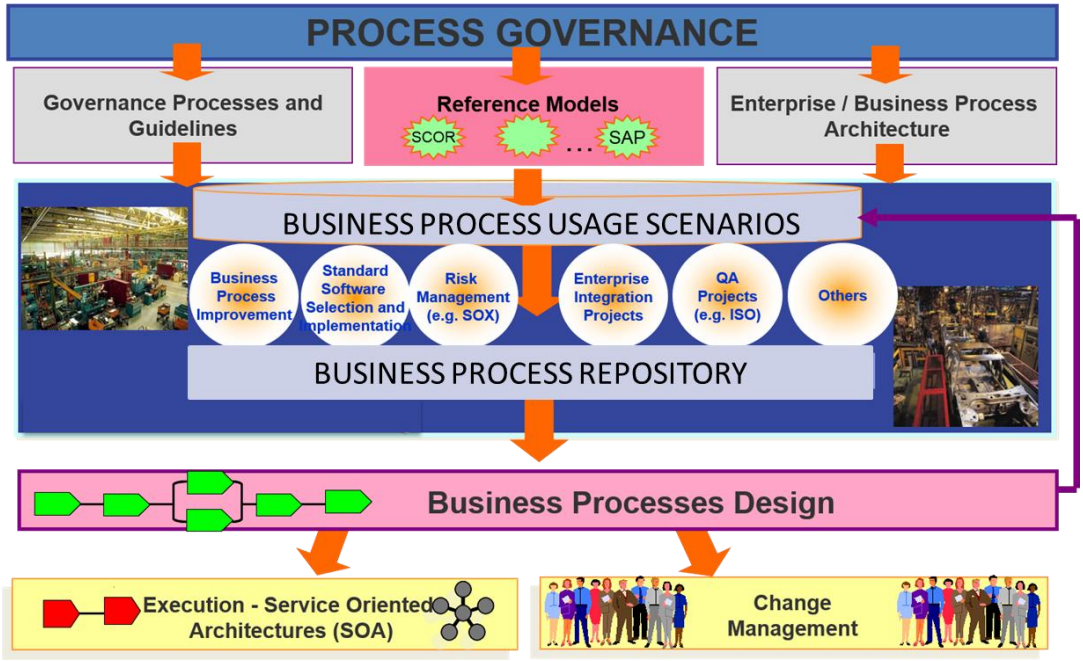


Figure 4.7 Process Architecture

4.2.6.1 *Commonly-Used Architecture Elements*

Notations are methods for describing things that use specific sets of symbols and rules. There a variety of notations for the process, people, and technology content types, each supported by various tools. The best way to use these notations is by clearly defining how to use them to store relevant information and by setting up checks to ensure these standards are followed.

Process

The *process* content type is covered by notations detailed in the following table.

Notation	Description
Business Process Modelling Notation (BPMN)	A graphical representation for specifying business processes in a business process model. Business Process Management Initiative (BPMI) developed BPMN, which has been maintained by the Object Management Group since the two organizations merged in 2005. Version 2.0 of BPMN was released in January 2011, at which point the name was adapted to Business Process Model and Notation as execution semantics were also introduced alongside the notational and diagramming elements.
Event-driven process chain (EPC)	The main process modeling notation within the ARIS toolset. EPC was developed in 1992 at the University of Saarland with SAP-employees.
Value-Added Chain Diagram (VCD)	A diagram showing a set of activities that a company operating in a specific industry performs to deliver a valuable product or service to the market.

SIPOC diagram	A visual tool that summarizes the inputs and outputs of one or more processes in table form. Used to document a business process from beginning to end. SIPOC (pronounced sigh-pock) diagrams are also referred to as *high-level process maps* because they do not contain much detail. SIPOC stands for suppliers, inputs, process, outputs, customers.
Flowcharts	A type of diagram that represents an algorithm, workflow, or process. A flowchart shows steps as shapes connected by arrows that depict the order of steps. Flowcharts can be used to illustrate paths available to solve a problem. Flowcharts can also be used to analyze, design, document, or manage a process. (Burlton 2013)

People

The *people* content type is covered by notations detailed in the following table.

Notation	Description
Organizational chart	A diagram that shows the structure of an organization, its job roles, and reporting relationship hierarchies. The concept of an organizational chart was developed by Scottish-American engineer Daniel McCallum. Other names for organizational chart include organization chart, org chart, organigram(me), and organogram.
RACI chart	Describes responsibilities by role for completing tasks or deliverables for a project or business process. RACI stands for responsible, accountable, consulted, informed. RACI charts are especially useful in clarifying roles and responsibilities in cross-functional or departmental projects and processes. A RACI chart is also called a responsibility assignment matrix (RAM), a RACI matrix, or a linear responsibility chart (LRC).
Balanced scorecard	A framework for measuring business performance and a full strategic planning and management system that organizations can use to identify their vision and strategy, define business objectives, and align business activities accordingly. A balanced scorecard allows executives to translate strategies into actions and monitor the accomplishment of strategic goals. The balanced scorecard system makes use of a simple graphic called a *strategy map* to show a logical, cause-and-effect connection between strategic objectives. Developed by Kaplan and Norton.

Technology

The *technology* content type is covered by notations detailed in the following table.

Notation	Description
Decision Model and Notation (DMN)	A standard approach for describing and modeling repeatable decisions to ensure that decision models are interchangeable across organizations. Published by the Object Management Group.
Entity relationship diagram (ERD)	Shows the relationships of objects in a database. An entity-relationship model (ER model) describes inter-related things of interest in a specific domain of knowledge. An ER model is composed of entity types (which classify the things of interest) and specifies relationships that can exist between instances of those entity types. Developed by Peter Chen.
ArchiMate	An open and independent Enterprise Architecture modeling language that supports the description, analysis, and visualization of architecture within and across business domains in an unambiguous way. Developed by the Open Group. Pronounced AR-ki-mayt.
Unified Modelling Language (UML)	A general-purpose, developmental modeling language in the field of software engineering that provides a standard way to visualize the design of a system. Developed by OMG.
Systems Modelling Language (SysML)	A general-purpose modelling language for engineering systems. SysML supports the analysis, design, and verification of complex systems including hardware, software, information, personnel, procedures, and facilities in a graphical notation. Developed by OMG.
Data flow diagram (DFD)	A graphical representation of the flow of data through an information system, modeling its process aspects. A DFD is often used as a preliminary step to create an overview of the system without going into great detail, which can later be elaborated. DFDs can also be used for the visualization of data processing (structured design).

BPM professionals should define a standard notation across the organization for the various types of information captured. The right notation ensures that all process information can be leveraged to provide a standard outcome. Using process technology, information stored across various parts of the organization can work in an end-to-end context to realize goals and deliver on strategy.

4.2.7 Selecting the Right Repository and Modelling Tool

Selecting a tool is typically the first step an organization takes on their BPM journey. Given the plethora of tools available in the market, you need a strategy to select the right tools. The best practice is to

develop usage scenarios, and then select tools based on the features needed to implement those usage scenarios.

4.2.7.1 *Types of Repository Tools*

There are three types of BPM platforms:

- Basic BPM platforms
- Business Process Management suites (BPMSs)
- Intelligent Business Process Management Suites (iBPMS)

A BPM platform minimally includes:

- A graphical business process and/or rule modeling capability
- A process registry/repository to handle the modeling metadata
- A process execution engine
- A state management engine or a rule engine (or both)

BPM platforms can help solution architects and business outcome owners accelerate application development, transform business processes, and digitalize business processes to exploit business moments by providing capabilities that manage different aspects of the business process life cycle. The following table lists tools that provide BPM repository support. The list is not comprehensive, and each tool provides unique strengths as a process repository tool.

Name	Creator	Link
ActiveVOS	Informatica	http://www.activevos.com/www.activevos.com
Activiti Modeler	Alfresco and the Activiti community	https://www.activiti.org/www.activiti.org
ADONIS (software)	BOC Information Technologies Consulting AG	https://uk.boc-group.com/adonis/uk.boc-group.com/adonis
Appian	Appian	https://www.appian.com/platform/bpm-suite/www.appian.com/platform/bpm-suite
ARIS Express	Software AG	http://www.ariscommunity.com/aris-expresswww.ariscommunity.com/aris-express
Aura Portal	Aura	https://www.auraportal.com/www.auraportal.com
Bizagi	Bizagi	http://www.bizagi.com/enwww.bizagi.com/en
BiZZdesign Architect	BiZZdesign	http://www.bizzdesign.com/enterprise-studiowww.bizzdesign.com/enterprise-studio
Bonita BPM	Bonitasoft	http://www.bonitasoft.comwww.bonitasoft.com
Enterprise Architect	Sparx Systems	http://www.sparxsystems.com/www.sparxsystems.com/
IBM BlueWorks Live	IBM	https://www.blueworkslive.com/homewww.blueworkslive.com/home
IBM Rational System Architect	IBM	https://teamblue.unicomsi.com/products/system-architect/teamblue.unicomsi.com/products/system-architect/
iGrafx Process	iGrafX	http://www.igrafx.com/products/process-modeling-analysis/processwww.igrafx.com/products/process-modeling-analysis/process
Imixs-BPMN	Imixs	http://www.imixs.org/www.imixs.org

K2 BLACKPEARL	K2	https://www.k2.com/products/k2-blackpearlwww.k2.com/products/k2-blackpearl
MagicDraw	No Magic	https://www.nomagic.com/www.nomagic.com
Microsoft Visio 2013	Microsoft	www.visio.microsoft.com
Modelio	Modeliosoft	https://www.modelio.org/www.modelio.org
Oracle Business Process Management	Oracle	http://www.oracle.com/us/technologies/bpm/overview/index.html www.oracle.com/us/technologies/bpm
Pegasystems	Pega BPM	https://www.pega.com/www.pega.com
Signavio Process Manager	Signavio	https://www.signavio.com/www.signavio.com
Software Ideas Modeler	Dusan Rodina	https://www.softwareideas.net/www.softwareideas.net
SYDLE SEED Community	SYDLE Systems	http://www.sydle.com/bpmswww.sydle.com/bpms
yEd	yWorks	http://www.yworks.com/products/yedwww.yworks.com/products/yed

4.2.7.2 *How to Select the Right Tool for Your Organization*

The key factors to consider while selecting tools to fit your organization are:

(1) The tool's capabilities to support the current usage scenarios that your organization plans to implement immediately
(2) The tool's capability to scale into the planned usage scenarios that you would like to develop in the future
(3) The tool's capability to support standard notations so that, as and when required, you can migrate your existing content into another tool

Clear insight into your process agenda and process usage scenarios helps ensure successful tool selection.

4.2.8 Repository Governance

In this section, we cover topics related to governance of a process repository. Two central concepts related to repository governance include:

- Process governance and repository governance are interdependent
- Repository governance relies on methods and conventions that map to an organization's architecture

4.2.8.1 *Process Governance*

The terms *process governance*, *business process governance*, and *Business Process Management governance* are used interchangeably.

Process governance guides the execution of Business Process Management. Process governance involves all processes of an organization, determining what should be done, who does it, and how it should be done to sustain or improve performance.

According to Rafael Paim and Raquel Flexa process governance may include:

The activities of formulating, introducing, controlling and reviewing policies, guidelines, rules, procedures, instruments and technologies that guide process management practices within the organization. It also includes the forms of organization, integration, collaboration, and communication among the various different process management initiatives within the firm. The objects of process governance are the organization's value chain, the process management methodology and the rules, roles, and responsibilities that structure and organize how process management functions.

A process repository enables process governance in several ways:

- **Process prioritization.** It provides, with its process hierarchy, a crucial element for process prioritization, which is a building block of developing an organization's process strategy.
- **Multi-level process ownership.** It provides, with its transparency over the process hierarchy, the backbone for structuring multi-level process ownership.
- **Multi-level process performance indicators.** It provides, with its transparency over the process hierarchy, the backbone for designing multi-level process performance indicators.
- **Lifecycle management.** It supports the management (create, update, release) of lifecycles for business process models and related information models.

Agreed upon content and format definitions, which are practically defining the Business Architecture, need to be made available in the repository and documented in a *methods and conventions* document.

4.2.8.2 *Business Architecture Related Methods and Conventions*

A *methods and conventions* document contains guidelines that include:

- Modeling notations to be applied per process hierarchy level
- Object types used per modeling notation
- Connector types used per modeling notation
- Symbols used per object type
- Naming conventions for information models and objects
- Banner layout and content for information models

Repository-specific aspects of the document include:

- Intended folder structure
- Naming conventions for the folder structure
- Information model statuses and their impacts
- Authorizations per user role
- Semantic checks

These methods and conventions are the foundation of repository governance and will come to life with the creation, update, and release of business processes. In the grander scheme, the benefits will be realized with the execution of Business Process Management.

The creation of a methods and conventions document can be tedious and time consuming despite following the guiding principle of *keeping things simple*. However, this document is crucial to providing guidance for existing and new members of the BPM organization. It is also the foundation of business process repository audits.

4.2.8.3 *Process Governance and Repository Governance*

Process governance and repository governance overlap wherever roles involved in the creation, update, and release of processes touch the repository.

Process Model Change Example

The following example illustrates the relationship between process governance and repository governance.

- A *create sales order* process model is already captured in the repository.
- The process model is live.
- A small change is needed.
- People involved:
    - Process ***Owner*** (has read access, can comment).
    - Order-to-cash process ***modeler*** (has write access, can change).
    - Process ***architect*** (has read access, can comment).

How is the change made?

(1) Owner requests the change from modeler.
(2) Modeler creates unpublished version of existing process model and marks status as draft.
(3) Modeler asks architect to review draft (via email or through the tool).
(4) Architect comments on the process, indicating need for adjustment.
(5) Modeler receives alert of comment.
(6) Modeler adjusts process model and requests architect approval.
(7) Architect comments, indicating approval adjusted process model.
(8) Modeler and owner receive alert of comment.
(9) Modeler sets status of the process model to approved by business process architect.
(10) Owner comments approval of adjusted process model.
(11) Modeler receives alert of comment.
(12) Modeler sets status of the process model to approved by Process Owner.
(13) Modeler publishes the draft model, making it public and the new as-is process.
(14) Owner implements the revised process in daily business activities.

Repository governance has to ensure that repository content cannot be compromised. This content management governance is owned and designed by the organization's BPM leader and is implemented by the repository tool administrator. It answers the questions of who can view, modify, create, approve, and retire business process models by defining roles and responsibilities and the respective processes. In addition, support processes need to be designed and implemented. Examples of support processes include:

- A regular audit process to ensure that people adhere to the guidelines or the methods and conventions document
- A version control process, which controls when the next version can be published
- A process for measuring the value created through the process repository
- A process for publishing all the governance guidelines
- A process for getting help

There are also technical aspects of repository governance. Examples of technical considerations:

- Database back-up schedule
- Process for moving content from the process repository to another tool
- Process for moving content from another tool to the process repository

- Process for creating custom symbols and objects

These technical governance aspects are owned by the repository tool administrator.

4.2.9 Monitoring Repository Usage and Expansion

Historically, many business process modeling initiatives underwent tough scrutiny in regard to the perceived value created. Extensive work went into the creation of process models, but they were hardly used or not used at all. This pattern contributed discrediting of business process modeling and the use of process repositories.

Use cases during the planning stage ensure process models and process repositories provide value to the organization. To ensure process models serve their intended purpose, usage must be monitored. Good measures of process usage include:

- Number of process models accessed in a certain period of time
- Distribution of process models access across process areas (should be approximately even)
- Percentage of users in an organization who use the repository
- Number different types of initiatives enabled by the repository
- Rate at which information is updated in the repository

Most of these measures can be calculated electronically. However, taking short repository-related surveys on a regular basis (once a year) will help gauge the pulse of the organization and identify further business requirements.

4.2.10 Repository Best Practices

The best practices for building a robust repository address five elements: value, content, format, governance, and tools and usability.

1. Value: Usage Scenarios

- Usage scenarios identified and repository support defined
- Regular update of usage scenarios
- Measurement of value delivered through repository

2. Content

- Relevant content for usage scenarios of specific processes available
- Appropriate reports available in repository

3. Format

- Ten or fewer modeling methods in use
- Standard modeling method used across organization
- Overall process architecture defined up to level three
- Modeling standards and guidelines defined and enforced

4. Governance

- Repository governance processes for creation, maintenance, and retirement of models defined and implemented
- Quality assurance in place, measured at least four times per year
- Quality of models and delivered value measured

- Number of repository accesses per month measured and consistent with defined usage scenarios
- Repository governance guidelines defined and published

5. Tools and Usability

- Repository tool available through the cloud
- Reports and configuration in place and updated based on usage scenarios
- Hotline support in place
- Relevant other tools connected and appropriate governance approach defined

4.2.11 Repository Metrics

A good repository should be measured according to:

(1) Percentage of users in an organization who use repository
(2) Different types of initiatives enabled by repository
(3) Rate at which information is updated in repository

Value-driven process management, if applied correctly, ensures the optimal development and use of the process repository. Optimal use means using the right standards, tool governance, and focusing on agreed-upon usage scenarios.

4.3 Process Modeling Tool Capabilities

Modeling tools vary in the number and types of components (and information) they can capture, which affects the type and level of process performance analysis you can conduct. Process modeling projects frequently grow in scope and complexity. Because of this, selecting a more powerful tool than required at the beginning of a modeling project often makes the most sense.

The following table presents some process components (and related information) you can capture in process models.

Examples of Process Components and Data in Process Models	
Inputs and outputs Events and results Value add Roles and organizations Data and information Probabilities Queuing Transmission time Wait time	Arrival patterns and distributions Costs (indirect and direct) Entry rules Exit rules Branching rules Join rules Work and handling time Batching Servers (number of performers available to perform tasks)

4.4 Purpose of Process Modeling

As a work activity, the purpose of process modeling is to create a representation of the process that describes it accurately and sufficiently for the task at hand. For this reason, the level of detail to model

and the specific type of model is based on what is expected from the modeling project. A simple diagram may suffice for one project, while a fully developed model may be required for another.

4.4.1 Process Modeling Is a Means to Business Ends

Process models are the means to:

- Manage organization processes
- Analyze process performance
- Define changes

Process models are tools that can express a target business state or specify the requirements for resources to enable effective business operations, such as people, information, facilities, automation, finance, and energy. The process modeler should be aligned with the project's defined level of detail based on the scope and timeline.

The following table outlines, from different points of view, some reasons for process modeling.

Point of View	Reasons for Process Modeling
Business community	• Save money — cut costs • Improve quality — reduce waste • Reduce time to production • Increase productivity • Reduce time for order to delivery — customer satisfaction • Target problems to fix those problems • Capture performer knowledge — avoid process breakdown • Standardize employee performance
Business process professional	Solves a business problem by: • Describing process as accurately and sufficiently as necessary for task at hand • Communicating process clearly to intended audience • Selecting level of detail and specific type of model based on: ○ What is expected of modeling project ○ Business problem that needs fixing ○ Providing a baseline for continuous improvement
Organizational	Process models are means to: • Manage organization's processes • Analyze process performance • Define changes Process models can: • Express a target business state • Specify resource requirements to enable effective operations ○ People ○ Information ○ Facilities ○ Automation ○ Finance ○ Energy

Analysis and performance improvement	• Increase clarity or understanding of a process • Aid in training • Assess performance against standards and compliance requirements • Understand process performance under varying loads or other changes • Analyze potential opportunities for improvement • Design a new process or a new approach to existing process • Facilitate communication and discussion • Document a requirements determination effort • Increase ability to respond to new outside constraints such as federal or state regulations
Process-managed business	• Central starting point to drive collective understanding and consensus among process stakeholders • Save costs, time, and effort over guesswork and experimentation with actual processes • Help process performers from a department see how their inputs and outputs affect development of value across functional lines • May result in local decision making that maximizes value in the process rather than producing local optimization • Identify compliance and/or auditable activities

4.5 Commonly Used Process Modeling Notations

Notations exist in many disciplines and are an important component of business process modeling.

> ***Notation.*** *A standardized set of symbols and rules that govern how the symbols represent something else.*

For example, musical notation includes universally recognized symbols for notes and clefs. Similarly, a business process modeling notation includes icons (pictures) and connectors that help show relationships among the various real-life components of a business process.

There are a number of modeling and notational standards and techniques in use today. Selecting the best approach from the available options can be difficult; however, selecting an approach that follows standards and well-known conventions provides far-reaching advantages. For example:

- Members of the business community, business process professionals, and IT professionals have a common symbol set, language, and technique through which to communicate.
- Resulting process models are consistent in form and meaning which simplifies design, analysis, and measurement while enabling model re-use.
- Staff can import and export process models among various tools.
- With some tools, staff can transform the modeling notation into an execution language.

There is a significant growth trend in some of these features, notably the import facility and compatibility with execution engines.

4.5.1.1 *Guidelines for Selecting a Modeling Notation*

This section provides a brief description of some of the most commonly encountered modeling notations. Note that the examples provided are just the graphical veneer of the notational systems presented. In modern modeling environments, there may be many levels and detailed attributes that help to more fully describe a business process.

When choosing a modeling notation, consider the unique combination of circumstances in your organization. Review the modeling notations in the table that follows to help make the selection. And keep in mind it is sometimes appropriate to use different notations for different stages of a modeling project or for different levels or types of models.

Commonly Used Process Modeling Notations	
Modeling Notation	**Description**
Business Process Model and Notation (BPMN) 2.0	Standard created by the Object Management Group; 103 icons, useful for presenting a model to multiple audiences.
Event-driven process chain (EPC)	Developed within the framework of ARIS, considers events as triggers to or results from a process step; useful for modeling complex sets of processes.
Flowcharting	Originally approved as an ANSI standard, includes a very simple and small set of symbols that are not standardized; facilitates *quick capture* of process flow.
Integrated Definition Language (IDEF0)	A Federal Information Processing Standard that highlights the inputs, outputs, mechanisms, and controls of a process and clearly links processes up and down levels of detail; good starting place for an enterprise-wide view of an organization. IDEF0 defines the standard for process modeling; is decreasing in use. IDEF1x defines the standard for data processing and continues to be popular.
Swim lanes	Not a distinct notation, but an addition to most other notation systems; helps identify hand-offs in a process.
Unified Modeling Language (UML)	Maintained by the Object Management Group, a standard set of diagramming techniques, notations primarily for describing information systems requirements.
Value stream mapping	From Lean Manufacturing, a very simple set of symbols; used to add process resource costs and time elements to a process model to clearly depict process efficiency.

4.5.2 Business Process Model and Notation (BPMN) 2.0

Business Process Model and Notation 2.0 is a standard created by the Business Process Management Initiative, now merged with the Object Management Group (OMG), an information systems standards-setting group. BPMN has growing acceptance as a standard from many perspectives, which has resulted in its inclusion in several of the most widely-used modeling tools. It provides a robust symbol set for modeling different aspects of business processes. Like most modern notations, the symbols describe definite relationships such as workflow and order of precedence. Figure 4.8 shows an example BPMN process diagram.

Key Features

- Version 2 (BPMN 2.0) represents significant maturing and solidification of the notation
- Over 100 total icons, organized into descriptive and analytic sets to meet different user needs

- Very precise notation indicating:
    - Beginning, intermediate, and end events
    - Activities and message flows
    - Intra-business communications and inter-business collaboration
    - Activity and data flows

When to Use

- To present a model of a process to multiple sets of audiences
- To simulate a business process with a process engine
- To execute a process

Advantages

- Widespread use and understanding; considered by many to be the de facto standard in the US
- Significant use in the US Department of Defense and other government entities
- One of the most powerful and versatile notations for identifying process constraints

Disadvantages

- Requires training and experience to use full set of symbols correctly
- Difficult to see relationships among multiple levels of a process
- Different modeling tools may support different subsets of the notation
- Information technology origins inhibit use with some organizations' members of the business community

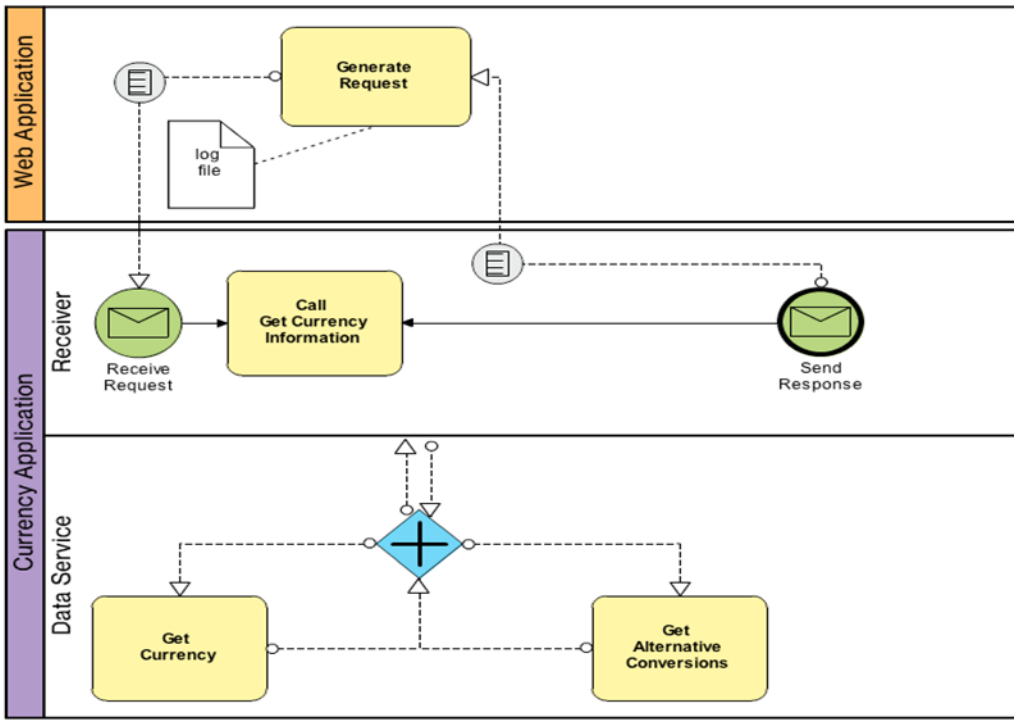


Figure 4.8 Simple BPMN Process Diagram

For more information see:

- The Object Management Group's dedicated website at www.bpmn.org

- Help files and sample models in most major modeling tools

4.5.3 Swim Lanes

Swim lanes are not a distinct notation but rather a useful notational responsibility attribution/distribution in addition to most other notation systems. Swim lanes are often incorporated into BPMN, EPC, UML, or simple flowcharting as a means of defining the performer responsible for carrying out an activity. The lanes (rows) are generally represented as long vertical or horizontal rectangles or sometimes as simple lines or bars, resembling the channel or lane markings in swimming competitions. Arranging the flow of activities and tasks across these rows makes it easy to visualize handoffs in the work. Figure 4.9 shows an example (used in BPMN) of one *pool* and three *lanes*.

Key Features

- Lanes represent performers or combinations of performers
- Lanes can indicate roles, organizations, systems, or any other performer entity or combination

When to Use

- To clearly distinguish at what point the responsibility for performance changes
- To increase understanding among process stakeholders

Advantages

- Aids collaboration as process performers are able to distinguish their roles in relation to others
- Clearly defines hand-off points in a process
- Can describe flows of operational precedence, material, and messages

Disadvantages

- Becomes complex in areas where performance responsibility is jointly held
- In certain cases, can preserve a silo process mindset

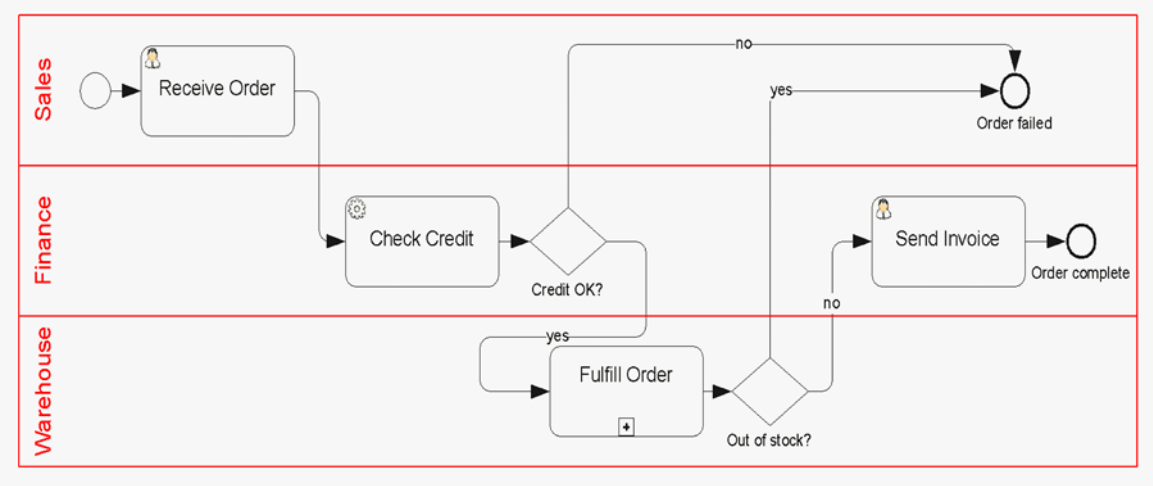


Figure 4.9 Traditional Swim Lane Diagram by Bruce Silver

For more information see:

- The Agile Modeling (AM) website at http://www.agilemodeling.com/style/activityDiagram.htm#Swimlanes
- Help files for most major modeling environments

4.5.4 Flowcharting

Flowcharting is widely used. It is based on a simple set of symbols for operations, decisions, and other primary process elements. The notation for the most common flowcharting was approved as an ANSI standard in 1970 for representing systems flows. Other flow-charting notations have been used by industrial engineers for decades and use different symbols and layouts for specific industrial mappings. For example, flowcharting is used to describe the flow of materials, roles and work, placement of machinery, and analysis of egress and ingress in dispatch centers. Figures 4.10 and 4.11, which use common symbols, illustrate how much flow-charting symbols can vary in appearance from one organization to another.

Key Features

- Used with or without swim lanes
- Many variations for different purposes
- Simple core set of easily recognized symbols
- Forerunner of many more modern notations

When to Use

- To quickly capture process flow for sharing where details do not require documenting
- To begin a modeling project where funding is not available for full-featured tools
- To develop highly detailed diagrams for use in traditional system coding

Advantages

- Well understood by software engineers and systems engineers
- At high levels, helps build consensus
- Adequate for *happy path* illustrations
- Inexpensive to use
- Supported by lower-order tools including general-purpose graphics and visualization tools

Disadvantages

- Despite influence from ANSI standards, there are many variations
- May be imprecise when used to depict complex business processes
- Must develop specific lexicon of symbols, icons, and formatting standards for each project to maintain consistency and readability among models
- Objects do not have robust set of descriptive attributes
- Models constructed are *flat*, requiring use of connector symbols to show where process segments continue
- Not generally considered robust enough for complex process capture

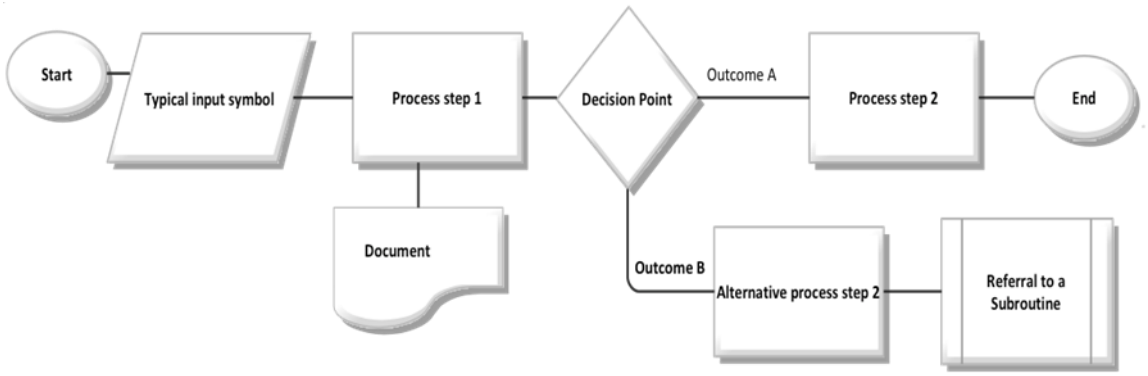


Figure 4.10 Example Flow Chart

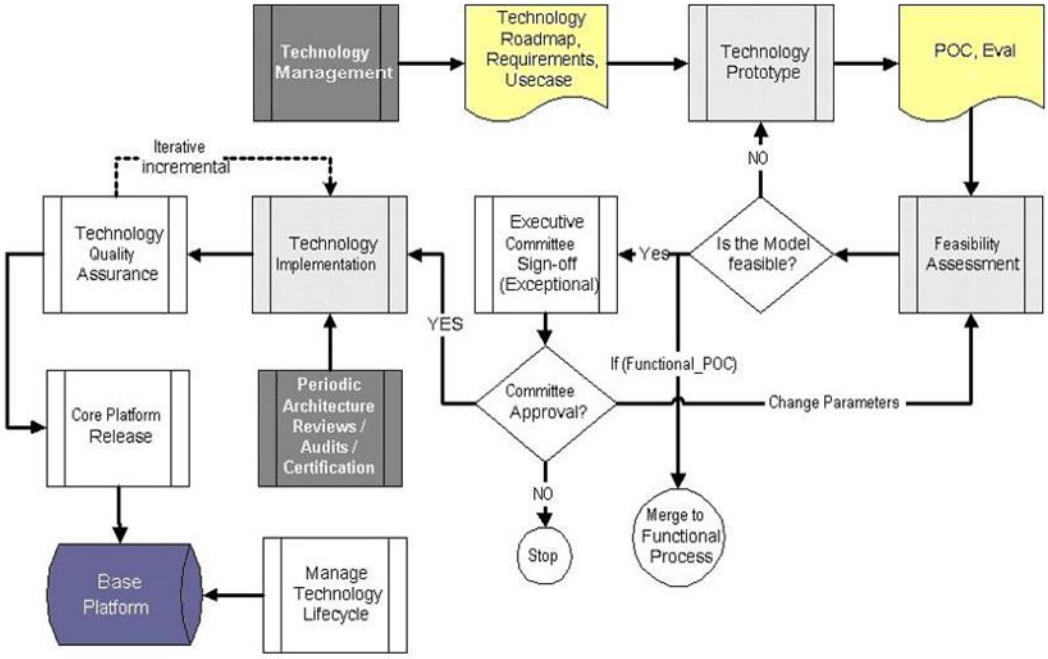


Figure 4.11 Another Example Flow Chart

For more information see:

- Applicable ANSI standards
- Introductory computer programming course texts

4.5.5 Event-Driven Process Chain (EPC)

Event-driven process chains range from very simple to very complex. EPC describes events as either triggering or resulting from a process step, called a *function*. Thus, the flow is normally event-function-event. EPC relies heavily on logical operators called *rules*. The basic rule objects are **AND**, **OR**, and **Exclusive OR**. These rule objects express decisions, tests, parallelism, and convergence in the process flow. A simple EPC consists of just these objects plus arrows that define relationships between them. Figure 4.12 shows an example of an Event-driven process chain.

Key Features

- EPC method was developed within framework of ARIS by Professor Wilhelm-August Scheer at University of Saarland in the early 1990s
- Can be used for modeling, analyzing, and redesigning business processes
- May be enhanced with vertical or horizontal swim lanes
- Simple core set of easily recognized symbols, augmented with a large number of optional or special-purpose objects
- Some tools employ a system of filters to limit or control subset of notation to be used

When to Use

- When modeling complex sets of processes with many process interfaces and sub-models
- To fill in details of processes below levels normally addressed by some Enterprise Architecture frameworks

Advantages

- Widely used and understood in Germany and other European countries, especially in multinational enterprises
- Substantial presence in US Department of Defense and other large enterprises
- A properly constructed EPC may be read like a set of sentences
- May be used as means of collaboration among groups of functional experts who have little experience with models
- Possible to enhance models through use of many optional object types that describe performers, supporting systems, information, or swim lanes of related activity
- Some tools may translate between EPC and BPMN notations with growing reliability
- One of the most powerful and versatile for identification of process constraints

Disadvantages

- Less prevalent than BPMN and flowcharting in US modeling projects
- Modeling teams must be disciplined in use of notation to avoid possible logic gaps
- Strongest implementation is limited to ARIS family of process modeling tools

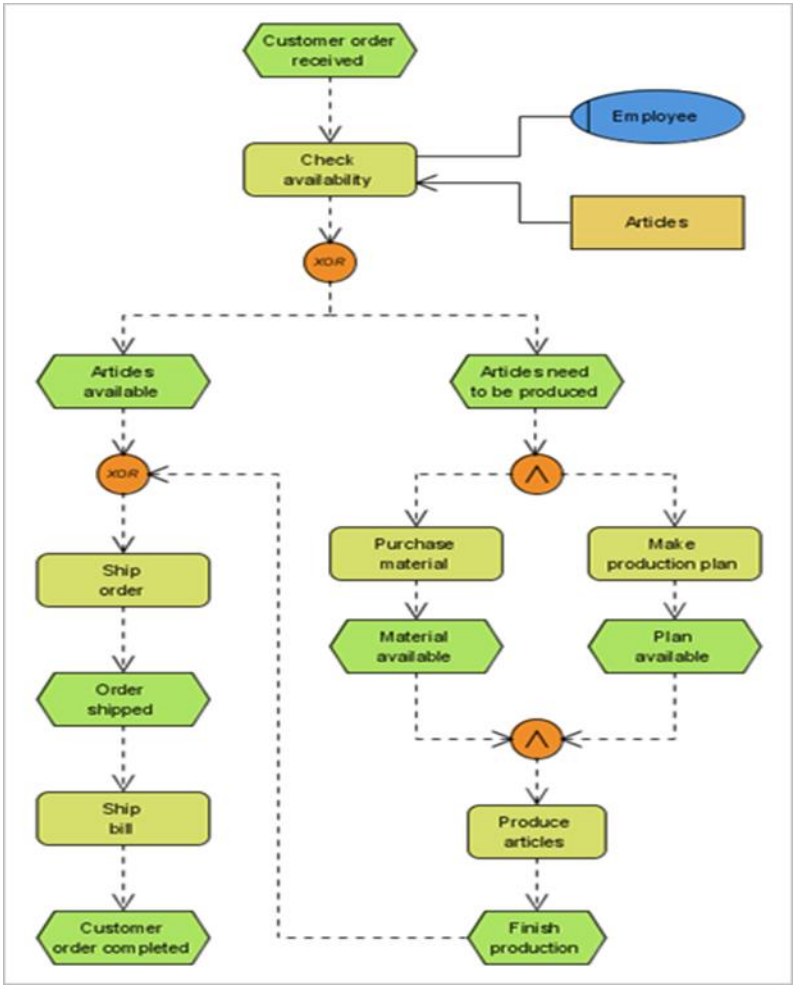


Figure 4.12 Event-Driven Process Chain

For more information see:

- The ARIS website at ariscommunity.com
- On the Software AG website at www.softwareag.com

4.5.6 Unified Modeling Language (UML)

UML provides a standard set of diagramming techniques and notations primarily for describing information systems requirements. While UML is primarily used for systems analysis and design, a few organizations also use UML activity diagrams for business process modeling. UML is maintained by the Object Management Group (OMG), a standards-setting body for the information systems field.

Key Features

- Actually is a set of nine or more related diagramming techniques and notations
- Describes very complex lateral and parent-child relationships
- Symbol set varies somewhat depending on model type
- An important subset, SysML, often used to describe systems and systems of systems

When to Use

- To develop use cases
- To describe information systems requirements
- To design system interactions below the level of the process flows depicted in other tools
- To capture or design data structures
- May also be used to depict business process flows at a lower level
- Often used to present use cases

Advantages

- Well-established community of users
- Implemented in most major modeling environments
- Many references available from books and online sources

Disadvantages

- Designed for modeling software applications; business process modeling is a secondary use
- Notational representation may vary from tool to tool

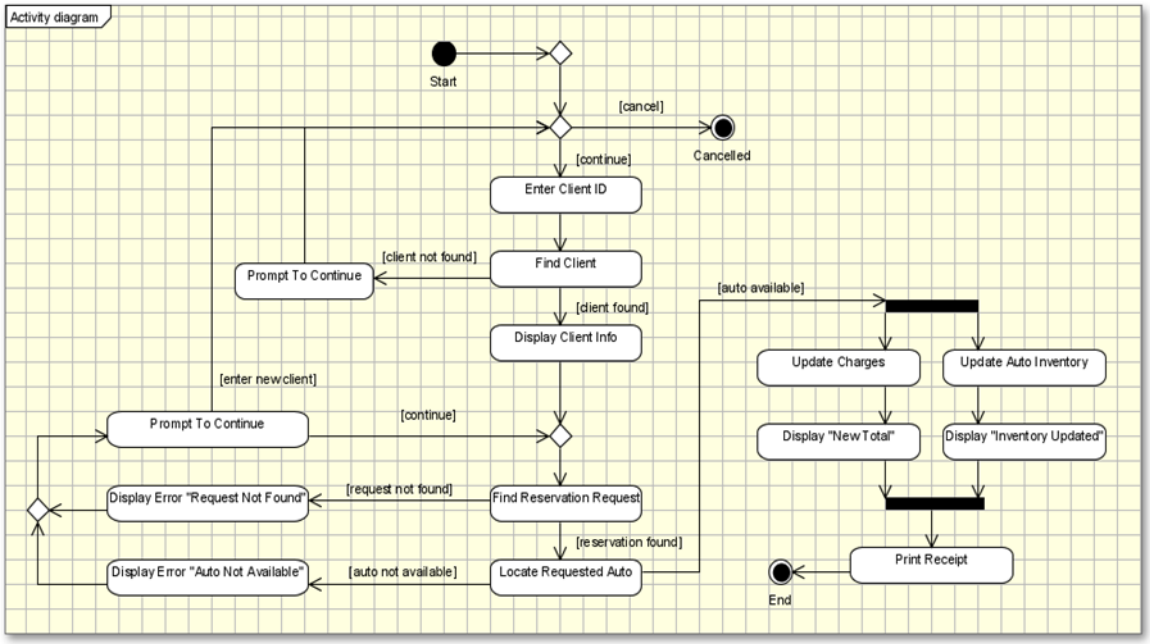


Figure 4.13 UML Diagram

For more information see:

- Object Management Group for complete specification and links to other useful information at www.uml.org
- Help file structure in IBM Rational software

4.5.7 IDEF0

IDEF0 is a family of modeling notation concepts described in a Federal Information Processing Standard (FIPS) that was developed by the US Air Force. It is a notation and technique that is one part of a methodology for defining the work processes and information systems in manufacturing environments. It was widely used and available in many modeling tools for many years and is now in the public domain.

IDEF0 is the process modeling notation and it employs a very simple set of symbols consisting of process boxes with arrows showing inputs, outputs, controls, and mechanisms. Although each level of the model is read left to right and top to bottom, the numbering system used for the major steps is represented in a way that allows for easy association between parent and child levels of decomposition in the process. Thus, a child process box named A1.3 is interpreted to be a child process of the parent diagram A1. Each successive level of decomposition uses another decimal point to continue this easy traceability of lineage. Figure 4.13 shows a sample IDEF0 diagram.

Key Features

- Top level defines topic to be modeled
- Subsequent levels display decomposition of level above with series of boxes
- Steps in process have inputs, outputs, controls, and mechanisms depicted by labeled arrows
- System of labeling indicates exact relationship with next level above (B3.2 is the second process sub-step of the B3 process step)

When to Use

- May be used for any level of activity modeling
- Integrated Computer-Aided Manufacturing (ICAM)

Advantages

- Precise expression
- Easy-to-follow logical decomposition of model levels
- Box and arrow names and definitions entered into model are retained in a data dictionary that is available for separate querying or exporting
- Can distill model down to one-page node diagram for presentation to executive level stakeholders
- Exhaustive documentation available from US Federal government or commercial sources

Disadvantages

- Implementations can be visually unappealing
- Notation mainly of boxes and arrows; can appear cluttered and busy without careful organization of symbols
- Popularity has decreased; major vendors such as CA no longer market IDEF0 product

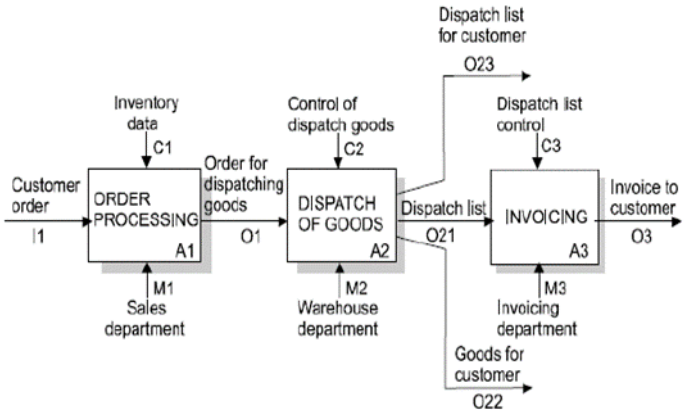


Figure 4.14 IDEF0 Sample Diagram

For more information see the *Draft Federal Information Processing Standards Publication 183* at www.idef.com.

4.5.8 Value Stream Mapping

Value stream mapping is a technique used in Lean Manufacturing. Not to be confused with value chain notation, value stream mapping expresses the physical environment and flow of materials and products in a manufacturing environment. At Toyota, where the technique originated, it is known as *material and information flow mapping*. Value stream mapping is used to add process resource costs and time elements to a process model. Adding costs and time allows the process model to include a view of the process efficiency. Figure 4.15 shows a value stream map.

Key Features

- Very simple set of symbols
- May incorporate diagramming from other notations

When to Use

- To increase involvement of process performers in process analysis
- To help guide performers in self-identifying opportunities to make a process Lean
- In any project that does not require use of full-featured modeling environments
- In environments where process costs and time requirements are easily identified

Advantages

- Simple
- Easy to use

Disadvantages

- Flat models
- No repository
- Unable to use for very complex issues

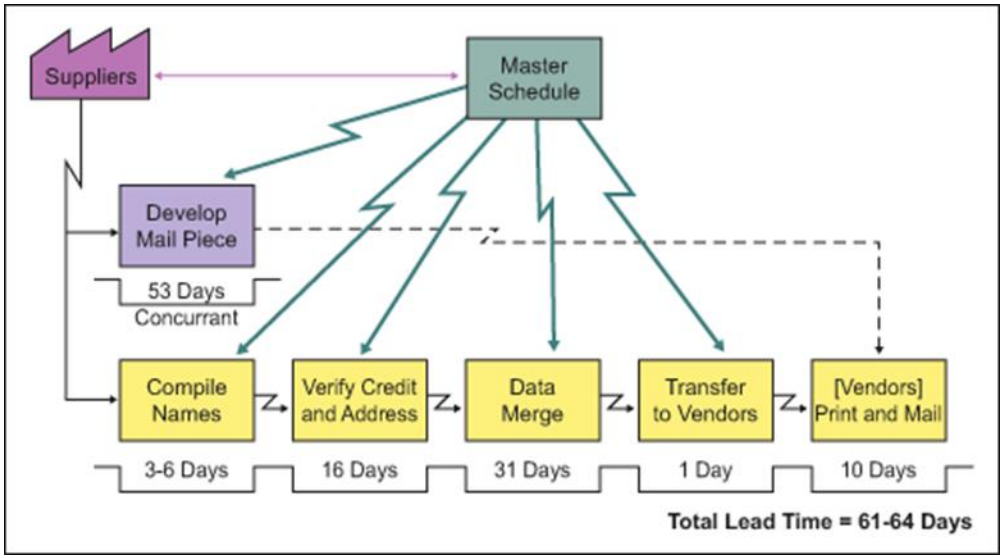


Figure 4.15 Value Stream Mapping Sample Diagram (from LSixSigma Publication)

For more information see most Lean and Six Sigma texts.

4.5.9 Specialized Approaches in Process Modeling

The following three approaches can be used in process modeling or process improvement initiatives. They are considered specialized approaches; each provides an enterprise perspective analysis. Further detail and sample materials are available from the websites for each approach, listed in the sections for each approach.

Value chain. Introduced by Michael Porter, this notation emphasizes capturing those processes and activities that add value to the service or product provided to a customer. Provides an overview but not detailed view of business processes.

Supplier, input, process, output, and customer (SIPOC). A style of process documentation used in Six Sigma, useful to emphasize the sources of inputs (suppliers) and the targets of the outputs (customer).

System dynamics. System dynamics models present a changing view of a business system's performance.

4.5.10 Value Chain

Value chain notations are a category of symbol sets used to visualize the accumulation of value or steps toward achievement of a goal. Various approaches to value chains employ their own sets of symbols, but these are generally easily interpreted and often employ an arrow or horizontal chevron to express each step in the chain. Relationships are also generally easy to understand, with the chief one describing a predecessor-successor relationship.

Sometimes groups of steps are summarized under a *process superior* object. These models generally flow from left to right, describing the sub-processes that directly contribute to producing value for the organization's customers (clients or constituents). The concept of the value chain was introduced by Michael Porter in his works on corporate strategy and is typically applied at the enterprise modeling and planning level. Figure 4.16 shows a value chain diagram.

Key Features

Features vary among tools:

- Sometimes implemented as Value-Added Chain Diagram
- Overlays representing performers, finance, time, systems, or specific data clusters may be added
- Swim lanes may be used to enhance effectiveness

When to Use

- To create a decomposition of those process segments that relate most directly to adding customer value
- To depict overview levels of processes

Advantages

- Easy to read and interpret

- Little ambiguity because of simple relationships
- May be augmented with optional input and output identification, or other overlays such as financial or organizational involvement

Disadvantages

- Decision points unclear
- Usefulness breaks down with increased complexity, requiring use of more detailed notations for further decomposition

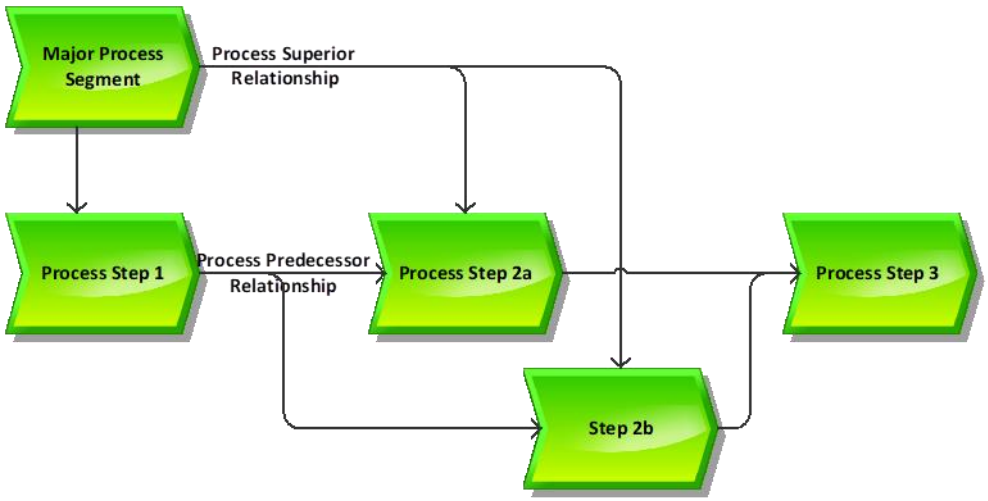


Figure 4.16 A Value Chain Diagram

For more information see:

- Value Chain Reference Model proposed by The Value Chain Group, Inc. at www.value-chain.org/en/rel/19
- A strong Value-Added Chain Diagram implementation in modeling tools from Software AG (ARIS)

4.5.11 SIPOC

SIPOC stands for supplier, input, process, output, and customer. It is a style of process documentation used in Six Sigma. There is no standard or preferred notation set, and this technique may be satisfied by completing a table with those headings. The SIPOC model is often used to gain an initial consensus on what areas of a process are under study. Figure 4.17 shows a SIPOC worksheet.

Key Features

- Simple columnar arrangement (not swim lanes)
- Text entries or well-understood notational elements may be used to populate columns

When to Use

- Used extensively at onset of Lean and Six Sigma projects
- Exercise of naming entities in each column can accelerate detailed modeling in another tool
- Use for initial consensus-building of process modeling project scope

Advantages

- Fast
- Simple

- Requires only a template in a spreadsheet or word processing document

Disadvantages

- Little potential for in-depth capture, design, or analysis
- May delay adoption of a more powerful method

SIPOC Worksheet

For Process: _____

Supplier	Inputs	Process	Outputs	Customer
Record entities that provide the inputs that trigger the process	Record each of the inputs	Steps to respond to inputs (may be a list or simple graphics)	List outputs	Record the entities that receive the result of the process

Figure 4.17 SIPOC Worksheet

For more information see the Six Sigma website at www.isixsigma.com.

4.5.12 System Dynamics

More than just a different notation, *system dynamics* models are not static — they show, with movement, how changing variables affect a process. System dynamics models are especially useful in developing life cycle models that focus on overall performance of a business system. System dynamics models also show the impact of changing key variables that affect overall performance. They are mostly used to model an entire enterprise or line of business rather than workflow-level processes. System dynamics models are often used to describe the enterprise business *architecture* from a dynamic behavioral perspective, rather than a static structural perspective.

Figure 4.18 shows only a snapshot from a system dynamics model. An actual system dynamics model is not static but shows, with movement, how changing variables affect a process.

Key Features

- Incorporates causal and feedback loop diagrams
- Dynamic — via controlled animation, demonstrates how process performs

When to Use

- To provide a macro view, simulating organization's overall performance
- To compare impacts of changing multiple variables on a process or organization

Advantages

- Presents active, moving, fluctuating representation of a high-level process
- Easier to understand than a static representation or text description
- Provides a systems approach view to process
- Include drivers or influencers on process
- Shows importance of feedback loop

Disadvantages

- Not useful for discerning problems at worker level or with supporting computer applications
- Not useful for discerning influences external to a process upon that process

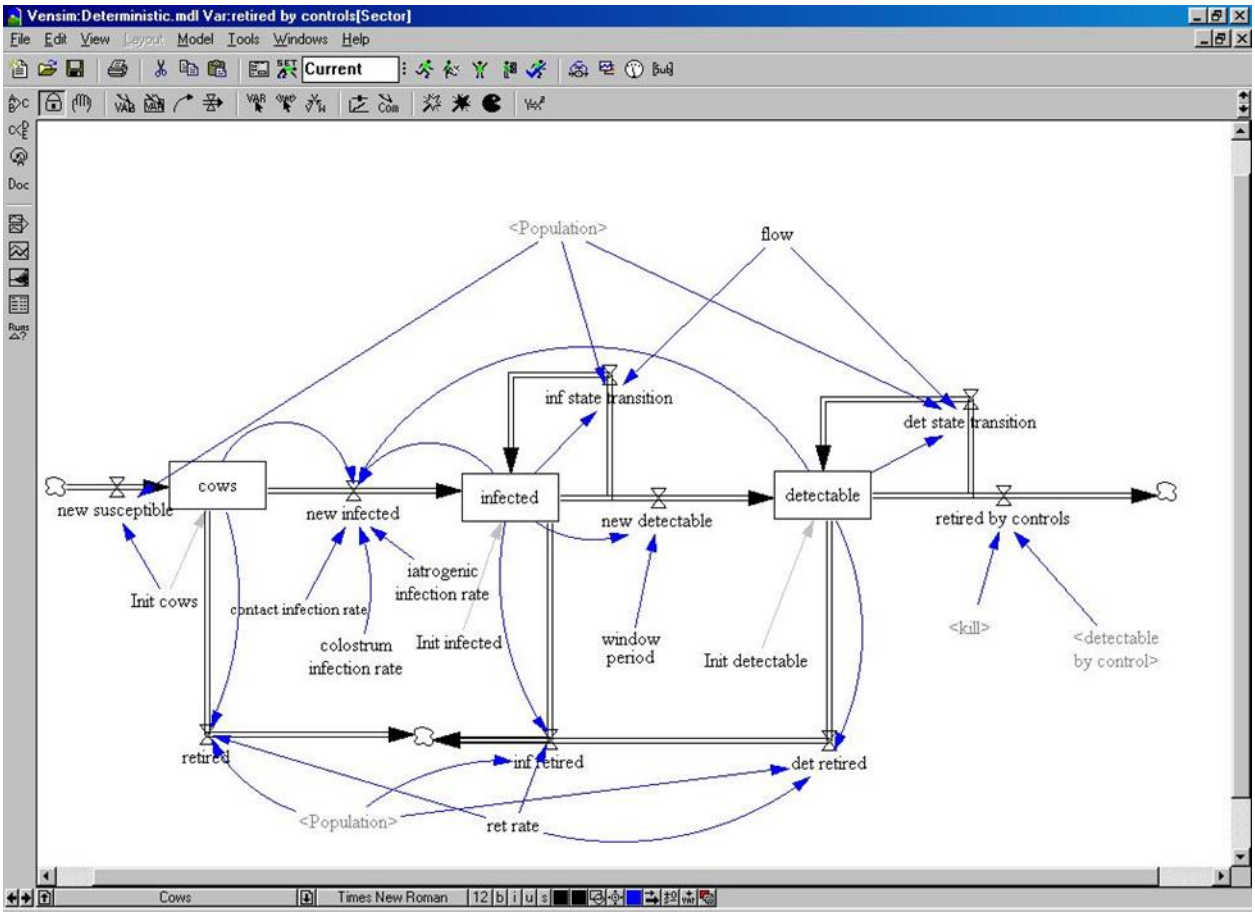


Figure 4.18 Still Capture of System Dynamics Model (Bagni, Berchi, and Cariello 2002)

For more information see:

- System Dynamics Society at www.systemdynamics.org
- System Dynamics — MIT Sloan Ph.D. Program at mitsloan.mit.edu/phd/system-dynamics.php
- *System Dynamics Review*, the journal of the System Dynamics Society at www.systemdynamics.org/publications.htm

4.6 Process Model Levels

Process information discovery uncovers information at various levels of detail. These levels of detail need to be sorted out and the information assigned to the different levels of processes within a process model hierarchy. The levels vary by organization, but are often based on perspectives from areas of the organization, such as operations.

4.6.1 Assigning Process Information

The top level of the model hierarchy shows the end-to-end process. From there it is broken down (decomposed) into lower levels of detail until you have identified the activities where the *work* of the process is performed.

Critical to sorting out the information is to establish an agreed-upon ontology. An *ontology* is the collection of the names of items in a domain (such as human resources). It is very difficult to define a business process that is complete and accurate if the constituent items of a domain are called by different names. Naming conflicts occur when either:

- The same name is used for different items
- The same item is called by two different names

4.6.2 Aligning Process Information

When collecting process information, consider assigning it to the appropriate process level as the information is collected. As the team learns more about the process, the process information can be re-assigned. Be sure to align the information at any level in the hierarchy to information at a higher level in the hierarchy. By doing this, the information at each level provides additional detail to the information at the next higher level. Additionally, aligning process information across process levels allows the team to identify missing information or information that needs to be questioned.

Figure 4.19 shows an example of a process hierarchy, starting at the enterprise level and drilling down to the business process and workflow levels.

4.6.2.1 *Levels Vary in Number and Name*

The number of levels and their names will vary according to the methods and naming conventions in different companies. Key points to remember:

- The process must be broken into a low enough level to understand the activities that are taking place and how they fit together to produce the business unit's end products.
- If there is to be any hope of controlling the process information and its quality, the team needs a way to organize the information that is collected and the models that are built.

The levels in Figure 4.19 are an example of how an organization can define levels of detail in its process modeling standards.

4.6.3 Best Practice: Business Modeling Standards

Formal business modeling standards should direct the number and name of the levels in both the current *as-is* and the future *to-be* models. In the past, these standards could be independent of any external modeling standard or tool, but that is changing. Consider aligning internal modeling standards with the tools that are used and their capabilities and limitations. For example, while it is not the only modeling standard, BPMN 2.0 is becoming a major standard for BPMS (Business Process Management suite) vendors. Consequently, an organization's internal modeling standards may need to conform to BPMN. A good rule of thumb in looking at modeling standards is to have them address, in some way at least, the levels shown in Figure 4.19.

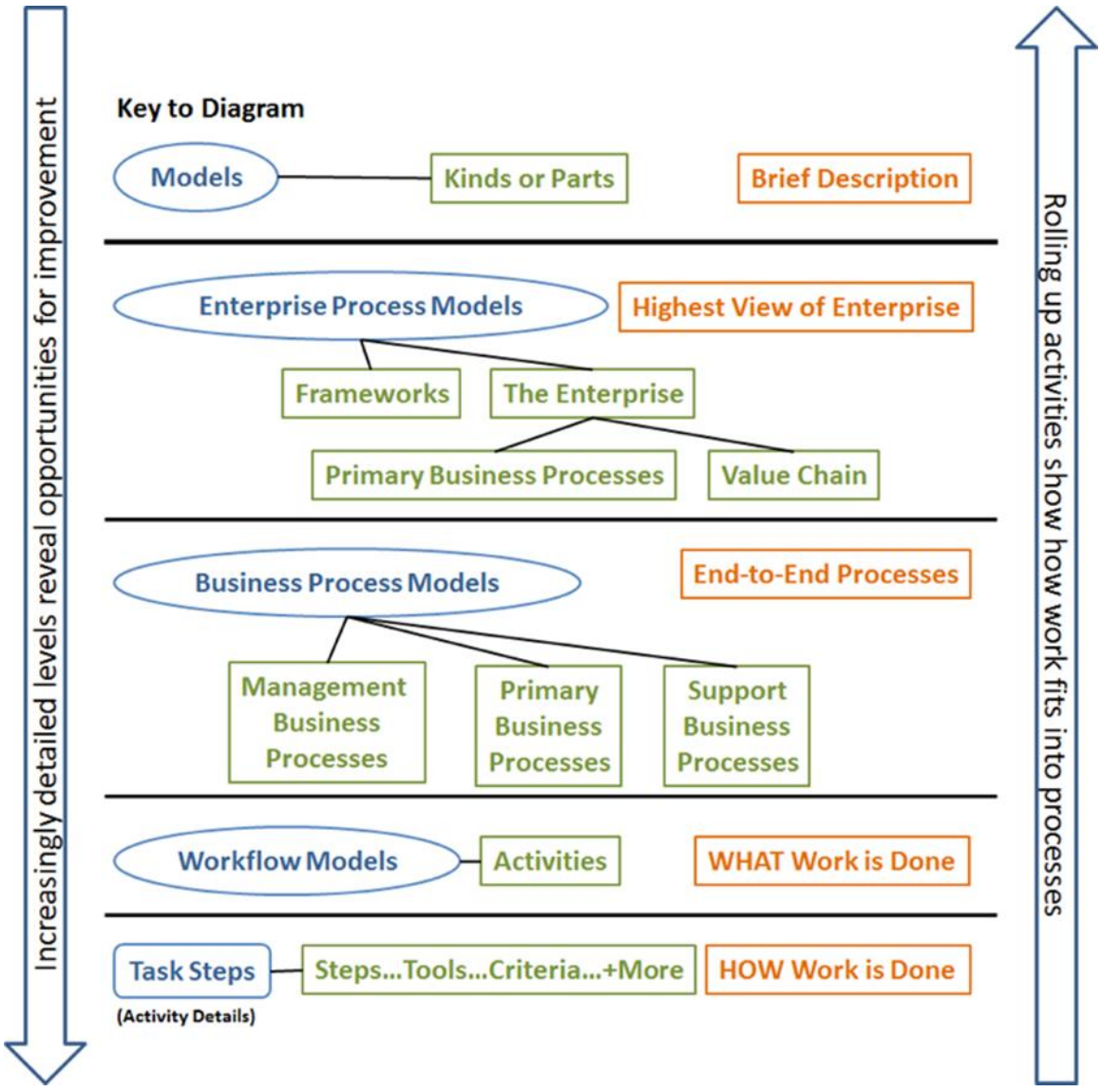


Figure 4.19 An Example of Process Model Levels

4.6.4 An Example Set of Model Levels

Processes can be modeled from many perspectives, or points of view, according to the needs of the organization. Process modeling has been used for strategic planning, improving operations, and specifying data and applications system requirements for many years. Our discussion uses four process model levels: enterprise, business, and workflow, and task steps as shown in Figure 4.19. These levels are based on:

(1) An executive perspective, which models processes at the highest, strategic level
(2) A business perspective, in which models show end-to-end processes
(3) An operations perspective, where models show actual work activities (workflow)
(4) The lowest level, the tasks and steps taken to complete work

4.6.4.1 *Integrating Process Models*

The advent of process-focused management disciplines created the need to develop models that integrate these different perspectives. In a BPM environment, an organization's strategy is enacted through process performance. Process performance links the enterprise and business process models to the workflow (or operations) model, which presents *what* must be done to provide the internal or external customer with a product or service. The workflow model, in turn, links to the task steps — which describe *how* the work is done. The task steps, in turn, must be supported by information technology systems. These relationships are depicted in Figure 4.19.

4.6.4.2 *Process Repository Maintains Alignment*

To keep these types of models aligned, a line of visibility is needed from one type of model and perspective to the next in a coherent framework, typically maintained in a process repository. The following table lists the different perspectives that a process repository can maintain.

Position	Is Accountable for	Takes this Perspective	Uses this Level of Model	Made Up of
Executive management	Aligning strategy with enterprise process performance	Enterprise perspective	Enterprise process model	Processes and sub-processes
Process owner	Business process performance	Business perspective	Business process model	Sub-processes and activities
Operations manager and staff	Overseeing and doing the work	Operations perspective	Workflow model	Activities

4.6.4.3 *Enterprise Process Models*

Enterprise models take a high-level look at business processes.

Enterprise Perspective

The members of an organization who need to see how the enterprise operates overall and align overall enterprise strategy with aggregated process performance take an *enterprise perspective*. The enterprise perspective arranges the primary processes cross-functionally to provide a full view of the scope of their

interaction, integration, and aggregation across functional areas. The enterprise perspective is captured, for each organization, in an *enterprise business process model*.

Enterprise Models

An enterprise business process model provides a full end-to-end, cross-functional view of the primary processes. The model can show sub-processes as well as high-level problems and application systems. An enterprise business process model is typically a very general model that describes the focus of an organization and arranges the major processes of the entire organization.

Enterprise Process Model Components

Generally, each cross-functional business process is further decomposed into more detail by its major components (sub-processes). An enterprise model typically has two or more levels of detail and serves as a high-level organizational blueprint. The enterprise business process model includes support and management processes.

Additional Uses for Enterprise Process Models

Enterprise business process models have uses other than as a general classification and communications tool. The processes can be:

- Mapped to key performance indicators (KPIs) and strategic goals in a process portfolio
- Used to prioritize resources and project efforts
- Mapped to a system dynamics model
    - To formulate strategies for alternate future scenarios
    - To develop high-level estimates and forecasts

Enterprise Level and Business Architecture and Metrics

At the enterprise level, the business architecture will tell you *what* to measure, and the metrics will tell you what *data* is needed for measuring value. Figure 4.20 illustrates what the enterprise level of business architecture for order fulfillment (level 0) would look like at level 2.

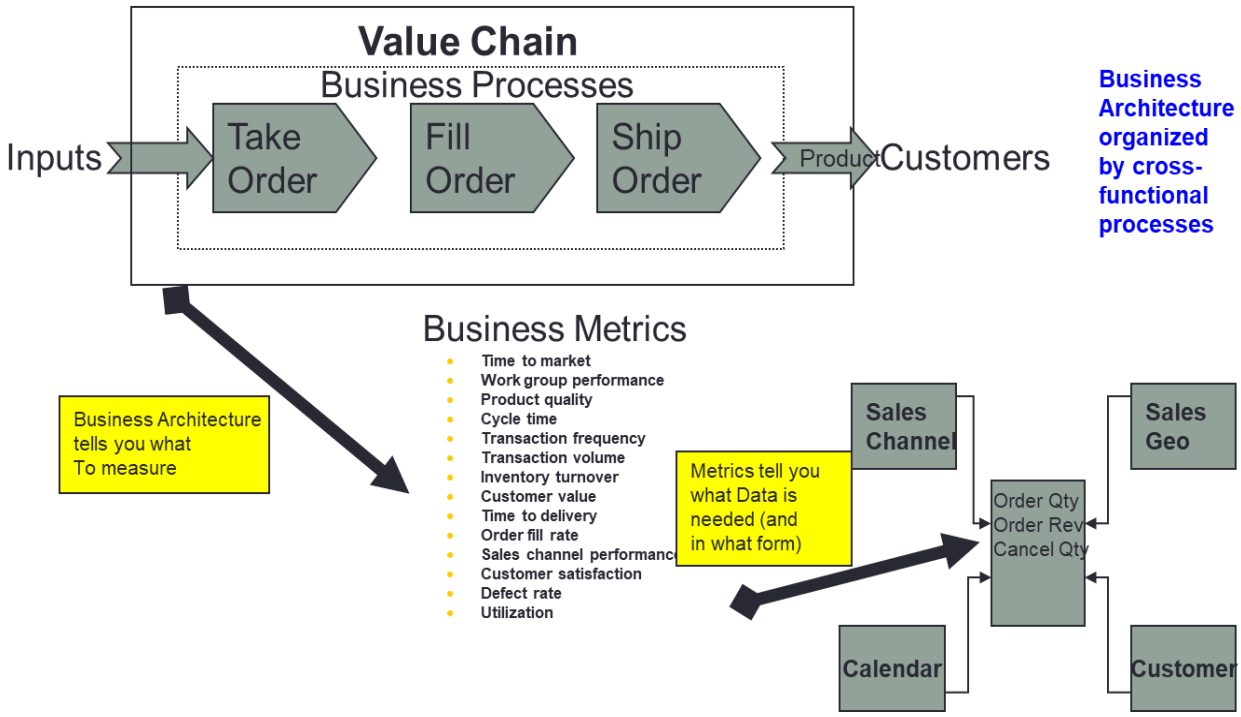


Figure 4.20: Business Architecture and Metrics for Order Fulfillment Represented at Enterprise Level

Use of Process Model Frameworks

Some enterprise process modeling projects start by using one or more process model frameworks to create a *straw enterprise model*. The straw enterprise process model provides a springboard for vetting or changing the model by executive management. Conversely, some enterprise process modeling projects begin with the executive and functional management's perspective and then benchmark the enterprise process model against the process model frameworks.

Process Model Framework Examples

Examples of process model frameworks include:

- Porter's value chain
- SCOR (Supply Chain Operations Reference)
- PCF (Process Classification Framework) from APQC — good for support and management processes
- Industry-specific frameworks such as those in the energy distribution, oil and gas production, telecommunications, and insurance industries

Frameworks Categorize and Group Processes

These frameworks typically categorize processes as primary, support, and management. Each of these categories may be used to group the major processes of the organization. In Porter's value chain, the primary processes are inbound logistics, operations, outbound logistics, marketing and sales, and after-sales service, as shown in Figure 4.21.

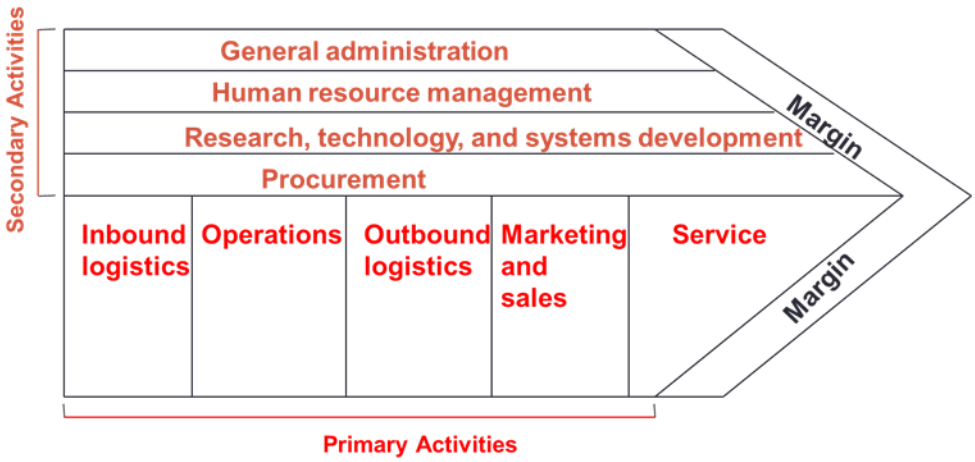


Figure 4.21 Porter's Value Chain

SCOR

The Association of Supply Chain Management (ASCM) is a consortium that markets a reference model called SCOR (Supply Chain Operations Reference). Organizations seeking a means of understanding their internal operations, especially the supply chain, for the purpose of process analysis, comparison with competitors, and assessment of improvements may subscribe to this reference model. It provides standards, common vocabulary metrics, and flexible integration of supply chain modeling projects. SCOR process frameworks have one component that others don't have — metrics. The metrics are cross-industry and can be applied for benchmarking exercises. Figure 4.22 shows a SCOR process framework. Note that prior to 2014, the association was called the Supply Chain Council.

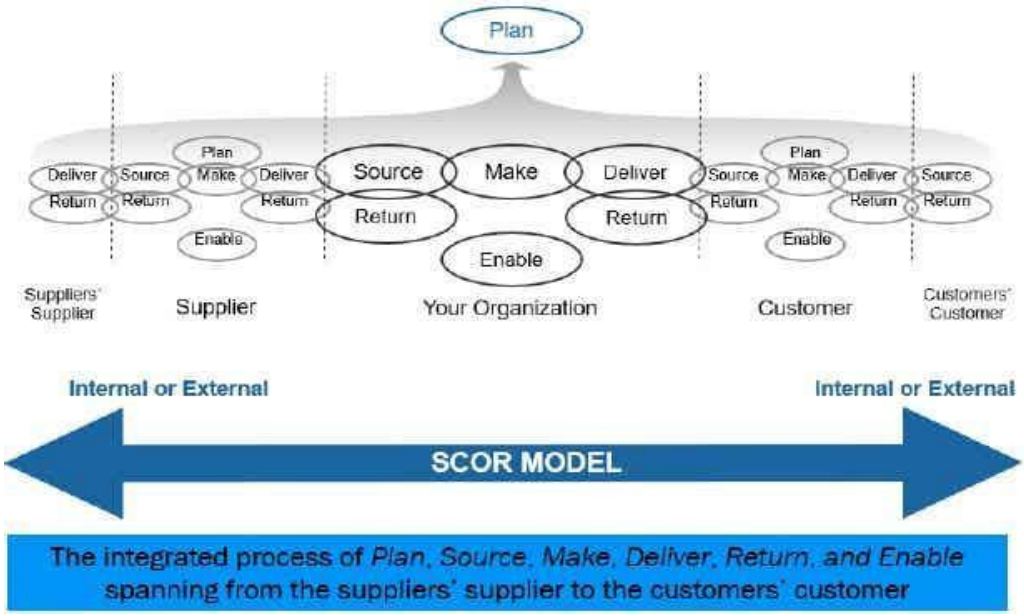


Figure 4.22 SCOR Process Framework 12.0

In PCF, the primary (operations) processes are to develop vision and strategy (1.0), design and develop products and services (2.0), market and sell products and services (3.0), deliver products and services (4.0), and manage customer service (5.0) as shown in Figure 4.23.

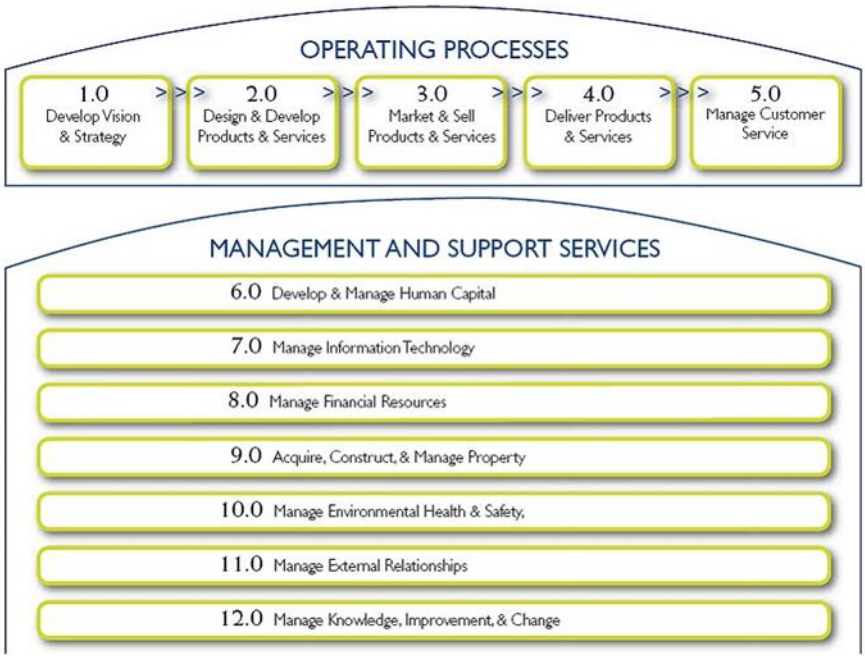


Figure 4.23 PCF (APQC Framework)

If PCF from APQC was a more customer-oriented services model, the primary business processes would be to engage customers, transact business, fulfill customer expectations, and service customers.

4.7 Business Architecture Alignment and Capability Map Development

Business Architecture is the formal documentation of an organization's core processes and their supporting roles and responsibilities. It defines the organization's value chains and how its business processes fit together, are managed, and measured. Business Architecture is used for:

- Aligning process capability to business strategy and goals
- Setting architectural vision based on business strategy
- Establishing guiding principles
- Formal documentation of processes and the supporting roles and responsibilities
- Process measurement for operational performance and benchmarking
- Process integration, alignment, and reuse
- Communication and education
- Enterprise storage and change management of process models

The primary uses for Business Architecture are to:

- Identify primary cross-functional processes aligned and linked to business strategy and goals
- Link those cross-functional processes to process capabilities to set architectural vision and direction based on strategy and goals

- Map process capabilities to either:
    - Available packaged software
    - Business processes and rules and data requirements for software development within the BPMS

Each process level is usually documented as follows:

(1) Business Architecture and Business Architects look at strategy and its impact on the organization. Documentation then moves to level 2.
(2) Process Architects model the current and future business operations. Documentation then moves to level 3.
(3) Process Analysts model the activity and workflow levels (tasks) for software application mapping or software development. Finally, documentation moves to level 4.
(4) Enterprise Architects align the application and IT infrastructure to the Business Architecture changes.

The Business Architecture approach has corresponding data, application, and infrastructure roles and activities that are done concurrently with the Business Architecture activities. Figure 4.24 illustrates the high-level activities of the other Enterprise Architecture disciplines that are performed concurrently during phase 2 of the BPM life cycle.

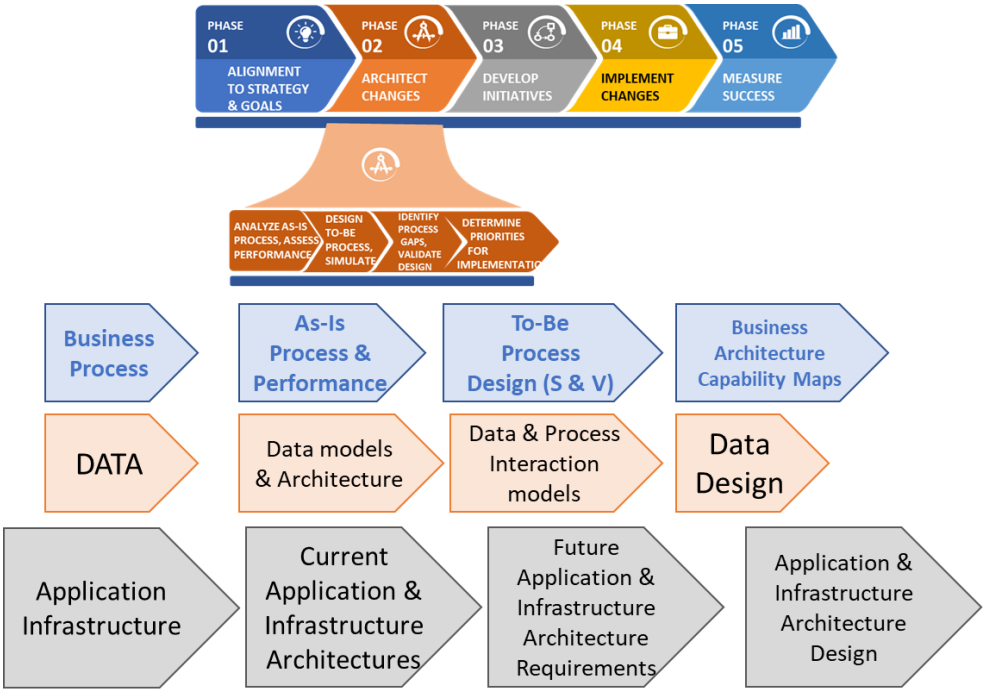


Figure 4.24 Concurrent Activities of Data, Application, and Infrastructure Architecture

The Business Architecture is part of the larger Enterprise Capability Architecture when all of these Enterprise Architecture activities are completed within phase 2, as illustrated in Figure 4.25.

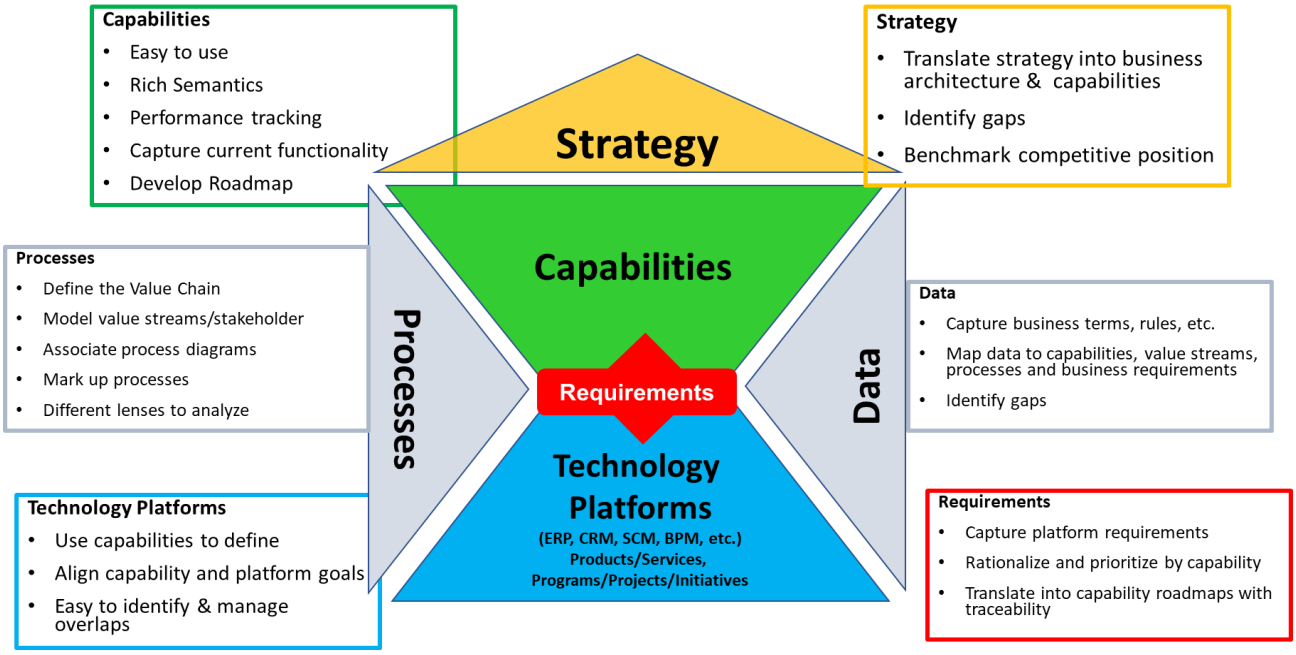


Figure 4.25 Enterprise Capability Architecture

Developing a Business Architecture and a business capability map will be discussed in more detail in *Technology and Transformation*.

4.7.1 Business Process Models

Business process models are the responsibility of a *Process Owner*. A business process model depicts the flow of business activities and how they are carried out to accomplish strategic objectives of an organization.

4.7.1.1 *Business Perspective*

The business perspective shows *what* and *how*. Each business process model has a process owner who is accountable for the process's performance and has the authority to add or remove resources that affect the performance of the process. The business perspective, used by the Process Owner:

- Provides the business context
- Describes the business process
- Defines the scope of the business process for analysis and implementation of changes

The business perspective is captured in business process models.

4.7.1.2 *What Business Process Models Include*

Business process models, built from the business perspective, show:

- **End-to-end primary processes.** Business process models depict the major events, activities, and results for each of the major end-to-end processes, their sub-processes, and their interactions with their environment.

- **Support processes and management processes.** Business process models also describe the support and management processes and how they interact with or support the primary processes.

4.7.2 Workflow Models

Workflow models are the responsibility of an operation's manager. A workflow defines the tasks, information, and documents that are passed from one participant to another for the next action, according to a set of procedural rules.

4.7.2.1 *Operations Perspective*

Operations managers who are responsible for monitoring performance and who look for ways to continuously improve operational performance take an *operations perspective*. Workflow models capture the operations perspective.

4.7.2.2 *What Workflow Models Include*

Workflow models describe *what* must be done, and more importantly, show *how* it is done to successfully complete a process. Workflow models are more detailed than enterprise or business process models — they are at the *third* level of detail in a Business Architecture. Workflow models are mapped down to activities (also called tasks or procedures) that make up the processes. Workflow models include the activities that functions perform and the relationship of the activities to other functions and processes. In this context, *functions* are positions, departments, and systems.

4.7.2.3 *Rolling Up Activities*

At this third level of detail, it is easy to understand the activities that are performed in a functional business unit. By rolling the activities up to the business process level, it is easy to see how all work fits into processes and how the activities play roles in producing the end product of the process.

4.7.2.4 *Details Below the Workflow Model*

The workflow model provides only a basic view of business operation activities. It is often not a sufficient level of detail to resolve problems, reduce costs, or support automation. For these actions, it is necessary to take the workflow level to a greater level of detail — the level of tasks.

4.7.3 Task Steps

The task steps level is where actual business activities take place. Tasks show *how* the work is performed and are made up of steps. Tasks are also called *activities*, *procedures*, and *responsibilities* but will be called *tasks* in this guide. You should map processes to the level of detail needed to automate and support what you are doing and what someone in the next step of the process project needs to do.

4.7.3.1 *What the Task Steps Level Includes*

At the fourth level, the task steps level, the organization and BPMS designers usually have enough detail to tie rules to specific worker or systems actions. The use of data is now at a low enough level of detail to design applications and reports and define edits and low-level decisions. As a BPM Professional, you

may participate in a project where the next phase involves developing software applications. To support software development efforts:

- Confer with software developers to determine information for:
    - Software design (or low-code or no-code development)
    - Software testing
- Consider forward-looking and backward-looking traceability matrices to:
    - Document functional requirements
    - Ensure software is coded and tested to support people who execute the process

Additionally, this level is used to generate BPMS applications that manage work and automate manual *transaction* level data entry and use.

Remember to consider the requirements for any of these follow-on development activities and the detail needed to drive their completion, reached in the models.

4.7.4 Worker Perspective

Those who actually do the work commonly focus on their tasks and the steps that make up the tasks. Task steps identify *how* work gets done.

4.7.4.1 *Task Steps and Work Performed*

This is the level of detail where the analyst can identify the steps that are performed to deliver the output or outcome of a single task. The task steps level includes for each task:

- Task trigger
- Steps
- Criteria of performance
- Principles to follow
- Materials and tools to use (including software)
- Expected results
- Indicators of correct performance
- People who need to be consulted
    - During the task
    - After the task is performed

Example of *Service* Task Steps

An insurance company's policy sales staff needs to enter a new policyholder into the system. The task steps level names the task and lists the steps that the sales staff must perform to enter the new policyholder.

Example of *Manufacturing* Task Steps

Another example at this level in manufacturing is *build-to-order* (BTO). Here a customer places an order with a salesperson. The project process analyst collects the requirements for the customized product. Assuming a build from common parts, the analyst identifies the parts, defines the options, cuts the build order, gets the parts, and then constructs it.

4.8 Capturing Process Information and Modeling Participants

There are several different ways to capture information for process modeling. Consider using one or a combination of these techniques to gather descriptions of a process:

- Direct observation
- One-on-one interviews
- Written feedback
- Structured workshops
- Web conferencing
- Process mining

4.8.1 Direct Observation

Advantages

Direct observation is a good way to document current procedural detail. It may uncover activities and tasks that otherwise might not be recognized, and it can be effective in identifying variations and deviations that occur in day-to-day work.

Constraints

Because it is necessarily limited to a relatively small sample size, direct observation may not capture the range of variations across groups and locations. Direct observation also entails the risk of the performers doing what they think you want to see, rather than what they normally do.

4.8.2 Interviews

Advantages

Interviews can create a sense of ownership and participation in the process of modeling and documenting business processes. This approach requires minimal disruption of participants' time and normal duties.

Constraints

Scheduling and conducting interviews is more time consuming than other methods. It may be difficult to build a cohesive process flow and to map the different views into a single view. This technique generally requires follow-up and sometimes doesn't uncover all of the activities to completely describe the process.

4.8.3 Survey or Written Feedback

Advantages

Written feedback requires minimal time and limited disruption of duties. Generally, data may be collected in this fashion.

Constraints

Written feedback is often prone to the same problems encountered with one-on-one interviews including:

- Requires more time

- Missing information
- Extra time spent reconciling:
- Differences of opinion
- Different descriptions of the same work by different people
- Differences found that require follow up

4.8.4 Structured Workshops

Advantages

Structured workshops are focused, facilitated meetings where enough subject-matter experts and stakeholders are brought together to create the model interactively. They offer advantages of shortening the elapsed calendar time required to develop the models and giving a stronger sense of ownership to the workshop participants than other techniques. Structured workshops can also be led by a facilitator skilled in modeling techniques not commonly known by process participants. Generally, models produced in workshops require less follow-up and generate a commonly agreed-upon description of a process more quickly and with higher quality than other techniques.

Constraints

Due to travel and meeting expenses, workshops may be more costly than other methods.

4.8.5 Web-Based Conferencing

Advantages

Web-based conferencing can deliver many of the same benefits as face-to-face workshops, but they work best with smaller groups. Web-based conferencing can be more convenient and less expensive than face-to-face workshops when the participants are widely distributed.

Constraints

Using web conferencing technology requires facilitators who are skilled in conducting remote meetings effectively. In remote workshops, it can be more difficult to monitor and manage individual participation in the group work.

4.8.6 Process Mining

Definition

Process mining is a process analysis method that aims to discover, monitor, and improve real processes (processes not assumed) by extracting knowledge easily from available event logs in the systems of record for current information of an organization. Process mining is an automated method of process discovery within existing systems that uses iBPMS capabilities to pull event logs to reconstruct the *real* processes. Intelligent BPMS (iBMPS) is covered in the *Technology and Transformation* chapter.

Advantages

Process mining goes beyond the pure presentation of key data of a process, recognizing the contextual relationships of the processes, presenting them in the form of graphic analysis in order to diagnose problems, and suggesting improvements in the quality of the process models. With process mining, it is

possible to detect or diagnose problems based on facts and not on conjecture or intuition. Process mining seeks the confrontation between event data (observed behavior) and process models (hand-made or automatically discovered). Through the pairing of event data and process models, it is possible to check compliance, detect deviations, predict delays, support decision making, and recommend process redesigns.

Constraints
Although process mining is often referred to as a method or technique, it is more of a capability built into iBPMS technology platforms. For organizations not using an iBPMS platform for process management, it is necessary to apply one or more of the other information collection methods.

4.8.7 Modeling Participants

Developing process models involves several roles because of the wide range of uses for process models. Creating a set of models that fully represent the processes requires many people. Roles who may create different process models for their own purposes include:

- Business strategists
- Business managers
- Financial analysts
- Auditors and compliance analysts
- Process performance analysts
- Requirements analysts
- Systems analyst

Models can be created by individuals expressing their personal knowledge or by groups outlining the scope and depth of the organization they are addressing. In a more structured approach, typically there will be a facilitator, a modeler, and several subject matter experts involved.

The subject matter experts may be any of the following:

- Executives expressing high-level business dynamics
- Mid-level managers defining, monitoring, and control mechanisms
- Workers who perform the work being modeled

For re-design efforts, information systems personnel or business analysts who develop the requirements for IT support must collaborate with organizational design personnel who determine roles, responsibilities, and reporting structures, or financial personnel who measure cost and value options.

4.9 Frameworks and Reference Models

A modeling project may require many individual models. These models have value both individually, as stand-alone representations, and as components of the whole project's complex picture. Frameworks and reference models maximize the value and usefulness of the set of models within the context of the whole. There are a number of framework and reference models below.

4.9.1 Modeling Within a Framework

A framework may range from a simple conceptual pyramid to a complex set of modeling products with rules governing what will be represented where. In the pyramid, each level of model summarizes the level beneath it and decomposes the level above. The pyramid may have a simple value chain at the top level that provides an instant overall summary of what the set of models will explain. The lower levels generally introduce key events, performers, operational activities, and more detailed process flow. Sometimes a level is included below the detailed process levels to show data structure and details of system or organizational components.

4.9.1.1 *Complex Modeling Frameworks*

The more complex frameworks may prescribe a standard set of products to depict the details of the processes under study. Very large, complex institutions often adopt IT frameworks intended to apply to all modeling efforts of the enterprise. Examples of these architecture frameworks include:

- Federal Enterprise Architecture Framework (FEAF)
- Ministry of Defense Architecture Framework (MODAF)
- Department of Defense Architecture Framework (DoDAF)
- The Open Group Architectural Framework (TOGAF)

These frameworks serve the dual purposes of helping users address extreme complexity within their environments and of enabling apple-to-apple comparisons among the different agencies within their vast and complex institutions. The last framework listed, TOGAF, is a general-purpose version of a complex framework originally developed by DoD, supported by The Open Group, and still used by DoD in conjunction with DoDAF. Most of these seemingly different frameworks are derivatives of or heavily influenced by the Zachman framework, proposed by John Zachman in 1987.

4.9.1.2 *Framework Management and Compliance*

Use and management of these enterprise frameworks at the agency or organization level is often the role of the Enterprise Architect, but all Business Process Management practitioners should comply with the structure of the framework to avoid gaps and inconsistencies.

4.9.2 Using a Reference Model

Reference models ease analysis of processes. Each of the architecture frameworks provide reference models such as:

- Performance reference model
- Business reference model
- Service component reference model
- Data reference model
- Technical reference model

A reference model provides a common way of viewing some aspect of a process and a common way of describing it for easy analysis and comparison. Reference models are also developed and supported by organizations and consortia such as ASCM. See the earlier section on *SCOR*.

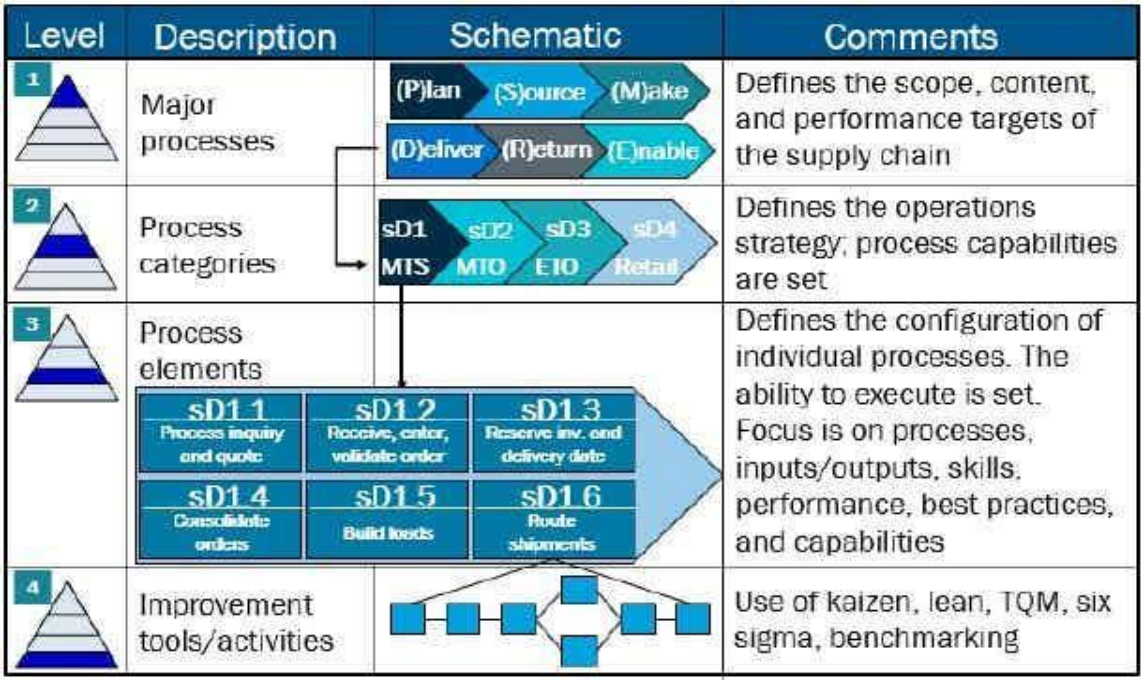


Figure 4.26 SCOR Process Hierarchy (ASCM 2017)

The SCOR model is part of an enterprise portfolio describing the critical elements in a value chain. Including SCOR, the APICS framework portfolio consists of the Product Life Cycle Operations Reference model (PLCOR), Customer Chain Operations Reference model (CCOR), Design Chain Operations Reference model (DCOR), and Managing for Supply Chain Performance (M4SC) shown in Figure 4.27. For more information, go to www.ascm.org.



Figure 4.27 APICS Frameworks and Relationships (ASCM 2017)

4.10 Modeling Techniques and Tools

There are many modeling tools and techniques available, ranging from use of simple whiteboards, butcher paper, or sticky notes to sophisticated and specialized BPM tools that include modeling and data stores for those models and processes. Process analysis can be done effectively and efficiently using any type of tool. The focus of the analysis or design, however, should be on the process itself, and not on the tool.

None of these techniques is necessarily exclusive of the others; all can be employed in a process redesign or improvement project with different groups or in differing circumstances.

4.10.1 Drawing Tools and Reports

During or after interviews and workshops, participants can capture the process flows and notes using inexpensive drawing tools. Microsoft Visio is still the most used process modeling tool, followed by PowerPoint, Excel, and Word.

4.11 Process Validation and Simulation

Process validation is a way to ensure desired outcomes; it uses data from all stages of a process to verify that the process is capable of consistently delivering quality products or services. Process simulation is a type of process validation that can show how a process will behave over time.

4.11.1 Process Simulation Uses

Process simulations are a form of model that provides valuable insight into process dynamics. Simulations require sufficient data to allow the process to be mathematically simulated under various scenarios, loads, or other conditions. Simulation can be used to achieve the following:

- Validate a model by demonstrating that real transaction sets, when run through the model exhibit, produce the same performance characteristics as those in the actual process.
- Predict the process design's performance under differing scenarios (vary the number of transactions over time, the number of workers, and so on).
- Determine which variables have the greatest effect on process performance.
- Compare performance of different process designs under the same sets of circumstances.

4.11.2 Simulation Tools and Environments

Simulations can be manual or, using process simulation tools, electronic. Process laboratories are often used as part of a process improvement, redesign, or reengineering effort. A process laboratory can perform simulations by developing mock transactions that can be manually executed through an end-to-end business process by a small cross-functional team. Simulations can be run against *as-is* processes or designed as *to-be* processes.

Process laboratories often identify exceptions and handoffs while providing important insights into existing and required communication between tasks, functional areas, teams, and systems. Some

organizations require a successful process demonstration in a laboratory setting before piloting or rolling out new processes or changes to process design.

4.11.3 Technical Simulation and Load Analysis

Some process simulation tools include *load analysis* capabilities. Load analysis tests components of a system under particular conditions. For example, simulating peak, average, and valley transaction loads predicts impact on cycle time, resource requirements, and bottlenecks. Simulation generates data sets that allow many different types of process analysis. Some of the typical analyses are resource utilization, distribution analysis, cycle time analysis, and cost analysis.

Some process simulation tools can also present animations of the simulations. Animations may be helpful in visually identifying phenomena during performance that may not be readily apparent in typical analysis of simulation data sets.

4.12 Business Process Modeling Key Concepts

The following table shows key concepts for business process modeling.

Business Process Modeling Key Concepts
Process models
• Are simplified representations of some business activity. • Serve as a means to communicate different aspects of a business process. • Are used to document, visualize, analyze, or design a business process. • Useful to document communication, training, and alignment; design and requirements; or to analyze aspects of the process. • Often express the *as-is* state of the model and one or more proposals for change, culminating in a *to-be* model and change management strategy. • May require validation by simulation.
Perspectives
• Different levels or *perspectives* of business processes are expressed by models showing different scopes and levels of detail for different audiences and purposes. • Models may display different perspectives: enterprise, business, and operations (workflow). • Each perspective has specific types of models and composition levels best suited it.
Notations
• Many styles of process modeling notations and ways to develop process models exist. • Notation selected should match project needs — task at hand and needs of project's next phase. • Some notations are more versatile and apply to a broad range of process modeling needs. • Sometimes, combinations of notations match project requirements better than a single tool.
Frameworks
• If the project must comply with a specific framework, identify framework requirements early on. • Reference models are available to help guide the development of models in some fields.

Capturing process information

- When approaching a modeling challenge, team may choose to model from top-down, bottom-up, or from the middle, depending on preference and project requirements.
- Information capture techniques vary widely among projects; can include any combination of observation, interview, survey, and formal workshop; can be in-person or online.
- Modeling project participants include strategist, managers, subject matter experts, and different types and numbers of analysts. Process implementation often requires skills of change management professionals.

5 Process Analysis

The first step in defining a new process or updating an existing one is to create a common understanding of the current state of the process and how the process achieves the stated business objectives. This common understanding is gained through *process analysis*.

In this section we will discuss the topic of process analysis, starting with why a process must be analyzed and who should be involved in the analysis. Then we will explore the specifics of how to analyze a process, followed by discussions about the techniques, tools, methodologies, and frameworks that can be used. Finally, to ensure a complete understanding of what is necessary for successful process analysis, we will look at suggested practices. Process analysis is the first stage of phase 2 in the BPM life cycle, shown in Figure 5.1.

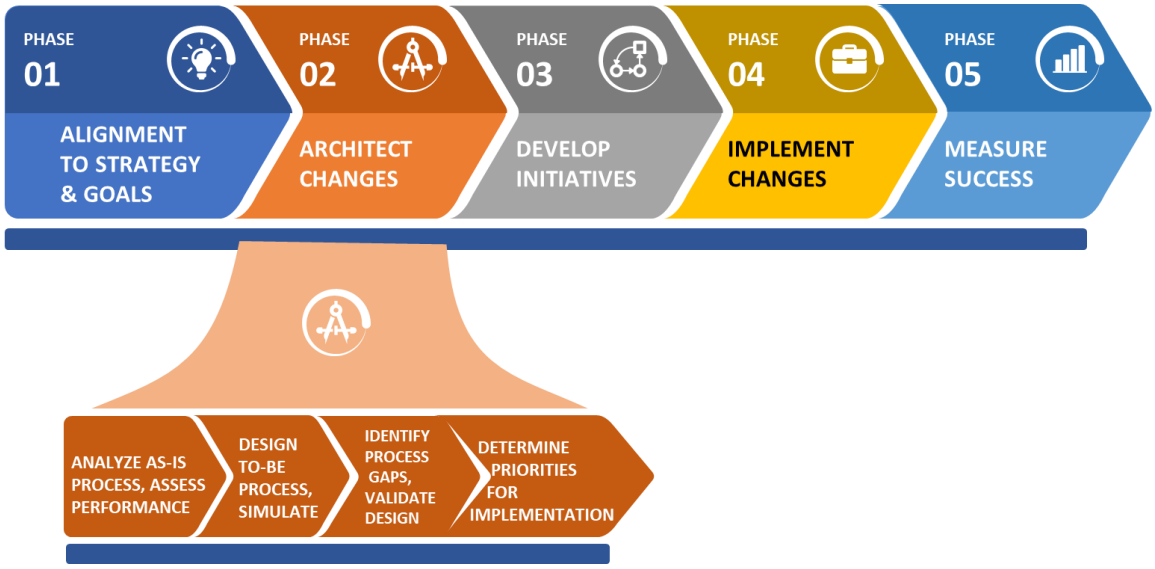


Figure 5.1 Phase 2 of the BPM Life Cycle

5.1 What Is Process Analysis?

Process analysis identifies and examines all process-related activities and measures the operations and effectiveness of those activities in meeting the organization's goals.

A process is a defined set of sequential or parallel activities that achieve a particular, definable, measurable end result. In the context of Business Process Management, a *business process* is defined as an end-to-end set of activities that delivers a product or service.

Whether the assignment is to analyze one process or the processes that connect activities across business units, business partners, or the broader value chain, process analysis can be applied to address current and future improvement opportunities. Opportunities may include:

- More efficient operations
- Avoidance and/or mitigation of risks

- Potential blended operations between two organizations
- Impact analysis of pending federal or state regulations

Process analysis is accomplished using a variety of techniques, such as mapping, interviewing, simulations, and other techniques. The analysis often includes a study of the business environment, the organizational context of the process, factors that contribute to the operating environment, industry characteristics, government and industry regulations, market pressures, and competition.

Key factors to consider include:

- Business strategy
- Objectives of process
- Key challenges in achieving goals
- Contribution of process in overall value chain
- Organization and business roles supporting process

Those who engage in the process should review the results of the analysis to help validate the information used in the analysis and the findings. The results of process analysis lay the foundation for process design, addressed in the *Process Design* chapter.

5.1.1 Why Do Process Analysis?

Process analysis is an essential tool to evaluate how efficiently the organization is working to meet its objectives. It generates the information necessary for the organization to make informed decisions about its business activities. The principal benefit of analyzing the *current state* of the process is a shared understanding of how the work gets done. By creating a foundational assessment based on documented, validated facts and metrics, current-state analysis can help a BPM team redesign processes to better meet the goals of the organization.

In order for the organization to evolve and adapt to change, an ongoing process analysis is required to ensure that business needs are met. Changing government regulations, economic conditions, and marketing strategies can quickly result in processes that no longer result in the outcomes intended by their original design.

A holistic review of the major processes within the scope of business activities begins with a review of organizational strategy. Strategic considerations frame the process objectives and challenges in a broader context. Process analysis goes beyond short-term tactical problems or the wish-list of the business unit. Process analysis addresses fundamental process changes that allow an organization to achieve its goals and strategies.

Process analysis measures the efficiency of a process by quantifying resources used while performing the activities of the process. It measures whether the process is costly, slow, wasteful, or has other deficiencies, revealing the overall performance of the process. An analysis of these measurements helps uncover important facts about how work flows in the organization. The data revealed can then help BPM Professionals design or redesign processes to better meet the goals of the organization.

Information generated from a process analysis includes contextual information such as a:

- Clear statement of the strategy, goals, and objectives of the organization
- Description of the business environment and context of the process (why process exists)
- View of the process within a larger cross-functional process

Once the organizational context of the process is established, the process analyst collects additional information including:

- Inputs and outputs of the process, including internal and external suppliers and consumers
- Roles and handoffs of each business unit in the process
- An evaluation of scalability and resource utilization
- Business rules that control the process
- Performance metrics that can be used to monitor the process
- A summary of opportunities identified to increase quality, efficiency, or capacity

Process analysis allows management to understand how the organization is functioning so they can make informed decisions about how to adapt to a changing environment. Aided by process performance information, management can optimize process structures for attaining business objectives.

5.1.2 When to Perform Analysis

Process analysis can be done in response to signals from continuous monitoring of processes, or it can be triggered by specific events. This section discusses the factors that drive process analysis.

5.1.2.1 *Continuous Monitoring*

Business Process Management (BPM) is a committed part of an overall business strategy, rather than a single activity completed in the context of a single project. Managing the organization by process requires using performance metrics to monitor processes so that they meet the identified goals of the organization. See *Process Performance Measurement* for more information on managing by process. BPM implementations should include the capability to continuously evaluate processes, as they are performed, using real-time monitoring tools. When deviations in performance arise, ongoing or triggered process analysis can reveal the reasons. In response, leaders can make decisions regarding corrective actions or a new analysis towards process change.

5.1.2.2 *Event-Triggered Analysis*

Events are the most frequently occurring triggers of process analysis. The following are just a few of the events that may trigger a process analysis.

Strategic Planning

Most companies regularly review and update their strategic plans. They survey the market and competitive landscape for new opportunities and establish new goals. Many of these goals affect the organization's structure, and therefore the processes supporting organizational goals. Following an update to the strategic plan, processes may need to be realigned to the new strategy and objectives.

Performance Issues

When performance issues emerge, process analysis can help identify the causes of poor process performance. Performance issues may present in various ways, such as unacceptable product quality,

production rates lagging behind demand, deviations from regulatory requirements, or existing sales support processes not keeping pace with new product lines.

New Technologies

Advances in technology can improve process performance or decisions within the workflow that directly affect process performance. BPM Professionals should assess new technology and create a best use blueprint. The blueprint should identify how and where to use the technology and its impact on other processes. For example, Amazon implementing machine learning allows them to tailor product recommendations to customers' buying patterns.

Merger, Acquisition, or Divestiture

Business mergers and acquisitions often result in decisions about integrating common production and service processes. To achieve value from mergers or acquisitions, process analysis is critical. Process analysis helps standardize primary, support, and management processes, which helps to reduce infrastructure costs post-acquisition through better IT application rationalization. The same process and IT standardization exercise allows analysts to identify new business capabilities required by the combined entity. In the case of divestitures, process analysis prior to the divestiture can help ensure that critical processes survive in the spun-off division or business unit.

Regulatory Requirements

Often, regulatory bodies governing businesses will create or change a policy that requires the organization to modify its processes. By performing process analysis to define the impact of these requirements, an organization can ensure that it complies with regulatory changes in a way that manages risk, controls costs, and minimizes disruption. Organizations with a high level of maturity in process management can find opportunities to benefit from regulation changes. They can integrate regulation-driven processes with internal quality controls to achieve more cost savings and more robust compliance than organizations that look at regulatory compliance as a costly add-on.

5.1.3 Process Analysis Roles

Successful process analysis involves a variety of individuals within the organization. Roles are further defined in the *Process Management Roles* section of Chapter 9.

Several key roles necessary to perform process analysis are defined below. One of the first steps in a process analysis is to establish and assign those roles. The individual or group ultimately responsible for how the process performs, whether it is the Process Owner or the executive leadership team, should carefully select those who will lead and manage the process analysis team. It will be the responsibility of these leaders to ensure successful completion of the project, including a comprehensive and accurate representation of the state of the process.

5.1.3.1 *Optimal Team Attributes*

A single individual can perform process analysis, but the best practice is to form a cross-functional team. This cross-functional team will provide a variety of experiences and views of the current state of the process, which results in a better understanding of both the process and the organization. This team should include subject matter experts, stakeholders, functional business leaders, and Process Owners, all committed to the best possible process outcomes. Members should have the authority to make decisions about the process and any needed changes. Such teams have the added benefit of establishing broad ownership and improved acceptance of the coming change.

It is also important to make sure that enough time has been allocated for these resources to contribute properly to the assignment. As in any project, process improvement projects often fail because of a lack of time and priority placed on the project. When the same people responsible for the process improvement project are caught between the competing priorities of their primary responsibility, the process improvement project is usually what will suffer. On the other hand, taking too long for the analysis phase of a complex project is one of the more common pitfalls. Balancing the inventory of processes and sub-processes involved and ensuring the process team will get the proper time commitment from the business units is the responsibility of the project team leader. Sometimes it is necessary for the project team leader to engage the stakeholder who has the authority to establish and enforce the commitments.

The analyst or a member of the process team should have competencies in process management frameworks. Organizations often use outside consultants with expertise in process management to supplement internal knowledge and experience of process management methodologies.

Once the process team is in place, the team lead must communicate the game plan and team-member roles. Each member must understand what is expected and agree to commit the time and effort required to make the project a success.

5.1.3.2 *Analysis Roles and Responsibilities*

Each person on the process analysis team has a role with specific responsibilities. The organizational competencies required to support a BPM program are further defined in the *Process Management Roles* section. The table that follows shows key process analysis team roles.

Role	Responsibility
Analysts or Architects	• Decide the depth and scope of the analysis, how it is analyzed, and then proceed to perform the analysis • Project manage or facilitate to help project advancement • Provide documentation and final reports to the stakeholders and executive leadership
Facilitators (Lead Architects)	• Lead process analysis teams • Facilitate with unbiased view to let the group discover the path through the analytical techniques chosen • Manage group dynamics

Subject Matter Experts	• Provide insight into the business process • Provide insight into both the business and technical infrastructure that supports the process

5.1.4 Preparing to Analyze a Process

Process practitioners who have been involved in the redesign of large-scale processes know that drilling down inside a single process usually doesn't provide a broad enough understanding of the process and its role within the organization. Evaluating the activities and workflow within only a single process may not provide an adequate basis for improving the process. One needs to consider how a change to a single process affects other related processes in the end-to-end process. For example, a new order entry system implemented for customer entry may initiate a transaction yet returns are reconciled from another system. This process may perform well from a customer perspective and yet fail because it does not provide adequate information from a financial perspective.

To determine the scope of the project and the tools to be used, the analyst should consider the full context of the process activities and the value provided along with the established dependencies. The following subsections will explore these factors.

5.1.5 Prioritize the Process

Although the processes to be analyzed often have already been determined in the context of an enterprise BPM engagement, there may be instances of competing priorities across the processes that need to be analyzed. For this reason, large-scale or cross-functional analysis should include governance that establishes criteria for prioritizing and ordering the processes to be analyzed. For example, an organization may identify the following criteria for high-impact processes:

- Customer-facing processes
- High impact on revenue
- Aligned to other processes that are high value to the organization
- Critical to coordinate with cross-functional impact

Another prioritization method involves creating a two by two matrix as shown in Figure 5.2.

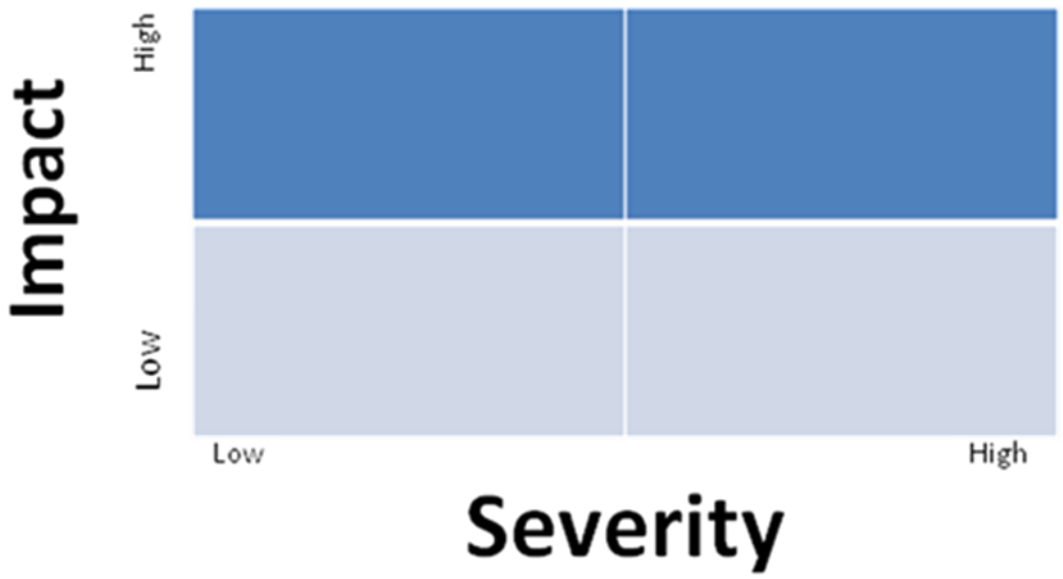


Figure 5.2 Two by Two Matrix for Prioritizing Processes

Each process is listed somewhere within the matrix based on its severity and impact on the organization. Those processes that scored a high in both impact and severity are the processes that need the most attention first.

Scoring metrics can be used to assign point values for these factors, and prioritization can be recommended based on the processes with the highest scores.

Whatever method is chosen to rank them, the processes chosen should directly meet the goals of the organization and have a positive impact on the critical business result.

5.1.6 Scope the Depth of the Analysis

Scoping the depth of the processes included in the analysis is one of the first actions of the process team. The depth of the analysis is the beginning and end of the analysis. Scoping is critical to decide how far the project will reach, how much of the organization it will involve, and the impact any changes will have upstream and downstream of the processes analyzed.

For example, to analyze an HR recruiting process, the scope of the analysis may include the activities from applicant screening through the candidate selection process. A second possibility would be to analyze the activities from applicant screening all the way through the employee onboarding process. This latter scope would extend beyond the traditional HR recruiting processes to include new hire orientation, employee benefits enrollment, and provisioning processes. Scope selection should consider the objectives and desired outcomes of the analysis. If the objective were related to systems supporting the end-to-end process, the full scope would be essential. If only the applicant screening process is to be analyzed, the impact on related upstream and downstream processes should still be considered even if those processes are not in scope.

Once the scope of the analysis is determined, the analyst should also consider the depth of the effort. What activity level will be adequate? What level of detail will be required for the inputs and outputs? It may be necessary to interview a variety of individuals in various business functions before making scope decisions. An important consideration is that the more business functions (such as human resources and finance) and activities included in the analysis project, the more complicated the analysis and the longer it is likely to take. To show iterative, definable progress and manage complexity, the analyst or team may want to break down larger processes and analyze sub-processes.

5.1.7 Using Process Frameworks for Analysis

Frameworks can help identify the process or processes to prioritize and align with the strategy and goals of the organization. Three enterprise-level process frameworks for analyzing processes include VCOR, SCOR, and PCF. VCOR stands for Value Chain Operations Reference model; PCF and SCOR are covered in *Using Reference Models*. Only VCOR and SCOR have standard processes and metrics built into each process element and link level one to level three. The APQC PCF doesn't have standard metrics built into the model (they are industry specific). Metrics are part of APQC's benchmarking practice and are a separate paid offering.

5.1.8 Performing the Analysis

There are several well-recognized and published methodologies for process analysis. Some of these topics are covered in related chapters on *Process Modeling* and Process Measurement. The sections that follow cover common activities of a process analysis. These activities apply whether the process is established or new and should be considered in the context of the process review.

5.1.8.1 *Business Context*

Analysis is a process of discovery in which you find answers to a series of questions about a process and generate data. The goal is to ensure that conclusions are based on facts extrapolated from the data and not on hearsay or generalizations. The following questions can help you understand a process from a business context, its strengths, weaknesses, and results achieved.

Business Context Questions
Why Process Exists
• What is process intended to accomplish? • Why was process created?
Change
• What triggered analysis? • How well does process operate in current business environment? • How well could it be adapted if environment changed? • What are risks to process?   ○ External   ○ Environmental   ○ Internal

- Can process be adapted for risks?
- Can other actions remediate risks?

Technology

- What systems support or enable this process?
- How sustainable are systems?

Strategy and Goals

- Where does process fit in value chain of organization?
- Is process aligned with strategic objectives?
- Does process provide value to organization?
- How critical is process?

5.1.8.2 *Organizational Culture Context*

Every organization has a culture that influences its internal and external processes. That culture includes how work is performed and what motivates members to do the work. By changing the process by which they work, the culture may also change. Cultural changes may lead to unintended consequences as new processes are put into place. Part of the analysis process is to ask questions about culture and those unwritten rules that determine how and by whom work is really accomplished. The goal of these discussions is to understand what will happen to the organization when a process is changed. The following culture-related questions will generate answers that improve the probability of success.

Cultural Context Questions
Leadership
• Which leaders are responsible for successful delivery of process outcomes? • How committed are they to changes? • How confident are they that improvements will be successful? • What are motivating factors for promotion? • Will goals for measuring leadership change?
Quality
• What are motivating factors for quality process outcomes? • How is process execution incorporated in incentives that reward work output? • Has process success been measured on quality outcomes? • Is process excellence defined and well understood throughout organization? • Is process excellence a key competency in the organization's strategy?
Acceptance
• Will individuals voluntarily leave the organization as a result of the process change? • If so, how will this disrupt the process? (Especially important in M&A.) • How will individuals affected by or responsible for process interpret reason for process change? • Are there attitudes, practices, or performance goals that provide incentives against cooperation or change?
Training
• How will change-management training be delivered? • Will goals for measuring success include successful implementation of change? • How will changes affect leadership training in the organization?

5.1.8.3 *Performance Measurement*

Performance issues can be defined as gaps between how a process is currently performing in relation to how it should be performing to meet the organization's objectives. A methodical analysis, often called *root cause analysis*, can identify the nature of the gaps, why they exist, and what changes need to be made to rectify the situation. A key step in the analysis is to identify actionable and auditable metrics that accurately indicate process performance. These metrics provide indicators as to where and how a process should be adjusted. Key questions to ask during a process performance discussion include the following.

Performance Measurement Questions
Current Performance
• Is process meeting performance goals? • What is accepted service level for process? • Are turnaround times lagging behind current acceptable targets?
Future Performance
• What could happen to make it worse? • How would we know if process improved? For instance: ○ If time is measurement of process, can cost be ignored?   ○ If cost is measurement of process, can time be ignored?
Process Monitoring
• How is business process monitoring managed? • What are the key metrics?   ○ How are they measured?   ○ How often are they measured?   ○ How are deviations addressed? • Are performance metrics or dashboards reviewed regularly and in a timely manner, so process is accurately measured and monitored?

Customer Interactions

Understanding how the customer interacts with a process will tell you if the process is a positive factor in the success of the organization's value chain. Generally, the fewer required interactions between a customer and a given service, the more satisfied the customer. A customer interaction discovery should include the following questions.

Customer Interaction Questions
Customers
• Who are our customers? • Why do customers choose to participate in process rather than go elsewhere? • What suggestions do customers have for improving process? • How do we acquire these suggestions?
Interactions
• How many times does a customer interact with process? • How does the customer want to interact with process?

- How coherent is process and use of customer information (from customer's perspective)?
- Are there redundancies in interactions?
- If process supports internal activities, what are the direct or indirect effects on the customer?

Satisfaction

- How do we know if customers are satisfied?
- What are the customer satisfaction metrics?
- Are satisfaction metrics within desired norm?
- What are customer expectations or objectives for process?

Handoffs

Any point in a process where work or information passes from one system, person, or group to another is a *handoff* for that process. Handoffs are vulnerable to process disconnects and should be analyzed closely. Ask the following questions regarding handoff.

Handoff Questions

Delays

- Which handoffs are most likely to delay process?
- Are there any bottlenecks of information or services?
  - Are bottlenecks a result of handoffs happening too quickly?
  - Are bottlenecks creating downstream delays?

Efficiency

- Can any handoffs be eliminated?
- Where do streams of information come together?
- Are timing and sequencing of streams accurate?

Business Rules

Business rules impose constraints and drive decisions that affect the nature and performance of a process. Often, business rules are created without sufficient understanding of why they exist. Alternately, rules are so outdated that they no longer apply, but because of organizational culture, they still are being followed. Following are questions to ask when analyzing the business rules of a process.

Business Rules Questions

Completeness

- Do existing rules comprehensively cover all scenarios and decision drivers that may be encountered during the execution of the process?
- Are there logical gaps, ambiguities, or contradictions in rules governing a process area?

Appropriateness

- Are dependent or interrelated processes governed by consistent (or contradictory) rules?
- Are business rules in alignment with expected output of process?
- Do current business rules cause obstacles by requiring unnecessary approvals, steps, or other constraints that should be eliminated?
- When and why were business rules created?

• How were rules defined?
Change
• What would be the result of eliminating certain rules? • What process is in place for managing changes to business rules?

Capacity

Capacity analysis probes upper and lower limits and determines whether production factors can appropriately scale to meet demands. Following are questions to ask when analyzing the capacity of a process.

Capacity Questions
Scale
• Can process scale upward? • If volumes are increased, at what point will process break down? • How well does process scale downward? • What is cost of process when idle?
Dependencies
• What happens to process when supplies and materials are delayed or unavailable? • When process accelerates or slows, what happens to downstream processes?

Bottlenecks

A bottleneck is a constraint in a process that creates a backlog of work to be done. The following questions may help the team understand the nature of the bottlenecks.

Bottleneck Questions
Constraints
• What is being constrained?   ○ Information   ○ Product   ○ Service • Is bottleneck the result of an internal or external constraint? • Nature of constraint?   ○ Resource availability   ○ Rules   ○ Process dependencies
Contributing Factors
• What factors are contributing to bottleneck?   ○ People factors   ○ Organizational factors   ○ Systems • Does bottleneck occur around handoffs among multiple groups? • Are there unnecessary role specializations or organizational silos? • Can checkpoints that create bottleneck be eliminated?
Streams

- If multiple streams are processing information in parallel, do streams come together at the same time or is one waiting for the other?

5.1.8.4 *Variation*

Although especially true in the manufacturing industry, variation in any mass production industry is not good. Variation inevitably slows down a process and requires more resources to properly scale. If the nature of the organization requires variation as its core business strategy, then look for places where some variation can be reduced, which could save on the overall cycle time of the process. Questions to ask about variation include the following.

Variation Questions
Variation Needs
• How much variation is tolerable for the process? • Is variation necessary or desirable?
Eliminating Variation
• Points where variation is most likely to occur? • Can points be eliminated? • If yes, recommendations for elimination? • Can automation help eliminate variation?

5.1.8.5 *Cost*

Understanding the cost of a process helps the team understand its value to the organization in real dollars. It also helps the team prioritize which processes deserve the most attention. Questions to ask about cost include the following.

Cost Questions
Existing Costs
• What is total process cost? • Can process be broken up into small cost allocations? • Is cost absorbed by the customer directly or is it a cost of business?
Cost Changes
• Is cost in line with industry best practices? • Can cost be reduced through automation or technology improvements? • If reduction is possible, how and by what extent?

5.1.8.6 *Human Involvement*

Processes involve automated activities and/or activities performed by real people. Automated activities generally run consistently, and when they don't it is possible to find and correct the situation that is causing the problem. Activities performed by real people are more complex because they involve judgment and skills that cannot be automated. People do not always do the same task in the same way. The following questions can help guide the discussion around this important human involvement analysis.

Human Involvement Questions
Variability
• How much variability is introduced by the human element? • Is the variability desirable? • Is it tolerable?
Automation
• Can tasks be automated? • Result to the process? • Result to the human element and organization's culture?
Complexity
• How complex are tasks? • What skill sets are required? • How are performers trained for tasks?
Performance and Feedback
• How do performers respond to external events during a task? • How do performers know when a task is done well? • What feedback systems are in place to guide performers? • What can performers do with this feedback — what can they change with this knowledge?
Knowledge
• Do performers know where task lies in process? • Do performers know results of tasks downstream? • Do performers know what happens before the task? • What do performers do with variations in task inputs? • How much knowledge is available to performers to accomplish task? • Is task knowledge it sufficient? • Can performers identify variations before task is completed?

5.1.8.7 *Process Controls*

Process controls are put in place to ensure adherence to legal, regulatory, or financial constraints or obligations. *Process controls* and *control processes* are related, but distinct. Process controls define the control, while control processes define the steps to achieve that control. For example, the requirement to obtain a signature is a process control, while the set of steps to obtain that signature is a control process. Ask the following questions to discover what process controls are in place.

Process Control Questions
Existing Controls
• Are there legal controls or regulatory risks that must be considered in relation to the process? • Who are the regulatory or governing agencies that regulate the process? • Do these agencies need to be informed of the process change? • What are the environmental impacts of the process? • Do environmental impacts need to be controlled?
People and Training
• What competencies and roles already exist to execute and oversee process controls?

- Are process control structures and procedures well documented and understood?
- Is there training and certification support to ensure understanding and execution?
- Do reporting relationships ensure independence of quality or process control functions and execution of control processes?

5.1.8.8 *Other Factors*

The purpose of the topics in the preceding sections is to spark discussion about data gathering questions for process analysis. Other discussion topics not mentioned will naturally arise during process analysis and should equally be explored. Conversely, some of the topics noted may not apply to the process your team is analyzing. The key point to remember is that process analysis must encompass a variety of techniques and topics to achieve a complete and well-rounded understanding of each process.

5.1.9 Gathering Information

The next step in process analysis is for the analyst or team to gather as much relevant information as possible about the process and business environment. The types of information gathered depend on the organization and process being analyzed. Information gathered can include any or all of the following:

- Strategic information about organization, such as long-term strategy, markets, threats, and opportunities
- Performance in comparison to peers or benchmarked to related industries
- Rationale for process analysis and at whose request
- Fit of process in organization
- People who should be involved in the process analysis project

Discovery methods include:

- Interviews with individuals involved in the process
- Performance records or transaction reviews on the process (although this data may or may not substantiate information learned in stakeholder interviews)
- Walkthroughs of the process or observation of actual execution
- Audit reports that identify control points in the organization

5.1.9.1 *Interviewing*

An important method of eliciting information and preparing for process analysis is to interview those who have activities in or are somehow associated with the process. Those interviewed may include Process Owners, internal or external stakeholders (vendors, customers, or partners), those who work the process, and those who pass inputs to, or receive outputs from, the process. These interviews can be in a formal face-to-face setting or can be conducted via phone or e-mail. Typically, the formal face-to-face setting is more productive, as it allows for greater dialog and discussion about what is (or was) actually happening. A group interview performed by a facilitator can also be effective in generating discussion about processes.

5.1.9.2 *Observing*

Another important method of gathering information, and similar to interviewing, is direct observation of the process. Either through reports or system transaction logs, or by observing the human interactions

with the process, directly observing the process will help create an understanding of what the process is actually doing.

Often, analysts find that during an analytical observation of a process, further questions and interviews need to be conducted to fully understand the process. Interviews and fact-finding should take place throughout the analysis, and it is quite appropriate to hold interviews during any part of the analysis process.

5.1.9.3 *Researching*

Begin by researching any documentation or notes about the existing process. This research can include written documentation created when the process was created, transaction or audit logs, process diagrams, and so on. Should this information not be available, the analyst may want to request written descriptions of the process from the key stakeholders and actors in the process.

5.1.10 Analyzing the Business Environment

To fully understand a business process, the analyst must also understand how the organization and the business environment interact. A business environment analysis includes understanding the organization's market and external factors affecting it, the customer demographics and needs, business strategy, the suppliers, and how work transforms to meet the needs of the customers.

As the business environment changes over time, so must the organization's processes. Business analysis informs the analyst of the environmental changes that have taken place since the process was first created and can help explain the reasons for poor performance of a process. Understanding these relationships is important for discerning how processes might need to change.

There are as many methods to analyze the business environment as there are researchers and consultants in the field of business management. This guide covers only Porter's Five Forces, SWOT, critical success factors, and benchmarking, which are common techniques used in analyzing the business environment.

5.1.10.1 *SWOT*

SWOT is a method used to uncover both the strengths and weaknesses in a process. For detailed information about SWOT, see the earlier section on *SWOT Analysis*.

5.1.10.2 *Benchmarking*

Benchmarking is in the Process Analysis section to emphasize that is should be performed after documenting *as-is* or current state business processes. The reasoning is that benchmarking should give you an idea of the current performance, but it will also lay the foundation for what the average performance is, enabling the Process Owner to set the bar for business process performance in the *to-be* or future state.

Benchmarking As-Is:

- Design or define KPIs

- Measure performance against KPIs
- Set improvement goals

Benchmarking for To-Be:

- Performance versus *as-is*
- ROI
- Set adherence to end goal

During the analysis, it is good practice to compare the performance of a process to similar processes in your industry and with competitors. These processes also can be compared to similar processes in different industries to understand if there are higher levels of performance achievable for the same processes. This information can be gained through industry surveys and other industry roundtable or exchange groups.

Another type of benchmarking technique is comparison of the subject organization with its direct competitors — that is, to analyze how processes compare to competitor processes and consider competitive advantages. A SWOT analysis is part of this investigation. Competitive analysis techniques include obtaining information from public sources, industry trade associations, websites, customers, or consulting firm surveys. Essential process characteristics from the organization are then benchmarked against those of competitors.

The final type of benchmarking analysis identifies processes that are similar to the process being analyzed but that exist as best practices in other industries. For example, online retail companies adopt best practices in order processing; as online order-entry for a retail organization is redesigned, an analysis of broader industry best practices can be reviewed for other types of ordering processes. The retail organization is apt to discover new processing ideas since they are researching companies outside their industry. This analysis allows the process designers to escape the *group-think* syndrome that often exists when organizations look only within their own company or industry. This type of analysis can help promote transformational change in an organization.

Understanding and analyzing these benchmarks in relation to the processes being analyzed will help the analysis team understand the performance potential of the process and its weaknesses in achieving that performance.

5.1.10.3 *Critical Success Factors*

Successful BPM efforts typically involve the consideration of a number of factors including organizational, management, process, and technology practices. While the *BPM CBOK Guide* covers many BPM success factors throughout, Figure 5.3 highlights and summarizes some of the more critical success factors for enterprise-wide BPM initiatives.

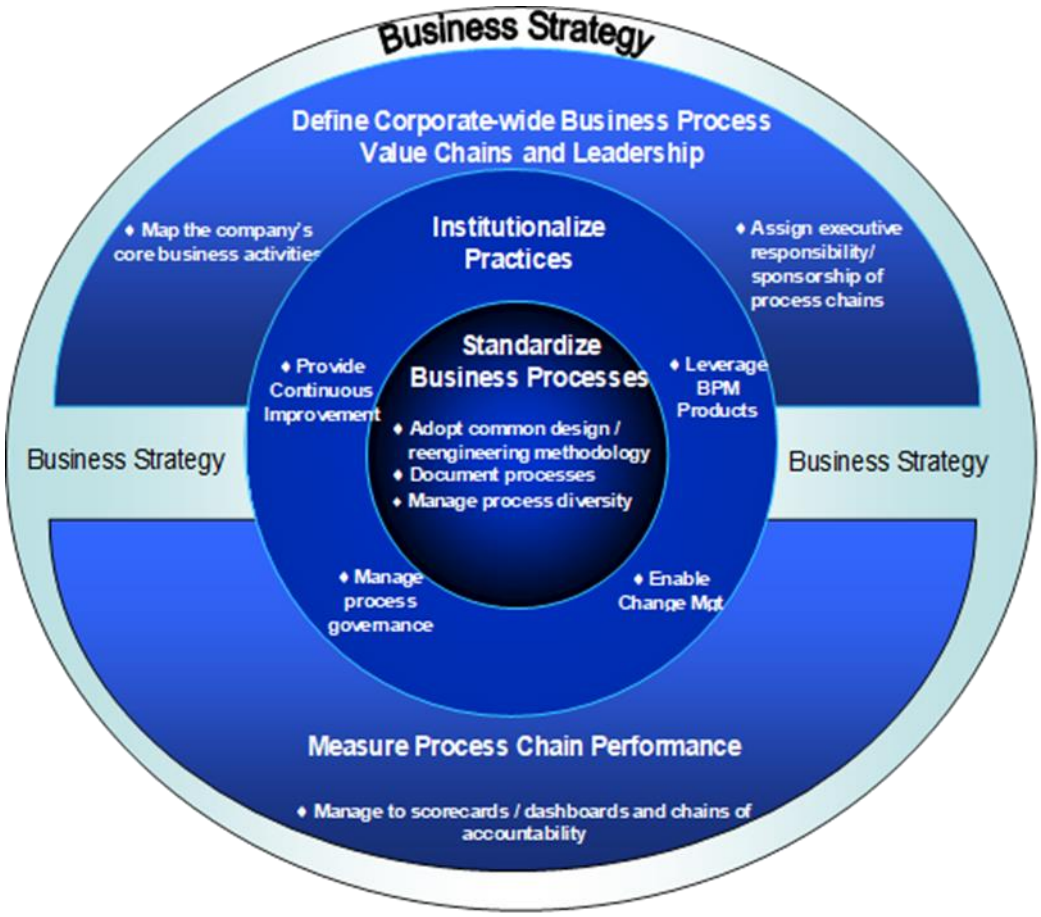


Figure 5.3 Business Process Management Success Factors

5.1.10.4 *Porter's Value Chain Analysis*

Porter's value chain allows process analysts to look at the process from a macro view that includes suppliers, vendors, customers, and so on. This view helps identify weaknesses in the process that might occur upstream or downstream from the actual process itself. For detailed information about Porter's value chain, see the earlier treatment of *Porter's Value Chain Analysis*.

5.1.11 Analyzing Information Systems

Information systems analysis looks at technology and information systems in relation to processes. It is a very straight forward type of analysis to perform, as it requires fewer individuals and is easier to base on fact and not opinion. The sections that follow describe a few common techniques for analyzing information systems.

5.1.11.1 *Data Flow Analysis*

Data flow analysis is a technique for mapping how data flows through a system. The goal of data flow analysis is to understand how points in a process interact with that data through the process. This analysis is usually done during modeling of the analysis and allows a unique view of what happens to the

data during the process. Data on transactions processed through the system will give insight into the volume and complexity of many types of transactions.

Data flow analysis helps the analyst uncover bottlenecks, unneeded queues or batches, and interactions that do not add value. Data flow analysis also helps uncover business rules that should or should not be applied, based on the data. Such business rules might add insight into the routine rules that could be automated and applied as standard transactions, as well as those representing exception processes.

5.1.11.2 *Business Rules*

Business rules were discussed in the *Performance Measurement* section and are covered again in the *Technology* section in greater detail. In the context of information systems analysis, business rules are often built into systems.

Many automated systems explicitly or implicitly incorporate business rules into their configurations or hard-coded algorithms. These rules often are essential to smooth business operations, yet are poorly understood by the people whose work depends on them. This is especially true in organizations that have not achieved disciplined process documentation and change control. In such organizations, institutional knowledge is lost as staff turns over, and the only evidence of these important rules is how they are coded on-system.

The challenge is to work with technical analysts and application support to uncover these often-hidden troves of rules information. The next step is to reverse-engineer the rules from the configurations in close consultation with staff who have functional expertise related to the rules.

5.1.11.3 *Systems Documentation and Suitability for Use*

Systems documentation from a software vendor usually includes data flow diagrams along with the system interfaces. If data flow diagrams are not available, reverse engineering may be the only avenue to data discovery. This method requires identifying systems-dependent processes and then reverse-engineering those processes and rules based on how the system is actually coded, configured, and used.

5.1.11.4 *Process Mining*

Process mining is a method used to discover, monitor, and improve processes by extracting data from event logs of information systems. See the previous section on *Process Mining*.

5.1.12 Analyzing the Process

Analytical methods like cycle time analysis are often used to extract information about a process, such as how long the process takes. The process analysis team should use the type of analysis best suited to the process being analyzed. The sections that follow cover the following types of analysis:

- Cost
- Root cause
- Cycle time
- Sensitivity

This is not an exhaustive list, but it does contain the more common techniques. The analyst or analysis team will rarely use more than a few of these for any one initiative. It is the job of the team to determine which are applicable to achieve the desired objective.

Process models are often used to show processes and the interactions among them. Chapter 3, *Process Analysis*, is devoted to techniques used to create process models.

5.1.12.1 *Cost Analysis*

Also known as activity-based costing, *cost analysis* is a simple list of the cost per activity, totaled to show the cost of the process. Organizations use cost analysis to uncover the true cost associated with a product or service. Cost analysis is often used in conjunction with other types of analysis. The focus of cost analysis is to find the costs and other attributes (for example FTEs and duration) at the activity level, which can be challenging and time consuming.

Analysts use cost analysis to find the dollar amount spent on the process so it can be compared to the dollar value in the new process. The goal of cost analysis is to decrease costs or increase efficiency. If increased efficiency is the goal, cost analysis examines the value of the increase in production compared to the cost.

Activity-based costing can quickly uncover financial bottlenecks in business processes as they interact with a system. For processes that depend on an automated system, the interaction and cost per transaction of the system is critical to understanding the overall process.

5.1.12.2 *Root Cause Analysis*

Root cause analysis (RCA) is a systematic method for identifying origins of problems or events and an approach for responding to them. RCA assumes that effective management requires finding ways to prevent problems rather than *putting out fires* as they develop.

The primary goal of using RCA is to analyze problems or events to identify:

- What happened
- How it happened
- Why it happened
    - To develop actions for preventing reoccurrence

The most common methods used in RCA are shown in the following table.

RCA Method	Description
5-why analysis	A simple problem-solving technique that helps users get to the root of the problem quickly. It was made popular in the 1970s by the Toyota Production System. This strategy involves looking at a problem and asking *why* (what caused this problem). The answer to the first *why* prompts a second *why* (up to five whys) as a way to inspect a problem by layers until the real cause shows.

Failure mode and effects analysis	A systems engineering process that examines failures in products or processes.
Fishbone diagram or Ishikawa diagram	Derived from quality management, fishbone is a systematic way of looking at effects and the causes that create or contribute to those effects. Because of the function, it may be referred to as a cause-and-effect diagram. The design looks much like the skeleton of a fish — hence the fishbone diagram name.
Pareto analysis	Pareto is a statistical technique in decision making used to analyze a select and a limited number of tasks that produce significant overall effect. The premise is that 80% of problems are produced by a few critical causes (20%).

5.1.12.3 *Cycle Time Analysis*

Cycle time analysis is a method for measuring process time. Also known as a duration analysis, it looks at the time each activity takes within the process. Each activity is measured from the time the input begins the activity until the activity creates the desired output, including the time any subsequent activity begins. The total time to complete all activities is the time the process takes to complete.

The goal of cycle time analysis is to reduce process time. It is also very useful to uncover bottlenecks and potential bottlenecks that prevent the process from performing correctly. Nonvalue adding activities that do not contribute to the process output are also revealed. Cycle time analysis is a common tool in Lean and value stream mapping.

5.1.12.4 *Sensitivity Analysis*

Sensitivity analysis is a method to measure the effects of change on a process. Also known as a *what-if* analysis, it tries to determine the outcome of changes to parameters or activities in a process. A sensitivity analysis helps process analysts understand process responsiveness and variability.

Process Responsiveness

Process responsiveness is a measurement of how well a process will handle changes to parameters. Responsiveness includes how quickly the process flows, how much work the process can handle, and where the bottlenecks will occur, given a set of parameters. Process responsiveness looks at what happens when you do one or more of the following:

- Increase inputs
- Decrease inputs
- Increase arrival time of inputs
- Decrease arrival time of inputs

Process Variability

Process variability is a measurement of how output of a process changes when parameters change. A typical goal of performance improvement is to eliminate variability in the outcome. A clear picture of how variability in parameters affects the outcome can help optimize scalability of the process.

The sensitivity analysis is instrumental in understanding the optimal performance and scalability of the process and the effects of any variations in its parameters.

5.1.12.5 *Risk Analysis*

Risk analysis is a method to identify actions and events that may have a negative effect on the organization. Similar to the sensitivity analysis, the risk analysis may include examining the effectiveness of process control points. Examples of these control points include validating customer identity or, for purchases, customer credit ratings. These steps and the business rules surrounding them establish limits before the process can proceed. These activities and business rules must be in place as the process is designed. The risk analysis aims to consider what would happen to the process should any of these scenarios happen, and ultimately what the outcome would be to the organization.

5.1.13 Analyzing Human Interactions

Many processes require some type of direct human involvement to ensure their progression. These are the processes that usually require the most analysis to understand. The following sections cover techniques for analyzing human interactions, including direct observation, apprentice learning, activity simulation, workplace layout analysis, resource allocation analysis, and motivation and rewards analysis.

5.1.13.1 *Direct Observation*

Direct observation is watching people performing the process. Much can be learned by just watching process performers in action. They are the experts and usually find efficient ways to do what they have been asked to do within constraints imposed on them. After observing the basics of what performers are doing, analysts should ask questions about actions that are not understood.

The primary advantage of direct observation is that analysts can see the current process firsthand. However, an analyst's presence can be an influence, causing slightly altered performer behavior. Allow sufficient observation time so performers become comfortable with someone watching them and taking notes. If the act of observation changes behaviors, it can skew the analytical results. Changes in behavior due to observation is called the *Hawthorne effect*. People selected for observation should represent the *typical* performance level for the working group and not (for example) the highest level.

Specific things to learn from direct observation include:

- Does the performer know how the thing he or she does affects the results of the overall process and customer of that process?
- Does the performer know what happens in the overall process, or is he or she simply working within the known procedures of the specific role?
- What criteria does he or she use to know whether, at the end of each performance cycle, the work performed is satisfactory?

People often do both transaction-based work and knowledge-based work. More questions may be needed to uncover and document knowledge-based tasks.

5.1.13.2 *Apprentice Learning*

Doing a task yourself offers a deeper understanding than watching someone do it. When possible and useful, the performer may teach the analyst the job, which can yield additional detail about the process. Teaching forces people to think about aspects of a process they might otherwise do subconsciously.

Apprentice learning is usually performed on repetitive tasks such as order fulfillment. By performing the steps in a task, the analyst gains a greater appreciation for the physical aspects of the activity and can better assess the details of the operation.

During the apprentice learning period, it is useful to have a second analyst observe the learning process and the initial actions of the apprentice.

5.1.13.3 *Activity Simulation*

One method of analyzing human performance is to simulate the activities involved in a process. The activity walk-through can be accomplished in a variety of ways including individual walk-through, group walk-through, and video of walk-through.

Individual walk-through. An individual analyst carefully steps through each activity, observing its inputs, outputs, and the business rules that govern its behavior.

Group walk-through. A group of process participants sits in a conference room, each taking the role of a process participant, and talking through the process. At each activity, the person representing the performer discusses in detail what is done, how actions are governed, what will be produced, and how long it will take. Handoffs from one performer to the next can be observed to ensure all needed inputs are available for the next activity and from what source. Have the process model available, in a format that all can see, so those who are not directly involved in an activity can follow the process in the model and note any deviations. The group can then discuss deviations to determine if the model requires correcting or if the work description is incorrect.

Video walk-through. A final variation is to record video of the group walk-through for later analysis and discussion to ensure nothing important has been omitted.

Group and video walk-throughs should use participants in the real process, who are the real experts and offer the best advice and means for improvement.

5.1.13.4 *Workplace Layout Analysis*

A workplace layout analysis is mostly a physical analysis of a workplace, assembly line, or manufacturing floor space. The activities used to analyze workflow and the movement of materials and resources as the work is completed are further detailed in the concepts of Lean. The focus on reducing extra motion, waiting time, and transportation steps can add value as the work is redesigned. Workplace layout analysis can uncover unnecessary motion for material-related bottlenecks, disconnections, and duplicated efforts as work items are transferred from one physical location to another.

This analysis can also be useful for any process that involves a physical space where activities are performed and handed off between individuals, groups, or workstations.

5.1.13.5 *Resource Allocation Analysis*

Resource allocation analysis is a method for examining how assets of an organization are used in a process. This analysis focuses on the resources required to complete the process. It takes into account

skills of the people and abilities of tools or other automated systems in meeting the needs that a process demands. It generally seeks to determine why, from the following perspectives, an activity takes a given amount of time:

- **Capabilities of the resource.** This analysis considers what the resource is capable of accomplishing and asks whether the skills and training are sufficient to perform the activity adequately. Comparisons can be made to similar resources doing similar tasks to validate whether the resource in question will accomplish what could be accomplished in the same amount of time.
- **Quantity of resources.** This analysis examines whether the resource is constrained. For resources engaged, such as a piece of equipment, the analysis examines the specifications of the equipment to ensure that it is being used within the tolerances given by the manufacturer. For human resources, the analyst examines whether the resources are fully engaged and mastering the key elements of the job, or are underutilized, in some way becoming a bottleneck.

Often, companies working through a process improvement initiative undergo a resource allocation analysis only to discover it is not the processes that are inefficient, but the resources as currently utilized. By performing this type of analysis, the analyst can often uncover several bottlenecks that can be improved or eliminated with little cost or change in infrastructure. If the bottlenecks are related to staffing or organizational structure, changes will depend on the organization's ability to manage human resource issues.

5.1.13.6 *Motivation and Reward Analysis*

One commonly overlooked analytical component is the examination of human motivational and reward systems in place for the process. The reward system could include promotional opportunities for mastering additional skill sets and competencies, bonuses, emotional satisfaction, and so on. Reviewing motivations and rewards as part of a process analysis will help uncover unseen disconnects and bottlenecks in the process.

Further, the motivation and reward analysis should also consider what rewards should be in place to positively affect any new process or activity that is introduced.

5.1.14 Document the Analysis

The final step in an analysis is the generation of reports and other documentation regarding the findings. The documentation of the analysis serves several purposes. It acts as a formal agreement among those who participated as to the accuracy of the analysis. Next, it is the basis for presenting the results of the analysis to management.

This documentation could include any of the following items, as appropriate for the process that was analyzed:

- Overview of current business environment
- Purpose of process (why it exists)
- Process model
    - What it does
    - How it is done
    - Inputs to process

    - Outputs from process
- Gaps in process performance
- Reasons and causes for gaps in process performance
- Redundancies in process that could be eliminated
- Expected savings from elimination of redundancies
- Recommended solutions
- Other considerations

The documentation should clearly present the current state and include deliverables that provide the information necessary to consider process change. Many of the more sophisticated Business Process Management tools now available can function as a repository for much of this process documentation.

5.1.15 Assess Business Process Maturity

Process maturity refers to how close a process is to being complete. For a process to be mature, it has to be complete in its usefulness, automated, reliable in information, and continuously improving. A *maturity curve* is a visualization of where a process falls in this measurement. Understanding and tracking the relative placement of the organization's business processes on a process maturity curve is important for three reasons. The first is it tells you where on the curve processes are assessed, which helps determine the magnitude (and difficulty) of business change and the recommended process approach for the process design phase. The second reason is that it helps determine the degree of process ownership, process governance, and the skills that will be needed to manage the process performance on an ongoing basis. Third, progression up the maturity model helps guide the organization to the available technology platforms for intelligent automation and control of business processes. Many organizations fall between level 1 and level 3, depending on whether or not they have documented their major cross-functional processes and are actively managing process performance.

Figure 5.4 shows a very simple maturity model to facilitate understanding of the various approaches to Business Process Management and technology platforms aligned to the degree of process maturity.

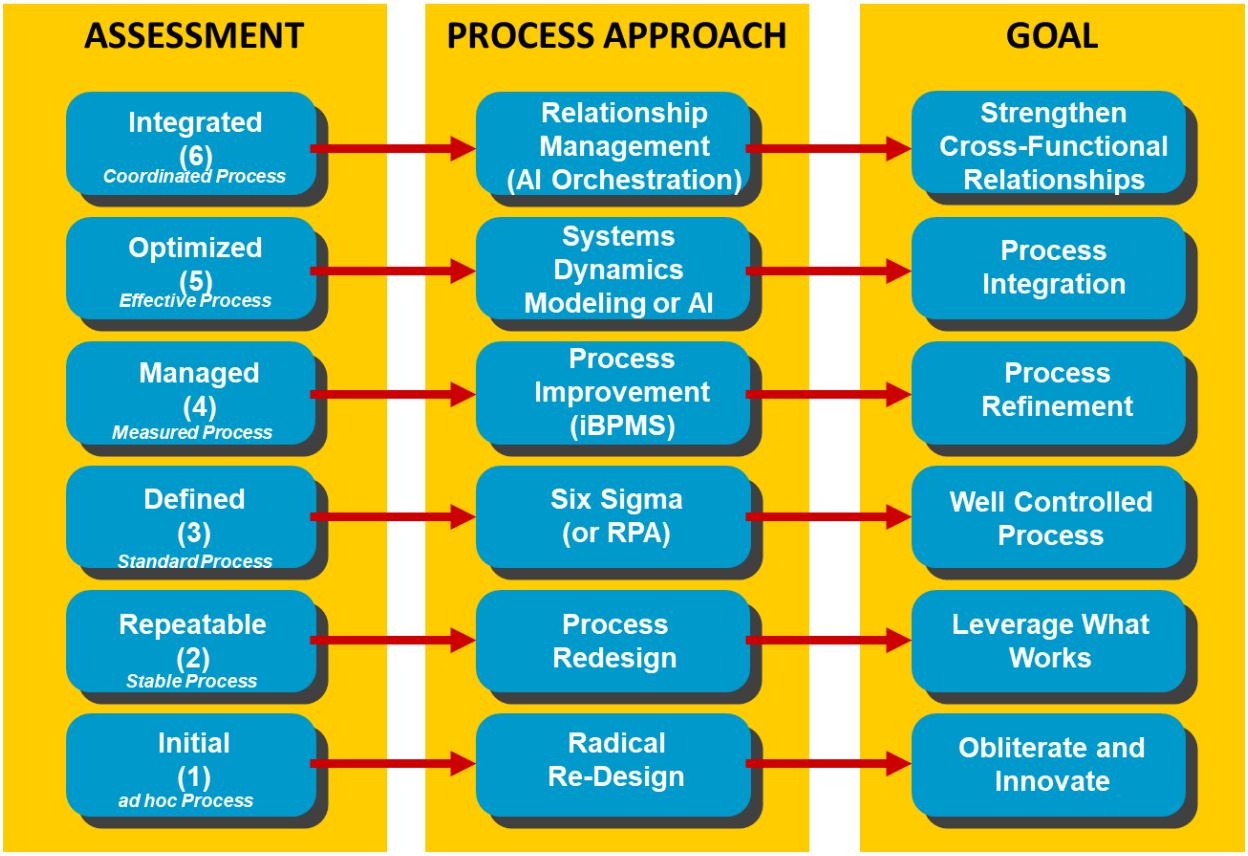


Figure 5.4 Process Maturity Curve
Adapted from Brett Champlin (earlier model)

5.1.16 Process Analysis Considerations

The following section outlines several of the critical success factors, suggested practices, and pitfalls to avoid during a process analysis.

5.1.16.1 *Executive Leadership*

One of the most important factors to ensure success during any stage in a process improvement project is the support and direct encouragement of the executive leadership team. Ideally, executive leadership should be the primary sponsor behind the process improvement project. At the very least, the executive leadership team must commit to providing full support to the process redesign or improvement project.

To convince the leadership team of a process improvement project's benefits, it may be necessary to demonstrate gains through a few small projects. Once these small gains have been proven and sustained over time, it is easier to obtain support for larger process improvement projects and, eventually, managing the entire business through process management.

5.1.16.2 *Organizational Process Management Maturity*

If the process analysis is part of a broader review of all processes within the organization, it is important to understand the *organizational maturity* in relation to the Business Process Management Maturity

scale detailed in the *Enterprise Process Management* chapter. Understanding the maturity of the organization in process management will help define the level of business change and the appropriate process ownership and process governance in preparation for broader organizational process transformation.

Figure 5.5 shows a five-level organizational process maturity model. Using common factors such as process alignment, process automation, and integration with other processes, ratings can be assigned to develop a rating for each process. Once these ratings are known across a broader business function, the model can serve as the guide for future transformation planning.

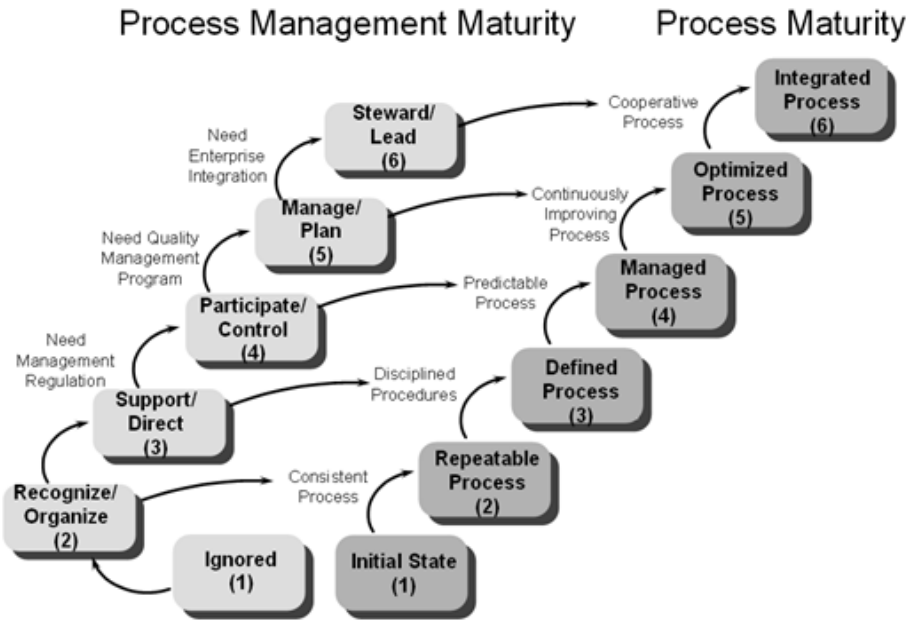


Figure 5.5 Process Management Maturity and Process Maturity Levels

(Champlin 2001) adapted from Parker (1995)

Process maturity is an essential input for a change initiative roadmap that includes investments in major technology platforms and for strategic planning updates. Organizational process management maturity considerations will also factor into opportunities for innovation and future business and digital transformation investment initiatives.

5.1.16.3 *Avoid Designing Solutions During Analysis*

Although mentioned previously in this document, it deserves repeating. Often during the analysis process, solutions to process problems will arise. Members of the process team will want to explore

these solutions and sometimes begin work immediately on designing a solution. This practice is analogous to beginning construction on a building with only part of the blueprint.

At the same time, it is important not to discourage suggestions for solving process problems that are uncovered during the analysis. One practice is to create a *parking lot* of suggestions based on the items discovered. When it is time to design the new process, address those items on the parking lot list as part of the larger, true process design.

5.1.16.4 *Paralysis from Analysis*

Experience has shown that it is possible to do too much analysis. Some members of the analysis team will want to document each trifling detail about each activity that happens in a process. Such detail can quickly become tedious, and the process improvement team can lose interest. Keep in mind, these details will have to be updated as processes change. It is critical to include just enough details to decide how they affect a process. Process analysis participants and management may become impatient with lack of progress. If analysis is prolonged, members may not be available for the remainder of the project due to other commitments.

In order to be effective, the analysis should be quick and progress readily visible to all. Members of the team, as well as the leadership team supporting the project, should see the progress. It is also critical to ensure that the scope of analysis is small enough to be manageable. A good consultant or facilitator can help move the team forward. If progress is slow, consider hiring a process consultant.

5.1.16.5 *Proper Time and Resource Allocation*

Often, resources assigned to improvement projects have other mission-critical responsibilities within the organization. Although it is wise to get the most knowledgeable individuals on the process analysis team, these individuals may not be able to dedicate themselves sufficiently to keep the project moving forward.

Fortunately, company leaders are often aware of this problem and decide to retain consultants or contractors to assist in the process improvement so the management team can continue running the organization. However, while consultants can help in the execution of the process improvement project itself, consultants are not a good substitute for those who actually own or execute the processes themselves. Advice: work with management to gain access to critical practitioners and to mitigate any effects on their work. It is crucial that those who are assigning the resources allow those resources appropriate time away from daily responsibilities to complete the project.

5.1.16.6 *Customer Focus*

One of the biggest factors leading to a successful analysis is factoring the customer into the process. Even if a process appears to work within the organization, it may not work for the customer. Inevitably, if the customer needs are neglected in the process, customer satisfaction will be sacrificed, and the process will not lead to the increased performance expected.

There is a growing trend toward considering inter-departmental relationships as service-oriented relationships. The same customer service-oriented interactions should take place within departments of

the organization as in the interactions with customers. However, it is important to realize that transactions between departments are not customer transactions unless the departments are separate business units that also serve customers external to the organization in the same way. Processes between departments should still be examined, with the focus of improvements on how they will indirectly affect the *true customer*.

This customer focus concept can be difficult to understand when, for example, the organization is trying to improve an internal function such as payroll processing. When considering how payroll processing affects the customer, the analyst focuses on how reduction of overhead expenses can be used to lower costs for the customer. This analysis result illustrates the relationship between everything in the organization's operations and direct or indirect effects on the customer.

5.1.16.7 *Understanding Organizational Culture*

As stated previously in this chapter, understanding the culture of an organization is critical to the success of the analysis and ultimately to the design and implementation of the new process. Following are two of the key elements that should be addressed when considering the culture of the organization. Consideration of these topics during the analysis stage will help ensure that the analysis presented not only represents the true organization, but that it is accepted by the organization.

Fact-Based Analysis

If any change to a new process is to be successful, it is vital that the analysis avoids directing any blame for problems that exist in processes toward any individual or group. Stating facts without placing blame is critical. By eliminating blame and simply stating the facts, the analysis is more likely to be accepted as a correct understanding of the current state of the process.

Potential Resistance

Process analysis could be considered by members of a business unit as a potential disruption, carrying unknown elements of change. The Process Owner may also view the analysis as a criticism about the way the process has been managed. Business units and Process Owners may therefore avoid opportunities to participate in the analysis. In instances such as these, it is vital for the leadership team to negotiate the situation, communicate the need for the analysis, and support the outcomes as an essential element of keeping the organization competitive within the industry. Involving the Process Owner in the analysis process is a key factor in overcoming this issue.

5.1.17 Conclusion

Process analysis should create a common understanding of the current and/or future state of the process to show its alignment with the business environment. A professional analyst or a team of individuals perform the analysis. Using several different techniques, frameworks, methodologies, and suggested practices, the analysis team documents the business environment and creates models and other documentation. The documents illustrate the workflow of process activities and their relationship to the environment in which the process operates. The team then uses this information to identify opportunities for process improvement or redesign.

Process analysis is a commitment that allows organizations to continuously improve their processes by monitoring process performance and thereby improving the performance of the organization.

5.1.18 Process Analysis Key Concepts

The following table shows key concepts for business process analysis.

Process Analysis Key Concepts
Process analysis serves to create a common understanding of the current state of a process and whether it is meeting the goals of the organization within the current business environment. Process analysis can occur at any time the organization considers it necessary, but the organization should have a goal to continuously monitor processes as opposed to waiting for single events to trigger a process analysis. Individuals who assist with process analysis include executive leadership and a cross-functional team of stakeholders, subject matter experts, and process analysis professionals. Process analysis should first focus on high-value or high-impact processes defined as: • Customer-facing processes • High impact on revenue • Aligned to other processes that are high value to organization • Critical to coordinate with cross-functional impact The analysis should find an explanation of the interaction of the process within the organization and find any of the following disconnections: • Performance goals not being reached • Failing customer interactions • Handoffs that create disconnections • Process variations • Bottlenecks Many analysis techniques can be used during the process analysis to obtain the type of information necessary for the process being analyzed. The chosen technique should help the process analyst consider human performance, systems, technology, modeling tools, business environment, and strategy assessments. Process methodologies and frameworks ensure the process analysis follows a commonly accepted path to achieve best results. Process analysis can follow formal analytical methodologies or a pragmatic review of the standards for best practice execution. Critical success factors for a successful process analysis include executive leadership, appropriate metrics and their measures, benchmarks, customer interactions, and cultural considerations.

6 Process Design

Chapter 6 focuses on the second stage of phase 2 in the BPM life cycle: process design. Process design is the creation or retooling of the major cross-functional processes that deliver value to customers. This chapter covers information discovery, process design preparation, key activities in process design, and key success factors for the initiative.

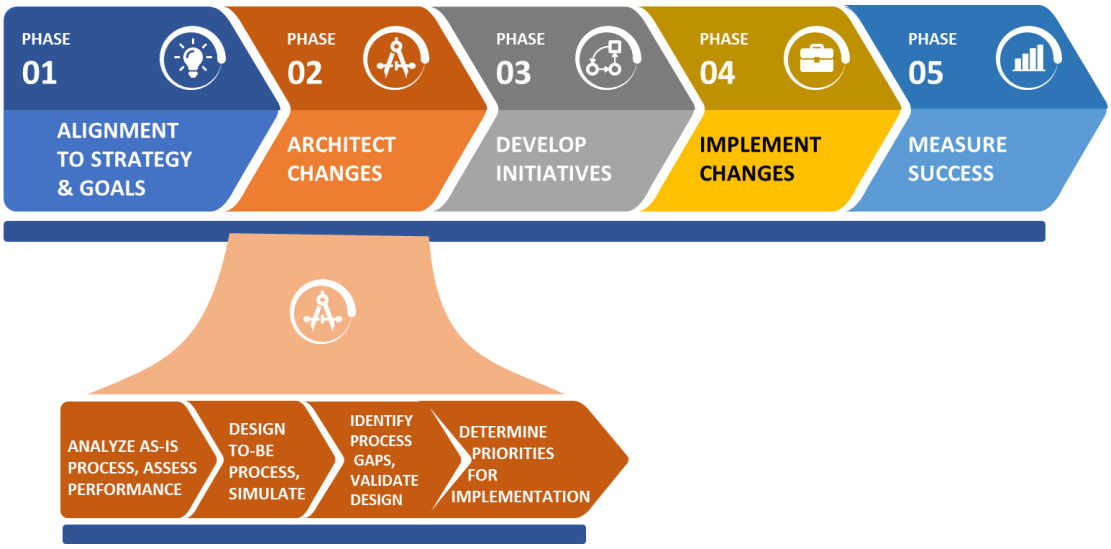


Figure 6.1 Process Design, Second Stage of Phase 2 in BPM Life Cycle

6.1 What Is Process Design?

Process design is the creation of specifications for new and modified business processes within the context of business goals, process performance objectives, workflows, business applications, technology platforms, data resources, financial and operational controls, and integration with other internal and external processes. Both a logical design (what activities are performed) and a physical design (how the activities are performed) are included as deliverables.

> ***Process.*** *A combination of all the activities and support needed to produce and deliver an objective, outcome, product or service — regardless of where the activity is performed. Activities are shown in the context of their relationships with one another to provide a picture of sequence and flow.*

6.1.1 The Value of Process Design

In October 2108, McKinsey published a study, "The Business Value of Design," that covered 300 publicly listed companies over a five year period. There were over two million pieces of financial data collected with over 100,000 design actions recorded. The industries studied were consumer packaged goods, medical technology, and retail banking. McKinsey developed its proprietary *McKinsey Design Index*

(MDI) which rates companies by how strong they are at design and — for the first time — how that links up with the financial performance of each company.

McKinsey found the following key themes of successful companies:

- **Good design is elusive**. Just over fifty percent admitted that they have no objective way to assess or set targets for the output of their design teams.
- **Success has a lot to do with analytical leadership.** Measure and drive design performance with the same rigor as revenues and costs.
- **It's more than a product; it's about user experience**. Make user-centric design everyone's responsibility, not a siloed function.
- **It's cross-functional, not departmental talent**. Break down internal walls between physical, digital, and service design.
- **It's continuous iteration (Agile)**. De-risk development by continually listening, testing, and iterating with end users.

Figures 6.2 and 6.3 show the *revenue growth* and *total return* to shareholders of companies with high MDI scores.

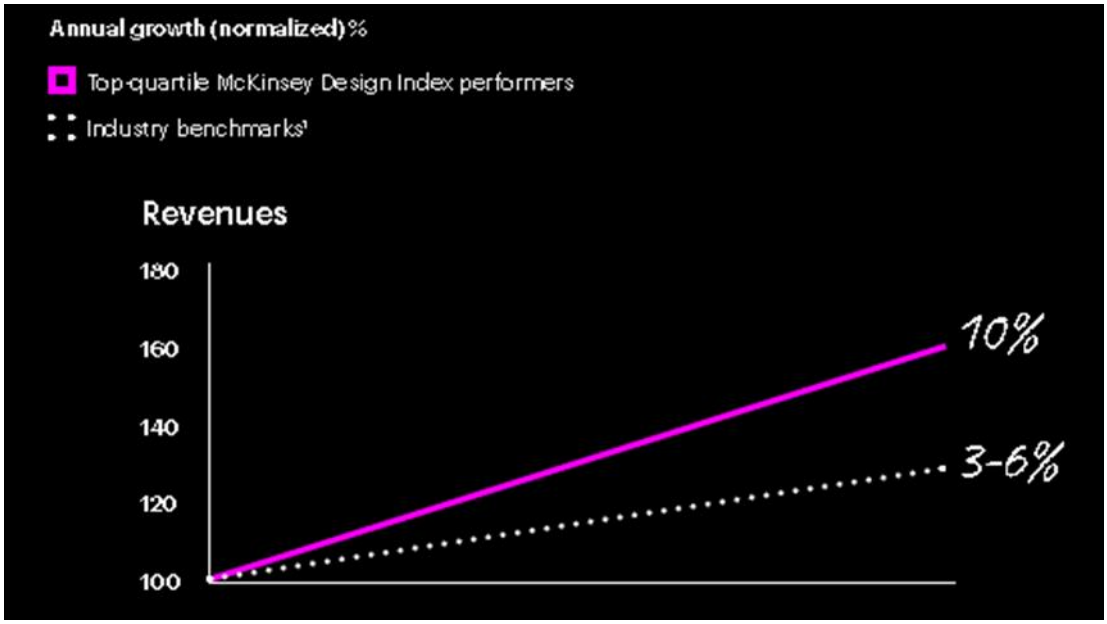


Figure 6.2 Annual Revenue Growth, Companies with High MDI Score

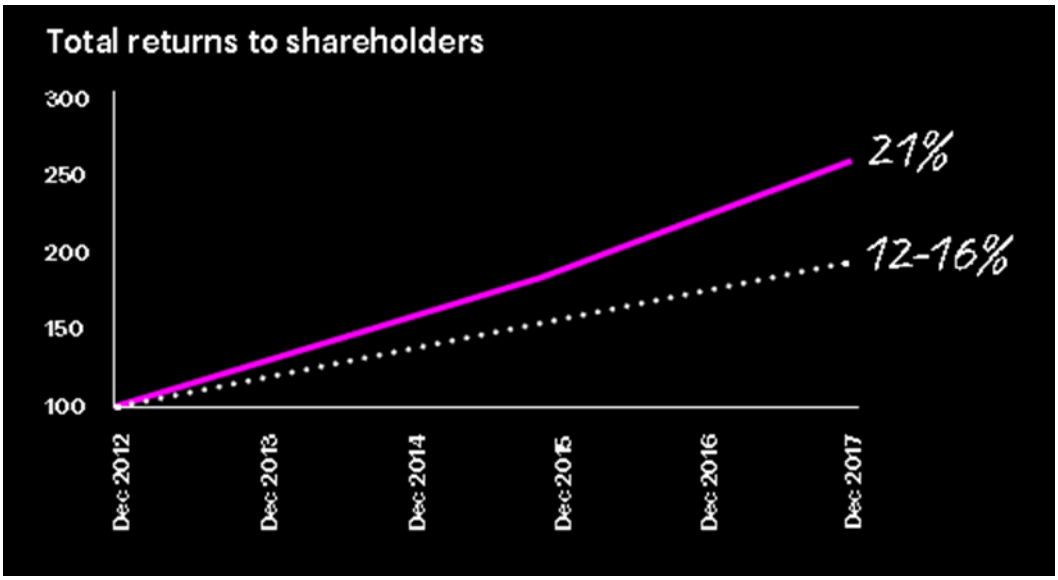


Figure 6.3 Total Returns to Shareholders, Companies with High MDI Score

The most significant finding was that companies with top-quartile MDI scores outperformed industry-benchmark growth by as much as two to one.

6.1.2 Process Design Roles

The following sections present roles that play a critical part in process design. The level of involvement of each role depends on process scope and degree of change. Transformational process changes, those that affect the entire enterprise, must have a top-down approach, involve everyone in the organization, and be led by the executive management team. Departmental or process-specific improvements require more of a bottom-up approach to process improvement and involve only those individuals and groups necessary to effect the change within the scope of that process. An individual may assume more than a single role in the process design initiative. To avoid re-inventing the wheel with a bottom-up approach, the project manager should consult with other departments to determine if a similar business process improvement project has already been completed. If true, any lessons learned and approaches undertaken may be considered for this new project.

Executive Leadership

The role of executive leadership during the design of a process is to ensure that the process designed will correctly meet the needs of the organization. The executive leadership must provide support and agree to the design changes before they are implemented.

Process Design Team

A common practice is to select a cross-functional team that represents stakeholders, participants, subject matter experts, and customers who interact with the process. If a cross-functional team is not created and the design work is left to an individual process designer, it is important that the designer validate the design with stakeholders, participants, and customers.

Subject Matter Experts

When designing a new process or revising a process, it is critical to involve the individuals closest to the process who have the expertise necessary to ensure the process is a success. Individuals from every business function that touches the process should be part of the design team. Since technology is used most often to manage processes and interact with existing systems, the IT organization must also be engaged early in the initiative. IT involvement helps to ensure that new or updated processes (or systems to monitor and control those processes) can be achieved using available technology.

Participants and Stakeholders

A participant is anyone who participates in or has activities that affect the process. These individuals play a critical role in defining the business process by outlining the activities that comprise the new process. For larger organizations, typically one individual represents an entire class of stakeholders. For example, a senior salesperson or sales manager represents the sales force.

Stakeholders also play a critical part in the design process, and they work closely with the Process Owner to ensure their interests in the performance of the new process are sufficiently met.

Customer

Any successful process improvement revolves around customer expectations. Therefore, the customer should be allowed to test the process and comment on its effectiveness. Involving the customer during the design stage increases the chances that process goals and the customer's expectations are properly addressed.

Project Manager

If not managing the process design directly, the Process Owner typically assigns a project manager to supervise the initiative. The project manager is responsible for the schedule and steps used to achieve the stated goals of the initiative. During the design stage, the project manager is responsible for the schedule, project plan, communication plan, managing scope, and mitigating risk.

Facilitator

Facilitators play a key role in process design. This individual (or team of individuals) leads the process design team through developing the future design of processes. Facilitators should be process professionals with knowledge in both the needs of the organization and business processes. Organizations lacking an employee qualified to act as a facilitator can hire a consultant specializing in business processes.

Process Owners

Process Owners are also part of the design team. During design of a process, Process Owners help ensure that the new design meets required objectives while remaining within the assigned budget.

6.1.3 Preparing for Process Design

Before beginning any process design, process professionals review deliverables from the analysis stage. Analysis deliverables should include current state documentation, a clear scope statement for the design, and a list of constraints. Additionally, deliverables should include the methodology and modeling

tools that best fit the organization and process design goals. A modeling tool may have been used in the analysis phase.

During the analysis stage, processes are listed, weighted, and prioritized. This analysis reveals weaknesses of current processes and helps decide which are to be redesigned and in what order. Once these processes are selected, the degree of the change can be assessed to make either incremental or large-scale systemic changes. Sometimes making frequent, small changes can have an equally significant effect on process performance as large, radical changes, provided there is a clear and accepted vision of the future state.

6.1.3.1 *Key Activities and a Roadmap for Design*

With knowledge gained from the analysis, the process design can begin. Although the methodologies to design a new process vary, there are certain key activities that take place during the design stage of process management. The *Designing the New Process* section addresses these key activities:

- Designing the new process
- Defining activities within the new process
- Defining rules that control the activities
- Defining handoffs of process between functional groups
- Defining desired metrics in the new process
- Gap and comparisons to existing analysis
- Creating the physical design
- IT infrastructure analysis and design
- Model simulation, testing, and acceptance
- Creating an implementation plan

Although key activities are listed here in a logical order, they do not always occur in that order, and many of the activities occur simultaneously.

6.1.4 Designing the New Process

There are many ways to design the new process, from using simple whiteboards to sophisticated software modeling tools that allow the storage and retrieval of processes. In addition, many different information-gathering activities (like brainstorming and story creation) can be used to facilitate creation of the model.

A complete discussion of the tools, activities, and methodologies used to model processes is beyond the scope of the *BPM CBOK Guide*. All of the tools or methods used have their various strengths and weaknesses. The correct tool, methodology, and activity to define the process depend on the project goal, the culture of the organization, and the current infrastructure.

The value of process modeling is in the discipline it provides to ensure that the model created matches the expected outcome. It also serves as written documentation of the process and detailed activity descriptions, customer interactions, business rules, and outputs.

In addition, it is critical to involve as many people as possible from the different functions that interact with the process. Employing the breadth of experience and knowledge of those closest to the process

helps ensure that the process truly reflects what the organization can accomplish. Finally, the simplest designs are most often the best designs.

6.1.4.1 *Defining Activities in a New Process*

Activities are a series of tasks performed to execute a process. During an order fulfillment process, for example, the activities would include entering the order, packing the order, shipping the order, and billing for the order. Each one must be performed for the order process to be complete. Often, the tasks depend on one another and so must be completed in sequence.

Options for listing key activities include sophisticated modeling tools, whiteboards, or even sticky notes. Any method the organization chooses is valid as long as the activities can be placed in order and can represent the final process design when completed.

Best practices when listing key activities include: focus on the activities not the actors, and keep the process as simple as possible. The simpler a process, the more likely it will be completed without error. Further, activities that can be completed in parallel with other activities help move a process along faster.

6.1.4.2 *Comparison to Existing Process*

New processes should be compared to the existing state. A comparison analysis allows a gap analysis to be performed, which will show the level and scope of changes. A comparison analysis can show savings that will be realized by implementing the new process. Demonstrating savings helps manage resistance to change. By showing the gap between the old and new process, you further the case for creating an organization that manages by process. The gap analysis also shows savings achievable via process improvements in other areas of the organization.

Process analysis results should show conditions that created variation in process execution and performance. Evaluation of this history may suggest critical factors, for example, event frequency, event workload, or event complexity that, in turn, could offer a set of event-action scenarios that the proposed process must accommodate. These scenarios must be tested to assess the robustness of the proposed design.

Finally, a comparison analysis also allows the process design team to revisit the existing state and ensures that the new design does, in fact, meet the expected goals and resolve the issues discovered in the analysis stage.

6.1.4.3 *Creating a Physical Design*

The list of key activities and order of execution is the *what* of your process design (the logical design). This logical design focuses on the expected business value, relevant performance metrics, appropriate activities and tasks, and linkages to other internal and external business processes.

This physical design describes *how* each activity or task is to be performed — manual or automated means or a combination of each. All resource categories for people, technology, and facilities must be considered. A tentative budget that now includes more detailed development and operating costs is evaluated for financial feasibility. Acceptance by organizational stakeholders also must be considered.

The timeline for installation must be considered in relation to the original expectations for implementation.

The degree of detail to be planned, documented, and evaluated for a physical design depends on the magnitude of the business process change. Small projects may require only a brief but accurate statement for changing existing processes or activities. Larger or more transformational projects require significant detail before moving forward to actual implementation.

> ***Workflow.*** *The aggregation of activity within a single business unit.*
>
> ***Activity.*** *A combination of work from one or more processes. Work is organized around efficiency.*
>
> ***Modeling****. Shows work as a flow that describes each activity's relationship with all the others performed in the business unit.*

To be effective, any process design must consider activity at both the process and workflow levels. The reason is that it is possible to maximize efficiency of a process and seriously impair efficiency at the workflow level. Of course, the reverse is also true, so care must be taken to consider the impact of change at both levels to avoid creating problems.

6.1.4.4 *IT Infrastructure Analysis and Design*

IT groups play a key role throughout the process design stage. As most processes involve a degree of automation in information flow, technology can be the vehicle to enhance process performance. Involving IT professionals in the design stage ensures that the process can be automated and that data can flow seamlessly between systems and activities within the process.

When involving the IT organization, the following concerns should be addressed:

- What software or systems best match the needs of the process?
- Are there limitations in the current infrastructure that limit the design?
- Can the design be implemented quickly?
- How will the design decisions affect the organization?
- Can a staged approach be employed?
- What will the new implementation cost (including training, technology, and so on)?
- Are there vendors that can assist in the implementation?

6.1.4.5 *Creating an Implementation Plan*

Implementation concerns should be addressed at all stages of the process improvement initiative, especially during the design stage. As concerns are discovered, they should be documented and referenced.

Implementation issues that may arise during the design stage include:

- Defining change management techniques that ensure employee support of the new process

- Identifying existing systems that will be affected
- How change to affected systems should be accomplished (incremental shift or immediate change)
- Whether the new process will be piloted or tested

Once the new process has been designed, the concerns can be reviewed using an implementation plan created to appropriately address those concerns.

6.1.4.6 *Model Simulation and Testing*

As a final activity in the design process, the new process should be tested. Testing ensures that the new process will work as intended and that the expected results are achieved. Following are approaches that can be used to test a new process. Options include role playing, practice, or running a simulation of the new design.

Role Playing

In role playing, you send fake inputs through the process to test it and assign relevant process roles to people (not necessarily team members). For example, someone might take the role of a customer while another might play an order taker, and so on. The fake inputs could be orders, contracts, or requests. Try to make them as realistic as possible. Once the roles have been assigned, each person must play his or her *part* when the new process is performed.

Practice Run

In a practice run, the new process has been designed, real inputs are used, and the people who will actually be working in the process participate. The practice run is different from role-playing in that a role player might not actually perform that step when the process is enabled.

Simulation

Simulation involves the use of computer software and hardware. The new process flow and key performance metrics are tested under various scenarios to find bottlenecks and other problems. For additional information about simulation tools and techniques, see *Model Simulation and Testing*.

Advantages

Role-playing, practice, and simulation have multiple advantages.

First, there is no risk. The new process can be debugged without any negative consequences. In fact, it is advantageous to try to break the new design during these test runs. Try to increase the volume that goes through the process or add complexity to the inputs, thereby challenging the process to identify weak spots, bottlenecks, quality, and coordination issues. The problems can be addressed and solved safely without harming customer relationships or creating negative consequences associated with actual process operation.

Second, role-playing, practice, and simulation can demonstrate to people the dependability of the new design. Once you have the role-playing, practice, or simulation operating properly, ask senior management and those resisting the new process to observe it. Encourage questions and comments. When skeptics see the new process working and have their questions and concerns addressed, they often become supporters of the new design.

Piloting the Process

The next option is to test the design in a pilot. During a pilot, the new design is run for real, but the scope of the process is constrained. For instance, you might try the pilot for one customer group, one geographic area, or one product line. The pilot can be constrained by time as well; run the pilot for six months and then evaluate its effectiveness. A pilot is slightly riskier than role playing, practice, or a simulation because it involves real products, customers, and services. Thus, a problem can have negative consequences.

The advantages of a pilot are several. First, risk is constrained. Pilots are closely monitored so if a problem does occur, it can be fixed immediately. Second, the people working in the pilot can become super-trainers as you introduce the process to the rest of the organization. Third, the pilot is another opportunity for skeptics to visit the pilot location and learn from those working the pilot.

Finally, when testing the new design, it is important that all involved in the process from senior management to all participants be allowed to comment on the new process. Open feedback not only provides valuable information as to the effectiveness of the process, but also creates organizational acceptance and enthusiasm for the change.

6.1.5 Process Design Principles

The following process design principles represent the major concepts involved in most process redesign projects. Not every design principle applies to every process. Never abandon common sense when you apply them. As a guideline, the principles should prove to be quite helpful.

6.1.5.1 *Design from the Outside-In Starting with Customer Interactions*

Customer interactions represent a point of contact into the organization and represent opportunities to show the success or failure in meeting the needs of the customer. Every customer interaction is an opportunity to enhance the reputation of the organization. The customer experience is the sum of the quality of each customer contact point.

When considering customer interactions during the design stage of process improvement, it is important to consider all the different opportunities where the customer could contact the organization. It is inefficient to optimize an order fulfillment process without considering the customer support process that facilitates resolving problems with that order. Although the order was processed smoothly, if the wrong item was shipped and the customer becomes frustrated trying to return the item, the outcome of the customer experience is not positive and repeat business is less likely.

The customer experience depends on the primary business processes that directly interact with the customer and the internal support processes that indirectly influence customer experience quality. Support processes also deserve serious attention, but may focus on different issues.

6.1.5.2 *Design Around Value-Adding Activities*

This principle requires a clear understanding of what the customer of the process requires. Transforming information or material to meet customer requirements creates value-adding activities. In addition, any

step the customer is willing to pay for, such as a service, is also value-adding. Study the *as-is* process flowchart and determine exactly where the value-adding activities are performed. Then, extract these activities from the *as-is* process and look for ways to enable the value-adding activities efficiently and effectively.

Do not discuss who will do any particular activity or where it will be performed at this point in the design process. Combining the *what* and *who* of the activities at this stage will distract the team from developing a creative, unique process solution. Your efforts to create an effective process may initiate debate about who should be responsible for the task, but save that discussion for later. After an effective process flow is created, then a discussion can ensue regarding who is responsible for the work required to enable the process.

To create a new process, job descriptions, work location, and task assignment must be flexible. Team members should be aware that the existing configuration of jobs, work location, and organizational structure can be reassessed. Additionally, do not impose constraints thinking. Freedom of thought, outside of existing patterns, allows people to create a dramatically improved process.

Some redesign methods serve to explore non-value-adding activities to eliminate or reduce them. This approach may create acrimonious relationships with people involved in this work. Informing people that their work adds no value to the process may trigger animosity in defense of their positions. To circumvent this situation, look for value-adding activities to optimize instead. Simply by focusing and optimizing value-adding activities, the non-value-adding activities will dissolve and you can avoid potential confrontation that may create resistance to the redesign project.

6.1.5.3 *Minimize Handoffs*

As activities and rules are defined during the process definition, handoffs between functional groups become apparent. A *handoff* in Business Process Management occurs when ownership of an activity or information is passed from one individual to another. For example, when a purchase order is transferred to invoicing, a physical handoff is created as the activity is transferred from one group (shipping) to another (billing).

Handoffs between individuals or functional groups are potential points for a breakdown in the process. As a transaction transfers from one group to another, data can be lost or misinterpreted. In addition, the more information transferred, and the more times it is transferred, the more distortion can occur, which can lengthen process completion time.

A key success factor is to simplify the handoffs and limit handoffs when possible. Automating handoffs through technology will help reduce errors and speed up the activity between individuals and groups.

6.1.5.4 *Have Work Performed Where it Makes the Most Sense*

Task assignment occurs after an effective process flow is designed. Application of the first design principle may negate some existing work, create new work, and/or may move work from one department to another.

For example, during one redesign effort, a team was challenged to decide who should be responsible for the initial review. The initial review required the expertise of an engineer with a broad background rather than a specialist. The position did not exist in the original process structure. To implement the new process, the department had to develop a job description for a generalist engineer and then hire someone for the new position. Therefore, current job titles and locations should not be constrained. Create the positions needed to allow the process flow to operate with the greatest efficiency and effectiveness.

6.1.5.5 *Provide a Single Point of Contact*

A common symptom of not having a single point of contact is multiple transfers of customers' calls. Another symptom of not having a single point of contact occurs when staff members are not told who to ask for information.

A single point of contact can be a person such as a project manager, process consultant, or customer service representative. In addition, a single point of contact could be a data repository like an intranet.

6.1.5.6 *Create a Separate Process for Each Cluster*

Often a single process attempts to handle every variation. However, process inputs and outputs often vary by complexity, type, size, and other factors. For some variations, the process might work smoothly, but for others, it might be cumbersome and slow.

For example, when shopping at a grocery store, a shopper has eight items to purchase and chooses to check out in the express checkout lane. The store has two checkout processes, one for many items and one for few. The regular checkout line has a bagger, but a bagger is not needed for the express lane.

If inputs naturally cluster from significant differences, then a decision diamond should be placed at the front end of the process asking which sub-process is most appropriate for this cluster. Additional resources and costs are introduced, but efficiency of throughput and greater customer satisfaction should occur. The input cluster is then routed to the appropriate process.

6.1.5.7 *Ensure a Continuous Flow*

In a manufacturing process, steps that directly add value to the customer such as delivering supplies, building the product, and shipping it, represent the main sequence. In Lean terminology, the main sequence is the *value stream*. In a service process, the steps that make and deliver the service are the main sequence. The customer pays for the output of the value stream, and the organization earns revenue.

In a Lean approach to process design, nothing should impede or slow down the value stream.

6.1.5.8 *Reduce Batch Size*

Batching causes wait time for items at the end of the batch. Batching causes inventory to build as it moves through your process. As you cut batch sizes, you start creating a smoother flow through the process. Ultimately, a batch size of one, or processing transactions in real-time, is ideal.

6.1.5.9 *Bring Downstream Information Needs Upstream*

At each step of the process, explore things that may cause frustration to team members. When a team member expresses frustration at missing or incomplete information, bring downstream information upstream.

There are two ways of implementing the upstreaming of the information design principle. If the process is routine and not complex, the upstream person should be trained or given a template or check sheet to capture what the downstream person needs. However, this solution will not work when the process is complex and/or changes frequently. For complex processes, the downstream person must be brought upstream during a redesign to receive information directly from the source.

6.1.5.10 *Capture Information Once at the Source and Share It*

If a process requires entering the same data more than once, then this design principle is appropriate. Root out data redundancy, re-keying, and reconciliation. Enterprise resource planning (ERP) software is designed to accomplish this principle. However, knowledge of the processes must be clear before installing an ERP system.

6.1.5.11 *Involve as Few Actors as Possible*

The children's game called Telephone illustrates the importance of this design principle. In the game, ten kids line up, and the first whispers in the ear of the next child. Each child passes the message along from ear to ear. The last child announces what the message was, and everyone laughs because the relayed version differs substantially from the original.

In a relay race, the baton pass illustrates our *few actors* design principle. Often, a slower team will beat a faster team because the faster team had a problem with the baton pass. (During the 2004 Olympics, both the US men's and women's relay teams suffered from poor baton passes and didn't win gold medals.)

Think of the handoff of work or information as the baton pass or message in Telephone. Every handoff presents potential for error. Eliminating so-called *baton passes* in a process eliminates potential for error. Expand the job scope upstream and downstream so that a person *runs* with the work longer (so to speak). Cross-training and a change in compensation to reward knowledge or pay for new skills are often required to expand job scope. There are some advantages to cross-training.

First, work often doesn't arrive at an organization in a steady, even flow. Instead, there are spikes and bottlenecks in the workload. With more cross-trained workers, bottlenecks can be broken as more workers are qualified to manage them.

Second, if a person does more of the work, he or she will take increased pride in the outcome. This person can see his or her major contribution to the whole. This pride increases the desire to produce a quality product or service.

6.1.5.12 *Redesign, then Automate*

One of the worst things an organization can do is take the *as-is* flowchart and lay information technology on top of it. Automation without redesign is bad for two reasons. First, information technology can be expensive. There might be much less expensive but equally effective solutions, such as redesigning processes or training. Second, despite the investment, the problem might not be solved and automating it could magnify the issue. It is crucial to first employ process design principles, benchmarking, best practices, and Lean thinking before automating an *as-is* process. Otherwise, a faster but much more expensive and still ineffective process may result. A clear understanding of the organization's processes is necessary. IT may not be the solution.

The process improvement team will begin to envision a new process after benchmarking best practices and using design principles. At this point, engage in conversation with IT on current and future IT capabilities, thereby conjoining innovative process ideas with enabling IT tools.

6.1.5.13 *Ensure Quality at the Beginning*

Quality problems encountered in the first several steps of a process will create exponentially negative effects downstream. The time spent to fix inefficiencies by the downstream people can be excessive. There are certain stages in a process where an investment in time and money is warranted and the beginning is one of them. Time and money spent up front to ensure quality, also emphasized by Lean thinking, pays for itself in preventing reviews and rework later.

6.1.5.14 *Standardize Processes*

Sometimes a significant variation in output is caused by five people doing the same process five different ways. This creates three concerns. First, with this kind of variation, it's difficult to improve the process. Second, when a problem occurs, it is difficult to determine if it is a process or training problem. Third, how can there be process control when there's no standardization? It's much easier to find the root cause of a problem when people standardize their work. Even less structured processes might be decomposed into more and less structured components. The former may be amenable to standardization.

6.1.5.15 *Use Co-located or Networked Teams for Complex Issues*

Complex problems require people to pour over information and data in real time. If complex problems occur regularly, consider co-locating team members. If co-location doesn't make sense, then network the team so information can smoothly flow.

6.1.5.16 *Consider Outsourcing Business Processes*

Outsourcing one or more processes to companies that specialize in that process may be the best choice for some organization. Outsourcing certain processes can free up internal resources to focus on other more strategic processes that add greater value to the organization. If outsourcing is considered, it should be compared to the costs of designing the process in-house as well as compared to the risks associated with outsourcing. Some risks include IP protection, quality and controls delegated to the outsourcer, and disposition of current employees.

Risks also include financial solvency of the outsourcer, integration of their process with your own, and culture change that would result from outsourcing. It is also important to consider how to terminate the outsourcing arrangement should you need to do so in the future. When considering outsourcing, weigh the risks against the potential to become more agile and focus on activities that add the greatest value to your organization.

6.1.6 Process Architecture Model Levels

Process information discovery reveals information at various levels of detail. These levels of detail will need to be sorted out and the information assigned to different levels in a process model hierarchy. This hierarchy begins at a high level with the entire process and is then broken down (decomposed) into lower levels of detail until the activities in a process are defined. In decomposition of process models, the process is divided into subprocesses and then functions. The functions are then related to the business operation where they are performed and combined with other subprocess work to form the activities in the business unit. These are then flowed to represent the way work is performed in the business unit.

Assign information to a level of detail as it is collected. This assignment can be changed as the team learns more. Information at any level in the hierarchy should be clearly aligned to information at a higher level in the hierarchy, and thus represent additional detail as one goes lower in the hierarchy. This will allow the team to identify missing information or information that needs to be questioned.

Figure 6.3 shows an example of a process hierarchy. Different organizations may use fewer or more levels and may label them differently than in this example. The important fact is that the team will need a way to organize the information collected and the models that are built to control the information and its quality.

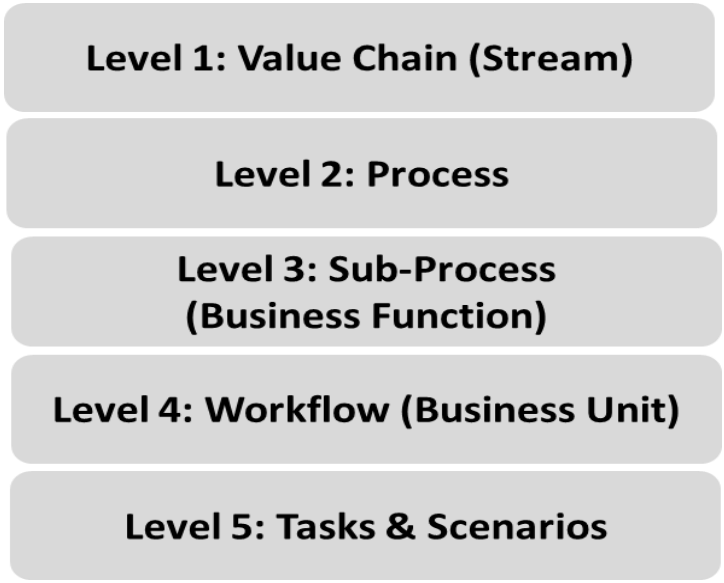


Figure 6.4: Process Hierarchy: Levels of Detail in Process Modeling

Note: The number of levels and their names vary by the methods and naming conventions used in different organizations. The point is that the process must be broken into a low enough level to understand the activities that are taking place and how they fit together to produce the business unit's end products. The levels in Figure 6.4 show a sample of how an organization could define levels of detail in the process modeling standards.

The number and name of the levels in both the current *as-is* and the future *to-be* models should be directed by formal business modeling standards. In the past, these standards could be independent of any external modeling standard or tool, but that is changing. Care must now be taken to align internal modeling standards with the tools that are used and their capabilities and limitations. For example, while it is not the only modeling standard, BPMN 2.0 is becoming a major standard for BPMS vendors, and internal modeling standards may need to conform to BPMN. However, a good rule of thumb in looking at modeling standards is that they address at least the following levels in some form:

(1) **High-level process.** The highest-level is a model that provides a full end-to-end, high-level view of the process. This model can show subprocesses and may show high-level problems and application systems.
(2) **Subprocesses.** Subprocess models are the next level and divide the work into business functions and then align the business functions by business unit.
(3) **Workflow.** Workflow within a business unit is a third level, and it identifies the activities that are performed. This level model can also be used to show the relationship between activities, and with activities from other functions and subprocesses that are also being performed in the business unit.
(4) **Scenarios.** At the fourth level of detail (scenarios) you can see how work that is performed in the business unit is driven by events, timing, or data values. By rolling tasks up to activities, activities to workflow, and workflow to subprocesses, it is easy to see how all work fits into processes and how it plays a role in producing the end product of the process.

But this fourth level of detail provides only a basic understanding of business operations. It is often not a sufficient level of detail to resolve problems, reduce costs, or support automation. For these actions, it is necessary to take the workflow to a greater level of detail, the task level.

At this fifth level, the organization and BPMS designers usually have enough detail to tie rules to specific actions. The use of data is at a low enough level of detail to design application screens and reports and define edits and low-level decisions. This level is used to generate BPMS applications that manage work and automate manual, transaction-level data entry and use.

Level five is where the process analyst identifies the tasks that are performed to deliver the output or outcome of a single activity. For example, for policyholder information at an insurance company, level five defines the tasks that must be performed to enter data in the system. Another example at this level, in manufacturing, is a build-to-order sale. The process analyst must define all the tasks needed to

identify the customized product, and — assuming a build from common parts — to identify the parts, define the options, cut the build order, get the parts, and then construct the product.

And yes, there are still lower levels of detail that may be needed. The key is to take the map to the level that you need to support what you are doing *and* what someone in the next phase will need to do. This may be to build an application using traditional languages, generate a BPMS application, integrate (or build interfaces) to legacy applications, build web applications to interact with customers, and more. The key is that the requirements for any of these follow-on activities will need to be considered and the detail needed to drive their completion must be reached in the models.

The project manager begins the project by defining the deliverables and then setting internal standards for data collection, interviews, models, and so on. Of course, if standards exist to address data collection, they will need to be followed.

See Chapter 4, *Business Process Modeling*, for a more detailed look at the way process models are constructed.

Project-level content should be used to support the eventual creation of an *enterprise business model*. Doing so removes the overhead of creating this whole model as a project in itself. To support the evolving enterprise modeling effort, business process models should include the following supporting information:

- Processes showing sub-processes and their interaction
- Subprocess operations showing business functions (scenarios) and the business units that perform them
- Workflow within a business unit showing activities that are performed (may be broken into lower-level models to show tasks performed within activities).

Note: these levels of model decomposition form the process modeling hierarchy.

- Problems and their effects aligned to one or more sub-processes, business functions, activities, or tasks they affect
- Opportunities for improvement and expected benefits aligned to the part of the organization they affect
- Metrics (staff, volumes, error rates) aligned to the point in the organization they measure
- IT applications and where they are used in the organization
- Basic functionality that each application system provides
- Data that is collected, where it is stored, how it is edited, and how it is used
- Rules that control the work — both documented and undocumented
- Decision processes with the probability of each exit from a decision
- Standards for quality, cycle time, efficiency, and so on
- Internal audit policy and any requirements
- Performance measurement requirements

Note: this is a partial list of information that should be collected as part of creating the *as-is* process and workflow business models. It is also the core information that should be considered in building an enterprise business model.

With forethought about future use of this information, you can use it to create the current target solution and, in increments, to construct a process-centric enterprise business model.

6.1.7 Process Rules

As activities are defined, the need for certain business rules will become apparent. *Business rules* define how or when a particular activity can be performed and help control the flow of the activity. Examples of business rules include, “if a purchase order is over 50,000 USD it must be approved by finance,” or “when total sales of a customer reach 30,000 USD, apply a discount of 10%.”

When defining business rules, the tendency for most organizations is to make them complex in order to eliminate confusion and emphasize control. Complexity in a set of business rules that govern an activity creates complexity in the process. The more complex the process is, the more opportunities for the process to fail. As a best practice, business rules should be applied when necessary. For example, apply business rules to enforce organization policies or external regulations, reduce process errors, and expedite process execution.

6.1.8 Simulation of Future State

Simulation is the next step in developing desired future states of process performance and identifying gaps in current processes that prevent transition to the desired future state.

The definition of *simulation* is the enactment or representation of the behavior or characteristics of one system through the use of another system. In the case of business processes, you can use software with simulation capabilities to model a process with all the associated parameters.

An example of cycle time parameters for each activity:

- In-queue time (before work begins)
- Work delay time (from start of resource involvement until start of work)
- Work time (from beginning of work to production of output)
- Out-queue time (from production of output to release of output)

Examples of cost parameters:

- Total staffing costs allocated by headcount (labor) including resources associated with each activity and cost of each resource
- Material consumed each time an activity is performed (direct costs)
- Overhead allocated to activities requiring resources incurred over an interval of time, such as administrative costs allocated as a percent of labor (indirect costs)

Other considerations with respect to parameters:

- Number of times the process runs per interval time (X times per hour, per day)
- Decision points in process (example — 60/40 split between path A and path B)

When all process parameters are entered for the modeled process, simulation is first performed on the current-state process. Once the simulation is completed, an output is generated by the software tool in an easy-to-interpret format. The output shows each activity with the time-metric dimensions

summarized per activity, along with the cost-metric dimensions summarized by activity. The output of the simulation helps identify process performance problem areas — supported by extensive data from the simulation.

Once the current-state performance is completely analyzed, then modeling of the desired future-state process begins. Once the future-state process is modeled, then the parameters are adjusted to achieve the desired process performance, and another simulation is run with a corresponding output generated for analysis and interpretation.

The BPM practitioner can then adjust the parameters and continue running simulations until the process performs as desired. During the simulation analysis, the process model may change with the parameters until the final model and parameters are determined. Adjustments are done in the modeling software before the BPM practitioner embarks on the actual process improvement effort with a team. Simulation can save a significant amount of time, cost, and effort because all work is simulated in a software environment before it is implemented in the organization.

Simulation using software tools provides an experimental lab for improving processes before actual implementation. It is not a substitute for the actual field work, nor is it a perfect method for determining the future-state process. However, it is a powerful tool to help the BPM practitioner more quickly assess the needed corrections than manually testing the changes. The biggest benefit of simulation through software tools is that it will automatically calculate the benefits of the process design and any future process improvement across time, cost, capacity, and quality dimensions. Simulation builds a data-driven business case for justifying your process design or improvement.

6.1.9 Process Compliance

Most industries have standards and guidelines relating to the execution of their business processes. Some of these are actual laws, and non-compliance can result in stiff penalties or even jail time for company officers. Following are examples of industry standards or standards bodies:

- **ANSI.** American National Standards Institute.
- **ISO.** International Standards Organization.
- **HIPAA.** Health Insurance Portability and Accountability Act.
- **SOX.** Sarbanes-Oxley.

6.1.10 Process Design Success Factors

There are several critical factors for a successful process design stage. These success factors, if not considered, can quickly become serious pitfalls during the design stage and can prevent a successful outcome of the new process. Therefore, attention to the details of these success factors should be observed throughout the design stage.

Success factors covered in the sections that follow include:

- Executive leadership
- Process ownership

- Incentive and rewards
- Cross-functional teams
- Continuous improvement
- Commitment to investment
- Alignment with strategy

6.1.10.1 *Executive Leadership*

The most important success factor is the direct involvement and leadership of the executive team. As a BPM initiative can have far-reaching and lasting effects throughout the organization, it is vital that the executive leadership not only agree to the change, but is visibly seen as the promoter, leader and champion of such change. The minute the organization senses that the leadership is distracted from the message of process management, the process change initiative will flounder and ultimately not yield the promised success that BPM can yield. One means to maintain this visible engagement is frequent communications to the organization reinforcing aspirations and reporting progress to date.

6.1.10.2 *Process Ownership*

Next to executive leadership, the next critical success factor is ownership of the process. All too often, organizations assign ownership of the process change initiative to a project manager who has little or no authority over the actual process. Those organizations that have successfully implemented process management testify that it takes a Process Owner to manage the change initiative.

Process ownership can take the form of a single individual responsible for the process, a cross-functional team of department directors, or another type of management. When the burden of success for the initiative is placed on the Process Owner there is a much higher probability that the process will meet its stated expectations.

The Process Owner may need to delegate other responsibilities until the process change has been completed. It may also mean other disruptions to the organization. When considering the huge benefits gained from a top-down approach to managing the processes of the organization, the small disruption in daily activities is more than compensated.

6.1.10.3 *Incentive and Rewards*

A successful process management system will have incentive programs in place that encourage adoption of the new process and changed roles and behaviors. These incentives should be based on the goals established in the analysis and are most effective when aligned with the customer's expectations and corporate strategy.

6.1.10.4 *Cross-Functional Teams*

True success in BPM lies in the ability to tie together seamlessly all functions to meet the needs of the customer. The success of these efforts depends on the degree of participation from all the functional groups that touch the process. During the design stage, key decision makers must be present and agree on the new design.

6.1.10.5 *Continuous Improvement*

Small changes that happen frequently can have a powerful cumulative effect — that is the concept of *continuous improvement*. Ideas for improvement can come from process metrics, workers in the process, supervisors, managers, Process Owners, and customers. Even information technology enhancements can inspire ideas for improvement.

In addition, it is necessary to act quickly in the process initiative. By acting quickly and making some small wins to move efforts along, participants maintain enthusiasm for the effort. One of the key benefits of a BPM system is the agility it brings to the organization, and that agility should be demonstrated within the BPM change process itself.

The longer the initiative takes, the more likely it is for participants to be siphoned off to run other projects, lose interest or focus, or leave the organization altogether. Longer initiatives could be perceived as simply another effort at *management-speak* to encourage shareholders, but that really amounts to *business as usual*.

By quickly implementing a few small changes, the positive effects of those changes can be communicated to the organization and will serve as a catalyst for larger organizational changes.

6.1.10.6 *Commitment to Investment*

Although one of the goals of Business Process Management is to reduce cost, there are often initial financial investments that must be made before that reduction is realized. These financial investments are in the form of consultant services, new technology, and possibly of additional resources. The organization's leadership must be committed to making the necessary investment to ensure the process improvement is successful before the return on the investment is achieved.

6.1.10.7 *Alignment with Strategy*

Understanding the business strategy and its relationship to the customer is critical to the design of new processes. A successful business strategy is one that is designed around customer needs. All activities in each process should contribute to the goal of meeting customer needs and realizing the business strategy. Activities that fail to meet customer needs should be considered extraneous. Before including extraneous activities in a process, give them careful consideration.

6.1.11 Conclusions

The process design stage in a process improvement initiative attempts to define the new process state and outlines the steps necessary to achieve that state. Throughout this chapter, the key activities, critical success factors, and suggested practices for achieving a successful process design have been discussed. The next stage in the process improvement initiative is to implement the new design.

6.1.12 Process Design Key Concepts

The following table shows key concepts for business process design.

Process Design Key Concepts
Definition
Process design is the creation of a new process that aligns with business strategy.
Principles
• Process design must be for continuous improvement as opposed to a one-time event. • Organizations must commit to investing in process management to benefit from process efficiency. • All processes should be aligned to the business strategy and customer needs.
People
• Process design involves executive leadership, Process Owners, and stakeholders in the creation of the new process. • The process design team should include subject matter experts, stakeholders, participants, and customers. • Critical success factors include the involvement of executive leadership, Process Owners, and cross-functional teams.
Best Practices
• Design around value-added activities. • Perform work where it makes the most sense. • Create a single point of contact for the customer. • Combine processes around clusters. • Reduce handoffs. • Reduce batch sizes. • Put access to information where it is needed the most. • Capture information once and share it with everyone. • Redesign the process before considering automation. • Design for desired performance metrics. • Standardize processes. • Consider co-located networked teams and outsourcing.
Activities
• Design the process with modeling tools and other tools.   ○ Define activities of the new process.   ○ Define rules of the new process.   ○ Define handoffs between activities.   ○ Define metrics. • Perform comparisons and benchmarking. • Perform simulation and testing. • Create the implementation plan.

7 Process Performance Measurement

Process performance measurement is the formal, planned monitoring of process execution and the tracking of results to determine the effectiveness and efficiency of the process. This information is used to make decisions for improving or retiring existing processes and/or introducing new processes in order to meet the strategic objectives of the organization. Topics covered include the importance and benefits of performance measurement, key process performance definitions, monitoring and controlling operations, alignment of business processes and enterprise performance, what to measure, process and measurement methods and frameworks, modeling and simulation, decision support for Process Owners and managers, and considerations for success.

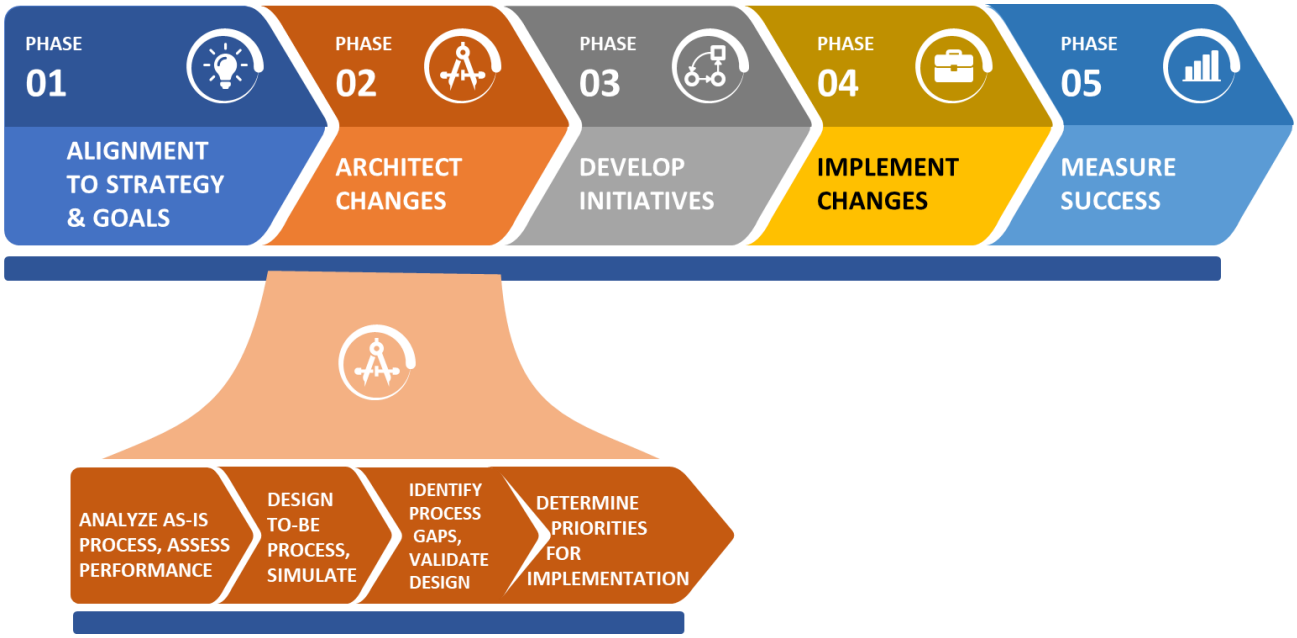


Figure 7.1 Phase 2 of the BPM Life Cycle

7.1.1 Key Process Measurement Definitions

Measurement, metric, and indicator are terms often misinterpreted and mistakenly used interchangeably.

> ***Measurement*** *is directly related to the quantification of data (or data set) in an acceptable standard and quality (accuracy, completeness, consistency, and timeliness).*

To illustrate the concept, take *ten inches* as an example of measurement. *Inches* are the standard and *ten* identifies how many multiples or fractions of the standard are being verified.

> ***Metric*** *is a quantitative measure that a system, component, or process has of a given data attribute. Metric represents an extrapolation or a mathematical calculation of measurements resulting in a derived value.*

For instance, number of defective products in the total number of products produced (defect number / total production) is a metric. Two errors identified by users in the first eighteen months of activity (number of errors / time) is a metric. Efficiency and effectiveness, are generally a function of one or more of the four fundamental measurements (time, cost, capacity, and quality), so they are more related to metrics than to measures.

> ***Indicator*** *is a representation of a measurement or metric in a simple or intuitive way to facilitate its interpretation against a reference or goal.*

An example of an indicator is, "green indicator is good; red indicator is bad."

Metrics fall into three categories:

(1) **Product metrics.** Describe the product characteristics such as size, complexity, design features, performance, and quality level.
(2) **Process metrics.** Describe process outcomes such as customer satisfaction, mean time to failure (MTTF), and effectiveness of defects removal.
(3) **Project metrics.** Describe project measurements and execution. Examples include resources allocation, cost, time, and productivity.

The importance of measuring the performance of a process cannot be overstated or overestimated. Aligning process performance to organizational goals is the primary reason for undertaking process management practices. It has been said that, "if you can't measure it, you can't manage it." This statement holds true, and no organization should invest time and resources to improve a process without knowing what they need to measure to improve.

Many process improvement efforts focus on one functional area, for example, manufacturing, without consideration for the enterprise context. There is nothing wrong with focusing efforts on functional process improvement and management provided that it can be linked to the overall cross-functional process performance that drives enterprise-level performance metrics.

Figure 7.2 illustrates the cross-functional, order-to-cash process from an enterprise perspective and shows metrics at the enterprise, process, and activity (individual) levels.

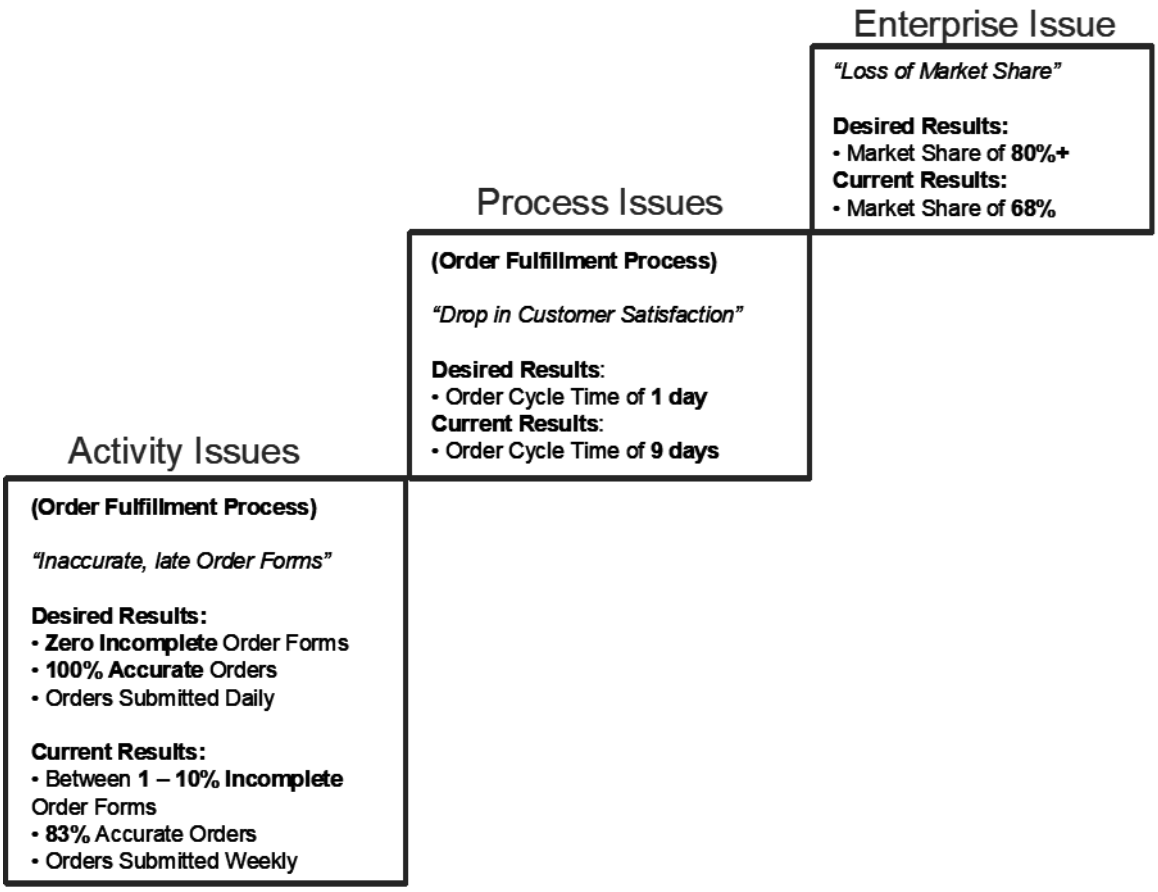


Figure 7.2: Order-to-Cash Metrics at Three Levels of Process
Adapted from Geary Rummler (1995)

Metrics evaluated in the order-to-cash process depend on point of view. Enterprise point of view is usually executive level (C-suite). Process point of view looks at functional areas that own or manage the metric. At the individual point of view are the people doing task-level work like order processing (warehousing, customer service, logistics, and so on).

There are countless industry examples that demonstrate how addressing process metrics has dramatically improved the overall performance of organizations and their competitive positions. Improvements occur more often in organizations that put importance on process and associated process performance metrics versus just financial metrics alone.

7.1.1.1 *Example: Order-to-Cash Metrics*

Organization ABC is experiencing a loss in market share. As shown in Figure 7.2, their current market share is 68%, but their goal is to have an 80% share. For simplification, this is a mature industry. The organization and its competitors are focused on taking market share from one another rather than new product development. Market share is what this organization uses to measure itself in terms of revenue growth. But aside from market share, in process terms, why are they having difficulty? In reviewing their order fulfillment process, we see a drop-in customer satisfaction — but why?

If they performed a process analysis, it would reveal that the current order cycle time is nine days. That is, it takes the organization nine days to accept, commit, order, and then ship a product to a customer. In this competitive global economy, in this type of industry, that level of performance is not acceptable. Customers can easily get the same product from a competitor faster — which is probably what is happening — hence the drop in market share.

The next question is, what is causing such a delay in the order cycle time? Further analysis of the process would reveal that the sales staff are late in entering customer orders, and orders contain errors or incomplete information. Between 1% and 10% of order forms are incomplete and order accuracy is only 83%. Furthermore, sales representatives are entering their orders once a week instead of daily. The desired results simply are not being achieved. Inefficiencies and errors are affecting different levels of the process, but more importantly, problems are affecting customers. But no one at the organization understands the root cause because they are looking at only the financial metrics, and not these process performance metrics.

The root cause is important to understand because not everyone in the organization has a complete picture of what is happening. The Vice President of Marketing views this as a market share problem. The Vice President of Supply Chain views this as an order cycle time problem. The Vice President of Sales views this as an issue with the accuracy and timeliness of the sales order forms. None understand the other perspectives. The CEO knows only that revenue isn't growing, and therefore neither are profits. Each person may or may not have a metric that they are accountable to, but more importantly, they don't have an understanding of the cross-functional process that links them altogether from a process performance perspective. What is worse is that they are *process focused*, which means that they will attack the symptoms independently and most likely make things worse. To make metrics work to solve its market share problem, the organization would need to take a process performance approach.

7.2 Key Process Performance Definitions

Before we look at the many schools of thought about Process Performance Measurement, let's review some process performance terminology. All processes have a metric or measurement associated with the work or output of the process performed. These metrics are based on fundamental metric dimensions of time, cost, capacity, and quality.

Term	Definition	Example
Time	A measurement of process duration.	Self-explanatory
Cycle time	Measures the time it takes from the start of a process to the completion of that process in terms of the output.	Self-explanatory
Cost	A measurement of the monetary value associated with a process.	Self-explanatory
Resource cost	A measurement of the monetary value associated with the resources (human or non-human) required to complete a process.	Self-explanatory

Opportunity cost	The value that is lost from the process by not getting the resultant output of the process.	A sales order is lost due to an error (quality metric) in the sales order.
Capacity	An amount or volume of a feasible output associated with a process.	Number of transactions associated with a process.
Revenue (capacity)	Potential increase in earnings based on higher output. Capacity usually has an associated revenue connotation.	If a widget manufacturer can improve yield and reduce variation, number of good products that can be sold to customers increases, increasing revenue to manufacturer.
Throughput (capacity)	Amount of material or items passing through a system or process. Capacity can have an associated throughput connotation.	When sales people enter orders manually, throughput is limited by number of people and orders each can process per hour (without errors). If orders were entered via a browser interface directly by customers, orders processed per hour would be limited by number of concurrent users on website. However, quantity is likely to be higher than orders processed by individual sales people.
Quality	Standard of something as measured against things of a similar kind. Usually expressed as a percentage of actual to optimal or maximum in process terms. Can take many forms.	Defect rates tend to be quality based, see below.
Satisfaction (quality)	A measurement of customer happiness, usually associated with a service level expectation on the part of customers.	Number of goods delivered on time, in right quantity.
Variation (quality)	A measurement of the amount, extent, rate, or degree of change. Generally expressed as the difference between the actual and target or expected result.	Delivery rates were 90% against a goal of 95%
Error or defect rate (quality)	An example of variation in the measurement of errors associated with the output of a process.	Quantity manufactured had an error rate of 2% (For every 100 made, 2 had defects)

There are other measures, such as efficiency and effectiveness. However, these measurements are generally a function of one or more of the four fundamental metrics of time, cost, capacity, or quality.

An important aspect of Process Performance Measurement is the concept of *adding value*. This concept has its roots in Deming and Juran (two pioneers on quality in the workplace). Briefly stated, an activity is *value-adding* when:

- It is required to generate the output required by customers.
- Customers are willing to pay to generate a process output.
- Quality and consistency of the component resources or output must be maintained.
- Circumstances may affect process continuity.

In services, additional value occurs when it enhances the customer experience, even when it does not contribute directly to the specific service. For example, the personal greeting and attention provided at a hotel front desk is value adding, even though it is not directly related to providing the room. The bottom line is that the activity is perceived as having added value to the customer. Understanding

whether an activity adds value or not is important when improving a process and deciding whether to keep or eliminate a process or subprocess.

Process performance metrics (PPM) derives from process goals and allows the Process Owner to control process performance in terms of time, cost, capacity, and quality. There are twelve characteristics of effective management through PPM:

Metric	Characteristic
Alignment	Key performance indicators (KPIs) are always aligned with corporate strategies and objectives.
Accountability	Every KPI is *owned* by an individual or group on the business side who is accountable for its outcome.
Predictive	KPIs measure drivers of business value and are leading indicators of desired performance.
Actionable	KPIs are populated with timely, actionable data so users can intervene to improve performance before it's too late.
Few in number	KPIs should focus users on a few high-value activities, or on the overall effectiveness of the process.
Easy to understand	KPIs should be straightforward, not based on complex indexes that managers don't know how to influence directly.
Balanced and linked	KPIs should balance and reinforce each other, not compete and confuse. Otherwise, you will degrade process performance.
Transformative	A KPI should trigger a chain reaction of positive changes in the organization, especially when it is monitored by the process manager or officer.
Standardized	KPIs are generally more effective when based on standard definitions, rules, and calculations so they can be integrated across dashboards throughout the organization and used for benchmarking within and across industries.
Context-driven	KPIs put performance in context by applying targets and thresholds so users can gauge their progress over time.
Reinforced	The effect of KPIs may be enhanced by attaching compensation or incentives to them.
Relevant	KPIs gradually lose their effect over time, so they must be reviewed and refreshed periodically.

Source: adapted from Eckerson (2010)

The overall purpose of understanding process metrics is so that a manager can attribute a value to improving or changing a process as part of Process Performance Measurement.

One important part of process design is making sure that everyone is clear on the metrics for each level of performance: individual, process, and enterprise.

7.3 Alignment of Business Process and Enterprise Performance

Enterprise performance and corresponding metrics are best expressed with respect to satisfying the needs of the customer. Enterprise performance metrics are extrapolations of the time, quality, cost, and capacity foundations. Examples of enterprise-level metrics:

Time Dimensions:

- Delivery performance, request date
- Order fulfillment lead time

- Product development lead time

Quality Dimensions:

- Product launch variance
- Forecast accuracy

Cost Dimensions:

- Sales cost
- Manufacturing cost
- Logistics cost
- Inventory days of supply

Capacity Dimensions:

- Customer dollars per order (wallet share)
- Customer growth rate
- Market share

These examples are all enterprise-level metrics that have cross-functional processes associated with them. Some cross-functional processes that drive enterprise-level metrics include:

- Order to cash
- Procure to pay
- Campaign to quote
- Plan to fulfill
- Manufacture to distribution
- Issue to resolution

Processes like *order-to-cash* and *procure-to-pay* are generic business scenarios that follow the same basic stages across different industries. What's important to note is that the cross-functional processes will affect more than just one enterprise-level metric. For example, a plan to fulfill will affect delivery performance, request date, and order fulfillment lead time.

Process transformation methods include Lean, Six Sigma, Process Reengineering/Redesign, and so on. BPM Professionals should assess such methodologies to see if they will address the cross-functional process, just a subprocess within the cross-functional process, or even an activity within a subprocess. Companies often settle on a process improvement methodology, like Six Sigma, and they still don't perform well at the enterprise level as an organization. There are many examples of companies that have fallen victim to jumping into a transformation method without seeing improvement.

> *"In fact, of 58 large companies that have announced Six Sigma programs, 91 percent have trailed the S&P 500 since, according to an analysis by Charles Holland of consulting firm Qualpro (which espouses a competing quality-improvement process)" (Morris 2006).*

Figure 7.3 illustrates the point of determining the right process level within the enterprise-to the appropriate transformation methodology to the desired performance outcome.

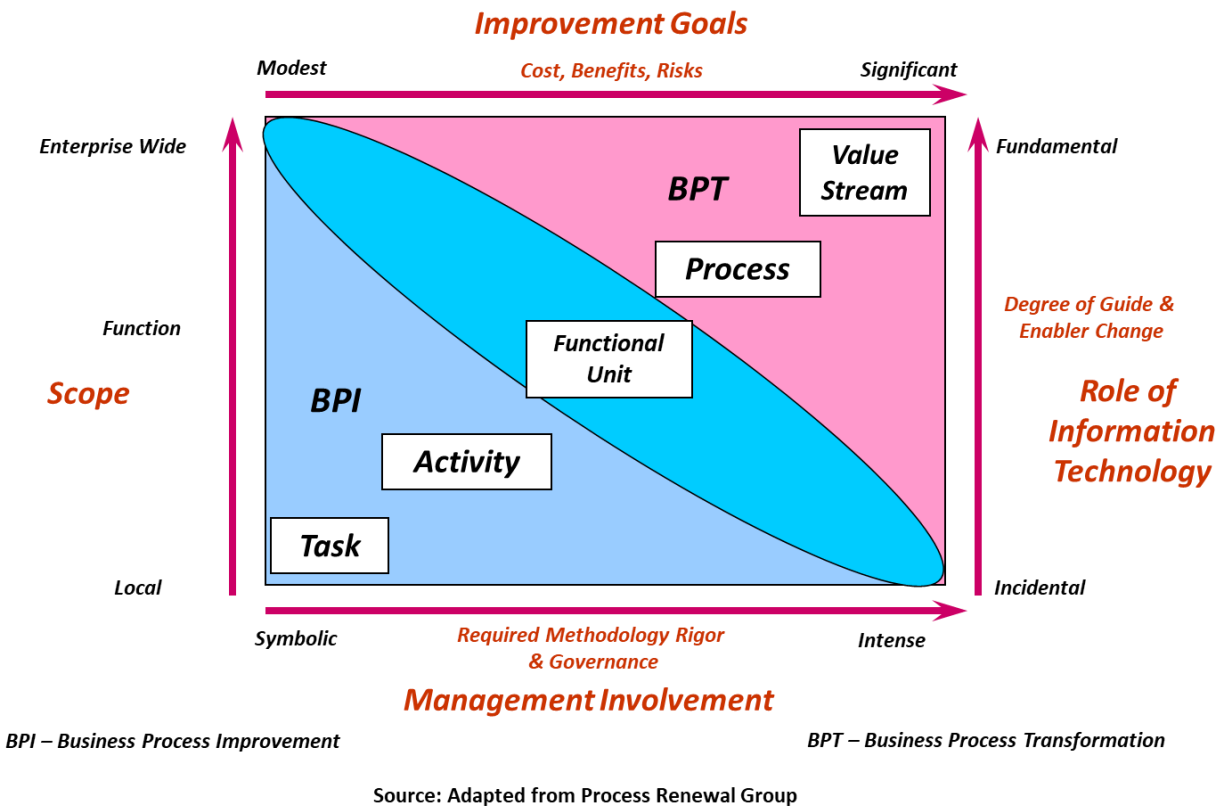


Figure 7.3: Linking the Process to the Enterprise-Level Desired Performance Metric

There is only one process framework that link cross-functional processes to enterprise-level metrics: the SCOR model. For detailed information on SCOR, see ASCM.org. The Association for Supply Chain Management offers an enterprise certification for SCOR, called SCOR-P.

7.3.1 What to Measure

What to measure in Process Performance Measurement has been a mystery to some and a dilemma to others. The best way to understand what to measure in a process is to first understand the desired result.

The information required for measuring the quality dimensions of a process can be obtained at both the input and output of the process. You can also measure the overall process in terms of service level satisfaction. Metrics such as error and defect rates are examples of quality-based metrics based on input and output information garnered from a process. Information required for measuring the cost dimension is usually based on the resources needed to perform the process itself. Although the opportunity cost can also come from the output information. Capacity information comes from the output information of the process. Time-based dimensional metric information is obtained from the entire process — that is from supplier to customer — but can also be broken down between supplier and input and output and customer.

7.3.1.1 *Measurement Methods*

There are two very common methods for measuring a process. One is manual, that is collecting data by hand and either drawing it on paper or entering it into a spreadsheet or modeling tool. The other method is automated, enabled by sophisticated software such as Business Process Management suites or enterprise software modeling tools. One can also use statistical methods, value stream mapping, and activity-based costing. The purpose of this section is not to recommend one method (manual or automated) over another, but simply to point out that there are many methods that can be used to measure processes, each with their own pros and cons and appropriateness for each situation or process.

BPM practitioners use a variety of measurement methods. This guide covers only four: modeling and simulation, value stream mapping, activity-based costing, and statistical methods.

Modeling and Simulation

Modeling and simulation is a simple method (using modeling software) for measuring the current state process performance and developing desired future states of process performance. It is also used to identify gaps in the current process preventing transition to the desired future state. See the section on *Simulation of Future State* for examples of modeling parameters.

Value Stream Mapping

A Lean planning tool can be used to visualize the value stream of a process, department, or organization. First, follow a product's production path from beginning to end and draw a visual representation of every process in the material and information flows. Second, draw a future state map of how value should flow.

See www.asq.org/glossary or www.leanqad.com/glossary for definitions related to Lean thinking and value streams. Following is a list of the seven wastes identified in Lean value stream mapping.

Value stream definition: By locating the value-creating processes next to one another and by processing one unit at a time, work flows smoothly from one step to another and finally to the customer. This chain of value-creating processes is called a *value stream*. A value stream is simply all the things done to create value for the customer.

The seven wastes consist of overproduction, waiting, transporting, inappropriate processing, unnecessary inventory, unnecessary or excess motion, and defects.

1. Overproduction

Simply put, overproduction is to manufacture an item before it is actually required. Overproduction is highly costly to a manufacturing plant because it prohibits the smooth flow of materials and actually degrades quality and productivity.

2. Waiting

Whenever goods are not moving or being processed, the waste of waiting occurs. Typically, more than 99% of a product's life in traditional batch-and-queue manufacturing will be spent waiting to be processed.

3. Transporting

Transporting a product between processes is a cost incursion that adds no value to the product. Excessive movement and handling cause damage and are an opportunity for quality to deteriorate. Material handlers must be used to transport the materials, resulting in another organizational cost that adds no customer value.

4. Inappropriate Processing

Often termed as “using a sledgehammer to crack a nut,” many organizations use expensive high precision equipment where simpler tools would be sufficient. This overtooling often results in poor plant layout because preceding or subsequent operations are located far apart. In addition, they encourage high asset utilization (over-production with minimal changeovers) in order to recover the high cost of this equipment.

5. Unnecessary Inventory

Work in progress (WIP) is a direct result of overproduction and waiting. Excess inventory tends to hide problems on the plant floor, which must be identified and resolved in order to improve operating performance. Excess inventory increases lead times, consumes productive floor space, delays the identification of problems, and inhibits communication.

6. Unnecessary or Excess Motion

This waste is related to ergonomics and is seen in all instances of bending, stretching, walking, lifting, and reaching. These are also health and safety issues, which in today’s litigious society are becoming more of a problem for organizations.

7. Defects

Having a direct effect on the bottom line, quality defects resulting in rework or scrap are a tremendous cost to organizations. Associated costs include quarantining inventory, re-inspecting, rescheduling, and capacity loss. In many organizations, the total cost of defects is a significant percentage of total manufacturing costs.

Activity-Based Costing

Activity-based costing (ABC) definition: An accounting methodology that assigns costs to activities rather than products or services. ABC doesn’t eliminate or change costs; it provides data about how costs are actually consumed in a process.

ABC axiom:

- Activities consume resources
- This consumption is what drives cost or inefficiency
- Understanding this is relationship is critical to managing overhead

Activity-based costing:

- Used to discover opportunities for cost or efficiency improvement
- Focuses on overhead, traces rather than allocates each expense to a particular cost object
- Makes indirect expenses direct

An ABC approach will account for:

- Activities / processes (comparing before and after the re-engineering project)
- The frequency and cost of the activity/process (comparing before and after the re-engineering project)
- The do-nothing scenario (what would happen if we do not do the project)
- Which processes provide value (that is are needed to attract and retain customers, result in operational savings)

When to use:

- High overhead
- Cost of errors is high
- Inefficiency
- Competition is stiff

Statistical Methods

Statistical methods definition: The science of collecting, analyzing, presenting, and interpreting data.

Statistical method axioms:

- All work occurs in a system of interconnected processes
- Variation exists in all processes
- Variation may occur in at least two forms:
    - Random
        - Natural variation due to the nature of the process
        - Can be reduced but not eliminated
    - Systemic
        - Variation due to some consistent cause
        - Cause can be addressed and eliminated
- Variability is what drives error rates or inefficiency
- Understanding what reduces the variability will help improve the process

Statistical method:

- Used to understand and then reduce or eliminate variability in processes for improvement
- Focuses on data (the Xs [inputs] which drive the Y [output])
    - Determines which processes are primarily responsible for driving the Xs
    - Then focus on those processes for improvement

When to use:

- High rate of errors
- Inconsistency of outputs

7.3.1.2 *The Voice of the Process*

Process performance can be affected by attributes of common entities such as people, training, procedures, tools, facilities, material, energy, money, time, policies, goals, constraints, laws, rules, and regulations.

When an organization commits itself to providing products or services to meet customer requirements and business goals, quality standards, schedules, and costs must be controlled if the process is to be considered capable of providing the desired outcome. By bringing a process under statistical process control for a sufficient period of time to detect the source of deviation, the errors or inefficiencies can be corrected, and a capable process can be attained. Therefore, the process must display a reasonable degree of statistical control to be considered capable of achieving the desired outcome.

The following are analytical methods you can use to understand and control process variation:

- Exploratory data analysis
- Bayesian statistics
- Regression analysis
- Discrete event simulations
- Reliability analysis techniques
- Non-parametric analysis
- Analysis of variance
- Control charts

Statistical control methods are well documented elsewhere. However, control charts warrant further explanation here for their role in BPM. *Control charts*, also known as Shewhart charts, are a powerful and commonly used technique for determining when a business process is in a state of *statistical control*. Following are different types of control charts that can be used to plot process behavior and determine the voice of the process:

- Average (X-bar) and range (R) charts
- Average (X-bar) and standard deviation (S) charts
- Individuals and moving range (XmR) charts
- Individuals and median moving range charts
- Moving average and moving range (MAMR) charts
- c charts
- u charts
- Z charts

Let's show an XmR chart for continuous data and how it could be used for investigating process variability. The following table is an XmR chart.

Day	Crude Oil Extraction (B/Dx1000)	mR	UCL	CL	LCL

Day 1	62		81,5	60,7	40,0
Day 2	69	7,0	81,5	60,7	40,0
Day 3	51	18,0	81,5	60,7	40,0
Day 4	57	6,0	81,5	60,7	40,0
Day 5	66	9,0	81,5	60,7	40,0
Day 6	60	6,0	81,5	60,7	40,0
Day 7	59	1,0	81,5	60,7	40,0
Day 8	58	1,0	81,5	60,7	40,0
Day 9	62	4,0	81,5	60,7	40,0
Day 10	51	11,0	81,5	60,7	40,0
Day 11	58	7,0	81,5	60,7	40,0
Day 12	69	11,0	81,5	60,7	40,0
Day 13	61	8,0	81,5	60,7	40,0
Day 14	53	8,0	81,5	60,7	40,0
Day 15	39	14,0	81,5	60,7	40,0
Day 16	70	31,0	81,5	60,7	40,0
Day 17	73	3,0	81,5	60,7	40,0
Day 18	59	14,0	81,5	60,7	40,0
Day 19	52	7,0	81,5	60,7	40,0
Day 20	53	1,0	81,5	60,7	40,0
Day 21	67	14,0	81,5	60,7	40,0
Day 22	63	4,0	81,5	60,7	40,0
Day 23	70	7,0	81,5	60,7	40,0
Day 24	61	9,0	81,5	60,7	40,0
Day 25	60	1,0	81,5	60,7	40,0
Day 26	65	5,0	81,5	60,7	40,0

Day 27	71	6,0	81,5	60,7	40,0
Day 28	60	11,0	81,5	60,7	40,0
Day 29	61	1,0	81,5	60,7	40,0
Day 30	62	1,0	81,5	60,7	40,0

Where:

Item	Description	Formula
mR	Moving range	Difference between data for day X and data for day X-1
UCL	Upper Central Line	$CL + 2{,}66 * \overline{mR}$
CL	Central Line	Average number of the collection of data
LCL	Lower Central Line	$CL - 2{,}66 * \overline{mR}$

Then:

CL = 60,7

$\overline{mR}$ = 7,8

UCL = 81,5

LCL = 40,0

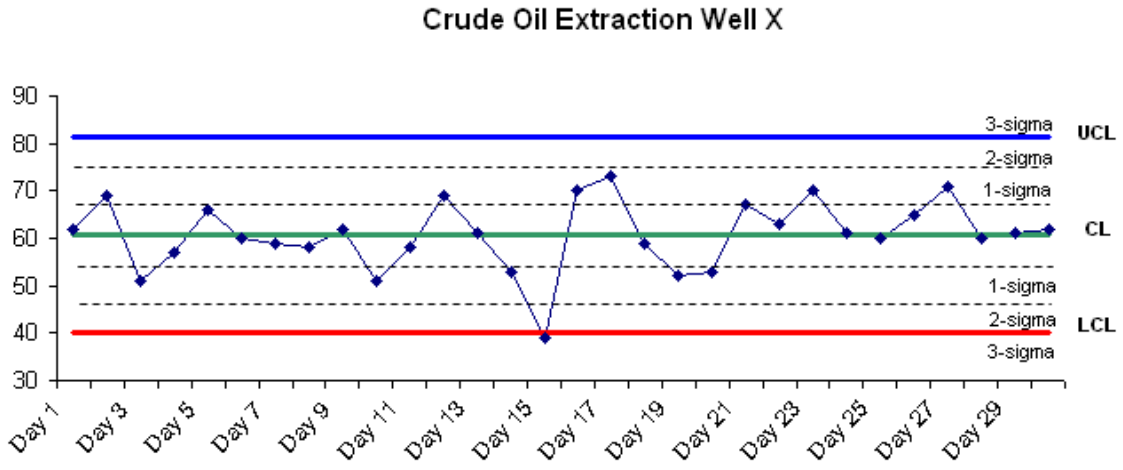


Figure 7.4 Data Summary

The example XmR table shows data for oil extraction. Each well produces crude oil year-round (24 hours a day, by 7 days a week, by 365 days a year). Every day, the Field Supervisor on duty registers the

extraction from each well in a table. How can we confirm if the production process has been stable and running continuously? Process performance can be quantified by measuring attributes of products produced by the process, so a control chart can plot process attributes values that have been observed during a period of time. When the oil well data from the XmR table is charted, it produces Figure 7.4.

At least four effective tests, called run tests, can be used for detecting unusual patterns in the process outcome (see Figure 7.5):

- **Test 1:** A single point falls outside the three-sigma control limits (UCL, LCL).
- **Test 2:** At least two out of three successive values fall on the same side of, and more than two sigma units away from, the centerline.
- **Test 3:** At least four out of five successive values fall on the same side of, and more than one-sigma unit away from, the centerline.
- **Test 4:** At least eight successive values fall on the same side of the centerline.

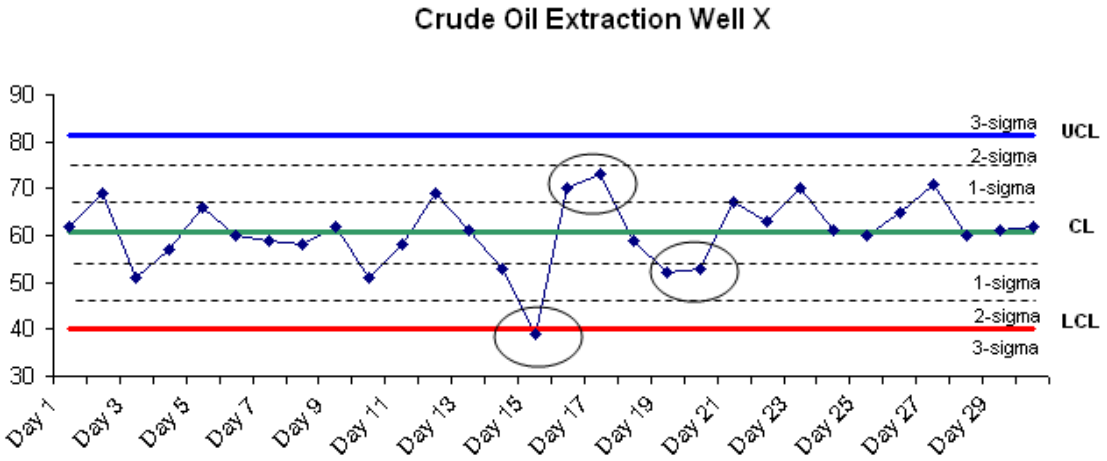


Figure 7.5 Patterns in the Process Measurement

These tests assume that successive observed values are statistically independent, so natural variation is symmetric about the mean. In our example, run tests can highlight process variability on day 15 through day 17, signaling that something happened to the process that should be investigated.

Walter A. Shewhart (1931) categorized two sources for process variation:

- **Common cause variation.** Due to natural and inherent characteristics of the process, variation occurs randomly around the mean. Synonyms for common cause are non-assignable cause or natural patterns.
- **Assignable cause variation.** Variation due to unexpected factors or occurrences that hinder process performance and affect process outcome. A variation occurs from the mean or persistently on one side of the mean. If it represents a problem, it should be addressed and eliminated. Synonyms for assignable cause are special cause or unnatural patterns. Examples: operator falls asleep, equipment malfunction, power surges, lack of raw material stopping production lines, workers on strike, or climate conditions preventing workers from carrying on activities.

[Total variation] = [Common cause variations] + [Assignable cause variations]

Assignable causes can be transient or persistent. Transient causes can be treated as a risk to the process, and actions should be taken in order to mitigate the risk (transient causes are rather infrequent and affect the process in an unexpected way). An example of a transient cause is the inability to complete an activity due to power outage in an urban zone where power outage is rare. A persistent cause, on the other hand, is something that has not been treated by the process as an inherent part of the process and that becomes a frequent and highly expected problem. Some adjustments might be needed in quantitative predictive models or process capability to account for the effects of persistent assignable causes. The inability to complete the activity due to power outage in a remote and underdeveloped zone where power outages are routine is an example of persistent cause.

Corrective actions can be performed to minimize or eliminate assignable causes of variation. When all assignable causes have been removed and prevented from recurring again, the preceding equation becomes [Total variation] = [Common cause variations], resulting in a stable and predictable process. Conclusion: Never stop control charting.

7.3.2 Decision Support for Process Owners and Managers

Decision support for Process Owners and managers is essential for continuously monitoring the actual process performance. Limited or inaccurate information about business processes can lead to poor decision making about where to invest in and how to improve organization performance.

Many organizations use a dashboard to monitor process performance based on the balanced scorecard (BSC) framework. These dashboards are a form of decision support and have been referred to as *business intelligence* and *business analytics*. Business intelligence generally deals with addressing Process Performance Measurement within an enterprise context. When business intelligence is instituted at an enterprise level, it mines information about specific cross-functional processes and the performance of those processes in real-time, displaying the information in a dashboard format.

Organizations that build broad capabilities for enterprise-level business analytics and business intelligence understand that the capability goes well beyond data and technology: it includes the capability to address the processes, skills, and cultures of their organizations.

7.3.3 Balanced Scorecard

The balanced scorecard is a management tool that provides stakeholders with a comprehensive measure of how the organization is progressing towards the achievement of its strategic goals. A balanced scorecard is intended to:

- Balance financial and non-financial measures
- Balance short and long-term measures
- Balance performance drivers (leading indicators) with outcome measures (lagging indicators)
- Contain just enough data to give a complete picture of organizational performance… and no more!

- Lead to strategic focus and organizational alignment

The five principles of a balanced scorecard are:

(1) Translate the strategy to operational terms
(2) Align the organization to the strategy
(3) Make strategy everyone's job
(4) Make strategy a continual process
(5) Mobilize change through executive leadership

The BSC is an integrated scorecard that aligns the major objectives of customer, financial, process, and people (learning and growth).

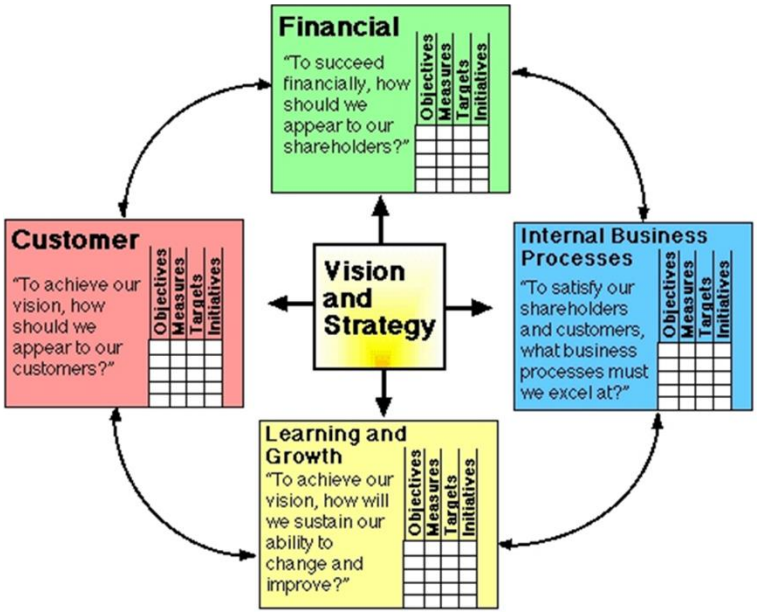


Figure 7.6 Balanced Scorecard, Norton/Kaplan (1992)

Strategy maps are a template for building out the full BSC. A more comprehensive example is provided for illustrating what it would look like when completed.

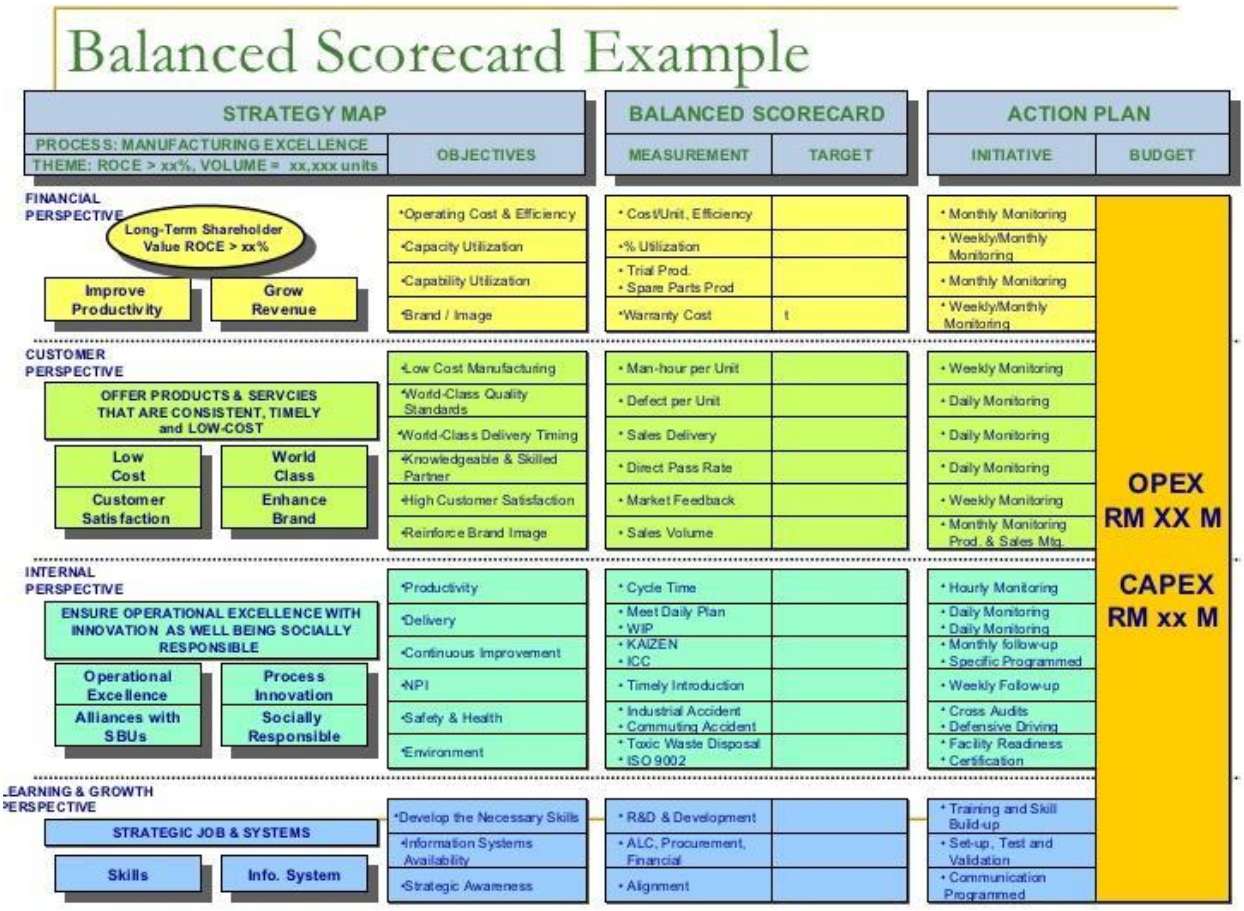


Figure 7.7 A Completed Balanced Scorecard Example from Strategy Map

While the balanced scorecard is used most frequently, it does have its drawbacks. Most of the criticisms tend to point to the fact that there are too many metrics and the ones that matter may not get the appropriate attention. Many organizations have modified the BSC to have fewer metrics and still include the major focus area.

7.3.4 Process Performance Measurement Key Concepts

The following table shows key concepts for Process Performance Measurement.

Process Performance Measurement Key Concepts
• Performance measurement is a journey — it must change as the organization changes. • The ability to support process performance measurement and then evaluate the results is related to the level of an organization's process management maturity. • Performance measurement starts with performance monitoring and a clear view of what should be monitored and why. • Performance measurement must be driven by evaluation targets — standards, KPIs, cost limits, and so on. • Any performance measurement *system* must be defined through a formal workshop approach that is managed by the managers who will be measured and use the information. • All changes should be managed through this formal workshop approach. • Any performance measurement *system* will evolve, or it will become out of sync with the organization and have little value. • Measurement is directly related to the quantification of data (or data set) in an acceptable standard and quality (accuracy, completeness, consistency, and timeliness).   ○ *Metric* normally represents an extrapolation or mathematical calculation of measurements resulting in a derived value.   ○ *Indicator* is a simple representation of a measurement or metric referencing a stated goal. • Measurement associated with the work or output of the process that is performed is based on four fundamental dimensions: time, cost, capacity, quality. • There are twelve characteristics of process performance indicators: alignment, accountability, predictive, actionable, few in number, easy to understand, balanced and linked, transformative, standardized, context-driven, reinforced, and relevant. • Value stream mapping, activity-based costing, and statistical process control are widely accepted, reliable measurement methods. • When a process is stable, the variation in process performance is predictable, so that unexpected results are extremely rare. • [Total variation] = [Common cause variations] + [Assignable cause variations]. • World-class quality = on target with minimum variability.

8 Technology and Transformation

The HBR article from February 2016, “What Do You Really Mean by Business Transformation?", identified three types of transformation: operational, operational model, and strategic.

Operational. What you are currently doing, but faster, cheaper, better. Many companies that are doing *digital* are mostly doing this type. Sadly, focusing on doing today *better* only creates parity with competitors and is only a recipe for short-term survival.

Operational model. Doing what you are currently doing in a fundamentally different way. Netflix is a great example of this type. Operational model transformation changes the metrics an organization uses to track performance. For Netflix’s DVD operation, it’s inventory management, warehousing, and distribution costs. For their streaming operation, it’s website uptime and bandwidth costs.

Strategic. Involves changing the very essence of an organization. Amazon going from online retail to a cloud computing company is a great example of this type.

When executed successfully, strategic transformation can reinvigorate an organization’s growth engine. Strategic transformation changes an organization’s competitive set. For example, in Google’s core advertising business, Google competes against other content and technology players. With its driverless car, it competes against car manufacturers like General Motors and BMW.

The best practice is to combine the operational model with strategic transformation. This transformation could be accomplished in two major phases:

- **Phase 1.** Organization strengthens *today* by reinventing their core operating model and
- **Phase 2**. Organization creates *tomorrow’s* core business. Future strategy could be planned with a carefully constructed capabilities set.

8.1 Business and Digital Transformation

Companies in every industry that have been engaged in business transformation are now engaged in digital transformation. How are *business transformation* and *digital transformation* similar, and how are they different? The most common definition of *business transformation* is the process of fundamentally changing the people, processes, systems, and technology across an entire business or business unit to achieve measurable improvements in efficiency, effectiveness, and customer satisfaction. Sounds a lot like BPM, doesn’t it?

There are three definitions of digital transformation worthy of mentioning.

Digital Transformation Definition	Source
Digital transformation is the integration of digital technology into all areas of a business, fundamentally changing how you operate and deliver value to customers. This one is aligned to type 1, operational.	The Enterprisers Project
Digital transformation marks a radical rethinking of how an organization uses technology, people, and processes to fundamentally change business performance. This definition aligns with type 2, operational model.	George Westerman, MIT principal research scientist

Digital transformation is the process of using digital technologies to create new — or modify existing — business processes, culture, and customer experiences to meet changing business and market requirements. This definition comes very close to type 3, strategic transformation.	Salesforce

This reimagining of business in the digital age described by Salesforce is digital transformation. It transcends traditional roles like sales, marketing, and customer service. Instead, digital transformation begins and ends with how you think about, and engage with, customers.

Think Amazon and Google as noted earlier — you get the picture. The latest thinking is that business and digital transformation employ what's called *digital twins*. According to Network World:

> *"A digital twin is a digital representation of a physical object or system. The technology behind digital twins has expanded to include large items such as buildings, factories and even cities, and many have said people and processes can have digital twins, expanding the concept even further."*

If you are going to digitize your processes or your supply chain, you must first document the physical processes — this is the first component. The second is either reimagining the process first, then digitizing it, or just digitizing it if the process is already a high-value process to the customer. The more that a digital twin can duplicate the physical object, the more likely that efficiencies and other benefits can be found. Digital twins will play heavily in IoT (Internet of things), discussed later.

In order to be successful in business and/or digital transformation, management must consider people first in terms of the roles, skills, and competencies required to engage in the overall transformation. BPM is foundational, as are the technologies to create the digital twins.

It also requires creating transformation teams with mixed skills and the ability to work in an open, collaborative environment. In such environments, people are encouraged to think outside the box and leverage their backgrounds, disciplines, and creativity to reimagine the organization and the customer experience. This represents a new approach for many companies that may not be currently supported by BPMS or other enabling technologies to simulate and iterate the physical via the digital twin.

The approaches and techniques presented in this chapter represent the combined experiences of several industry-leading practitioners working across a variety of industries and companies.
Today, business and digital transformation are positioned to change the way the customer is delighted and the way business is conducted. Transformation can be accomplished by leveraging emerging technologies and BPM methods and techniques. As BPM practitioners, we are at the front of this revolution, and we are positioned to make a significant difference in the marketplace.

8.1.1 Business Driven Change versus Technology Enabled Change

"If you don't manage and lead change, you have to surrender to it," is a quote that can be interpreted with different meanings. The quote is actually Law 1 from the book, *Single Point of Failure: The 10 Essential Laws of Supply Chain Risk Management*, by Gary Lynch (2009). Within the context of the book, it means that, "Everyone, without exception, is part of a supply chain." When it comes to business processes, that is also true: the business process may start with one person and hand off to another on down the path until the outcome is delivered to the customer. The book was written ten years ago and

was, in fact, a book on supply chain risk. However, the reality is that we are all part of a value chain, and in that context, the law can also mean *plan for change,* otherwise the change will force you to react in ways you wouldn't if you had planned for it.

One of the most common misconceptions about business change is that it *needs* technology to be successful. That couldn't be more untrue. In fact, most business change happens without technology. It's really a question of how companies choose to respond to the business change that differentiates them from the competition. Most choose technology and fail for two main reasons:

- They don't start with the customer and work from the outside in
- They lead with technology and not with process and capabilities

Business and digital transformation are much broader than organizational and business unit improvements. The scope and reach encompass the end-to-end interactions between an organization and its customers and its suppliers. It can even reach one level deeper to their customer's customer and their supplier's supplier.

For example, if a brand drug manufacturer like Pfizer outsources manufacturing of one of their brand drugs to an offshore manufacturer in India, the offshore manufacturer is Pfizer's supplier. However, that offshore manufacturer then has to procure API (active pharmaceutical ingredients) from their supplier (supplier's supplier) to manufacture the brand drug for Pfizer. On the customer side, the drug wholesalers and retail pharmacies are the direct customers of Pfizer and the customers of the wholesalers are hospitals (customer's customer).

Censuswide conducted a global survey in 2017 on digital transformation. Findings were surprising.

- 58% said customers are the biggest driver for going digital.
- 74% said digital projects are often not linked to the overarching strategy. This was not surprising as most of the respondents stated that it was *all about the process*.
- 70% said that they are lacking the skills, in particular, AI (83%) and cybersecurity (80%).
- 84% said that they would change their business model to take advantage of a new technology.
- 83% said AI will revolutionize the skills their organization needs.

See www.cio.com/article/3236965/is-your-digital-transformation-behind-the-curve-see-how-you-compare.html#slide1.

It is the recommendation for the current BPM practice that business and digital transformation begin with physical processes — the value chains. The next stage is to rethink the operational model and capability set to design, then digitize, by applying the appropriate BPM methodologies and frameworks, enterprise technologies, organizational restructuring and reskilling, and culture changes through collaborative teams. The transformation can achieve, in some cases, twelve-fold improvements in any of the major indicators like revenue and EBITDA growth, cost optimization, and ultimately, customer satisfaction.

8.1.2 Emergence of Chief Digital Officer Role

Many Fortune 500 companies (and more) have created the CDO (Chief Digital Officer) role, to jump-start digital transformation efforts within their organizations. Surprisingly, the CPO (Chief Process Officer) role didn't really take hold, and where it did, in many cases became the COO (Chief Operating Officer). It's

important to note that a thorough understanding of the business operations, including core cross-functional processes, is essential to digitizing your organization. In the August 5, 2019 issue of HBR, there was an article titled, "Don't Put a Digital Expert in Charge of your Digital Transformation." The article starts off asking: *Who should you pick to lead your company's digital transformation?* They give three choices (not real names):

- **William**: an insider who has a proven track record but doesn't know much about digital
- **Sarah:** a young digital guru who's just led a new category expansion at Amazon
- **Sophia:** a sharp ex-McKinsey consultant with experience advising customers on digital

Most executives in the HBR survey picked Sarah. Well, this is a true story of a global appliance manufacturer who picked Sarah. She was able to communicate the strategy to senior executives, but when it came time to talk to the managers and engineers (who were resistant to change) all hell broke loose. She hired a talented digital team and did strategy by the book, but failed. On the second try, who do you think they picked? The insider with a proven track record. The first thing he did was focus on the customer and the sales force to get an idea of what the pricing experience was like for them. Then he talked to customers directly to understand what they wanted with regard to products and pricing. Long story short, the effort was a huge success. The important point is that a business operations leader who is familiar with processes, customers, and stakeholders was the right choice for this company. The first choice was a good choice for a startup, but not for an established company.

The Chief Digital Officer is also the Chief Process Officer.

8.2 Technology as an Enabler

Experience shows that the application of technology is effective when the complexity of the process or the amount of information to be processed is too great to manage with manual methods. This notion is now being turned on its head with the introduction of artificial intelligence (AI) and robotic process automation (RPA). Tasks that are repetitive and mundane can now be automated such that RPA of processes is increasingly important for medium to large scale enterprises. RPA attempts to coordinate efforts among members of geographically dispersed workgroups. The automation of task-intensive workflow can create remarkable increases in efficiency by reducing the time and costs associated with process activities and the lag times between the steps in a process, particularly when compared to paper-based methods. As an assistant to human efforts, technology can help people become more efficient by providing memory aids, balancing workloads, and making more information available in decision processes.

Business Process Management (BPM) is a management discipline that translates business strategy into process, people, and IT-based operational execution — at pace with certainty. BPM technology is key to delivering on this promise. It helps create the transparency necessary to achieve conflicting goals like quality and efficiency, agility and compliance, or internal alignment and external integration into enterprise networks. BPM systems enable the implementation of *processes to change* where this is appropriate. The high level of maturity of many components of BPM technology is also a reason for the

increasing interest in BPM. Now BPM practitioners can focus on business outcomes and line up the necessary technology accordingly. We can move towards *value-driven BPM*.

BPM technology supports the entire life cycle of a business process, from design through implementation to execution and controlling of processes. It supports the linking of strategy to processes through an appropriate design using *business process analysis* (BPA) tools and converts that strategy into an agile execution using BPM automation engines. Process Performance Measurement and *business activity monitoring* (BAM) systems shed light on running processes that enable effective controlling. New architectures, such as *service-oriented architectures* (SOA), enable the agility of IT-supported business processes even more. The resulting agility will again be increased through new approaches such as *software as a service* (SaaS) or cloud computing. BPM systems align software components with the business needs of processes. The use of social media resulting in *Social BPM* creates opportunities to integrate the people and IT dimension of BPM, delivering even higher performance of the powerful management discipline of BPM.

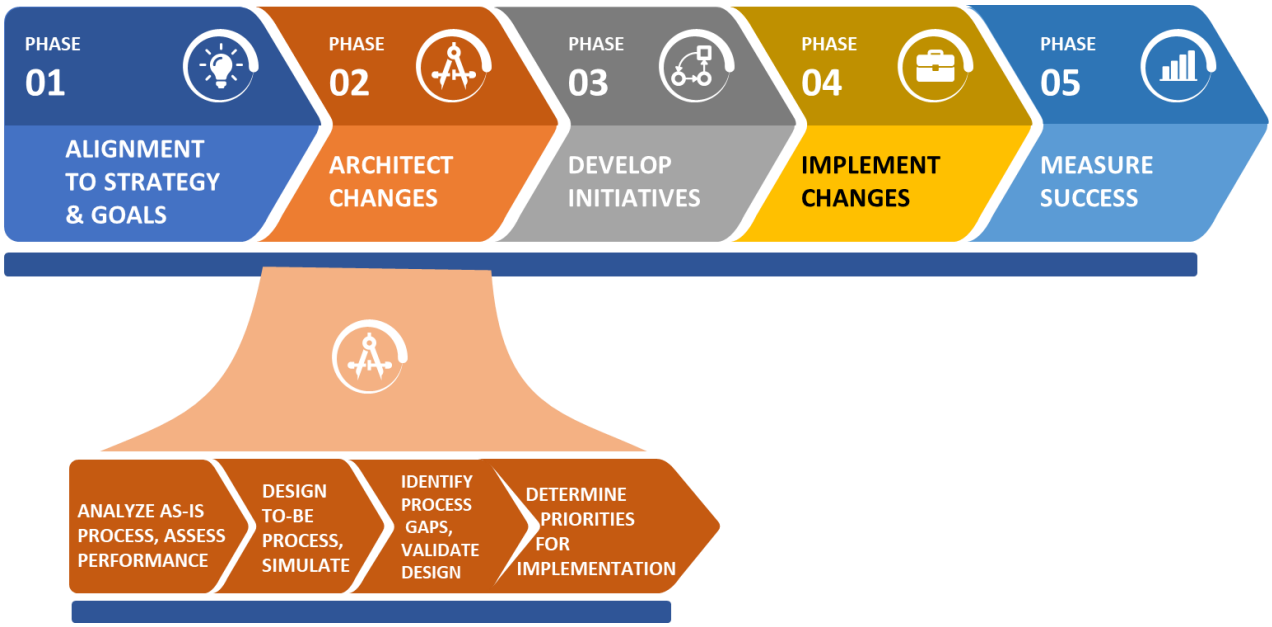


Figure 8.1 Phase 2 of the BPM Life Cycle

8.3 Business Capability Development

8.3.1 Enterprise and Business Architecture Management

Technology management begins and ends with enterprise architecture. *Enterprise Architecture* is the process by which organizations create conceptual strategic blueprints. The blueprint defines the structure and operation of how an organization can most effectively achieve its current and future objectives. The intent is to standardize and organize IT infrastructure to align with business goals. In the twenty-first century, these strategies should support digital transformation, IT growth, and the modernization of IT as a department. That's the technical definition; the simple, business definition is

that Enterprise Architecture is about *design*. Figure 8.2 illustrates this design concept in a simple manner.



Figure 8.2 Enterprise Architecture *Design* Domains

There are four domains of Enterprise Architecture:

- Business
- Data
- Application
- Technical (Infrastructure)

Following are definitions of each Enterprise Architecture domain:

- **Business Architecture**. Translates business unit strategy or objectives into business process focus areas and corresponding capabilities that reflect a view of the functions and processes required for an organization's business to be successful.
- **Data (Information) Architecture**. A set of rules, policies, standards, and models that govern and define the type of data collected and how it is used, stored, managed, and integrated within an organization and its database systems. It provides a formal approach to creating and managing the flow of data and how it is processed across an organization's IT systems and applications. (Techopedia Staff, n.d.)
- **Application Architecture.** The process of defining the framework of an organization's application solutions against business requirements. It ensures the application landscape is scalable, reliable and manageable. Application architecture defines the applications required to support business functionality and identifies the delivery methods for information.
- **Technical architecture.** A process to define an enterprise's entire collection of hardware, software, networks, data centers, facilities, and related equipment used to develop, test, operate, monitor, manage and/or support information technology services.

There are several Enterprise Architecture frameworks (process life cycles). Following are some of the most common:

- **Zachman Framework**. First proposed in a 1987 article in the IBM Systems Journal, the Zachman Framework is one of the earliest examples of an Enterprise Architecture framework. It arose out of the work of John Zachman. It organizes enterprise artifacts onto a two-dimensional grid, usually six-by-six.
- **TOGAF.** Short for The Open Group Architecture Framework, TOGAF is the product of work done by an industry standards organization and is based on an earlier framework created by the Department of Defense. It is one of the most popular Enterprise Architecture frameworks in use today. It has a circular structure with eight key sections and four architecture domains.
- **FEAF.** The Federal CIO Council first introduced the Federal Enterprise Architecture Framework (FEAF) in 1999. The US government later dramatically revised FEAF in 2013, and it is now the standard for US government agencies. Many of its characteristics are mandated by law. It includes six reference models: performance, business, data, application, infrastructure, and security.
- **DoDAF.** Based on work from the 1980s and 1990s but not released under this name until 2003, the Department of Defense Architecture Framework (DoDAF) continues to be a popular framework for use in highly complex environments. It incorporates seven different viewpoints: systems, services, data and information, capability, project, operational, and standards.

There are pros and cons to all of them, and regardless of which one is used, they all have the following things in common as it relates to the organization.

- All start with corporate strategy and goals or objectives
- Sequencing starts with business, data, application, technology
- Each one aligns to the precedent in the sequence

Figure 8.3 illustrates the basic principles shared by Enterprise Architecture frameworks.

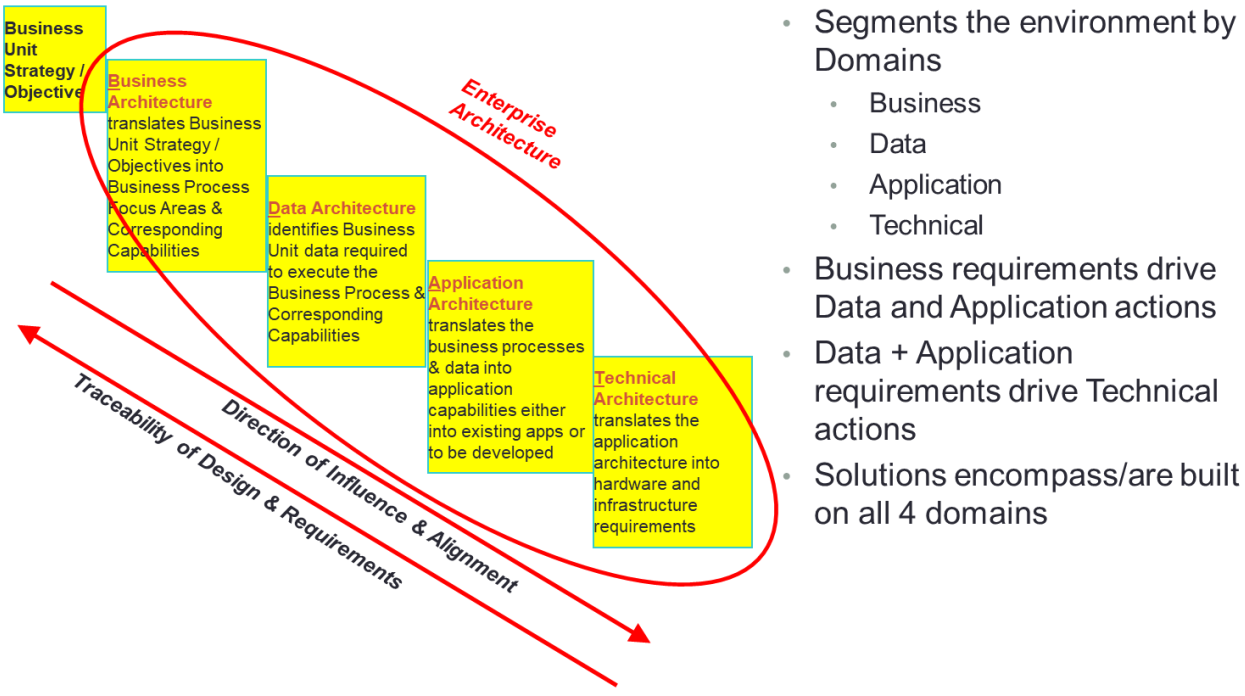


Figure 8.3 Enterprise Architecture Alignment

Enterprise Architecture answers the following questions:

Question	Focuses on
Why?	Purpose or goal
When?	Period or event
How?	Process
What?	Product or output
Who?	Person or role
Where?	Place or facility

(Based on vertical dimensions of Zachman Framework)

BPM practitioners must be very familiar with Enterprise Architecture and be capable of using at least one EA framework (or an adaptation of one). The *Business Architecture* discipline is a part of BPM that cannot be over-emphasized, especially for both business and digital transformation in any organization.

Business Architecture alignment starts in phase 1 and should finish in phase 2 of the BPM life cycle. The sections that follow cover the role of Business Architecture in aligning *process* to *strategy* and linking *capability* to *process* and to *technology*.

The Zachman Framework is the most referenced for Enterprise Architecture, and when applied to Business Architecture, provides the best context for the vertical and horizontal dimensions.

The vertical dimensions are the six questions covered in the preceding table. The horizontal dimensions are illustrated in Figure 8.4.

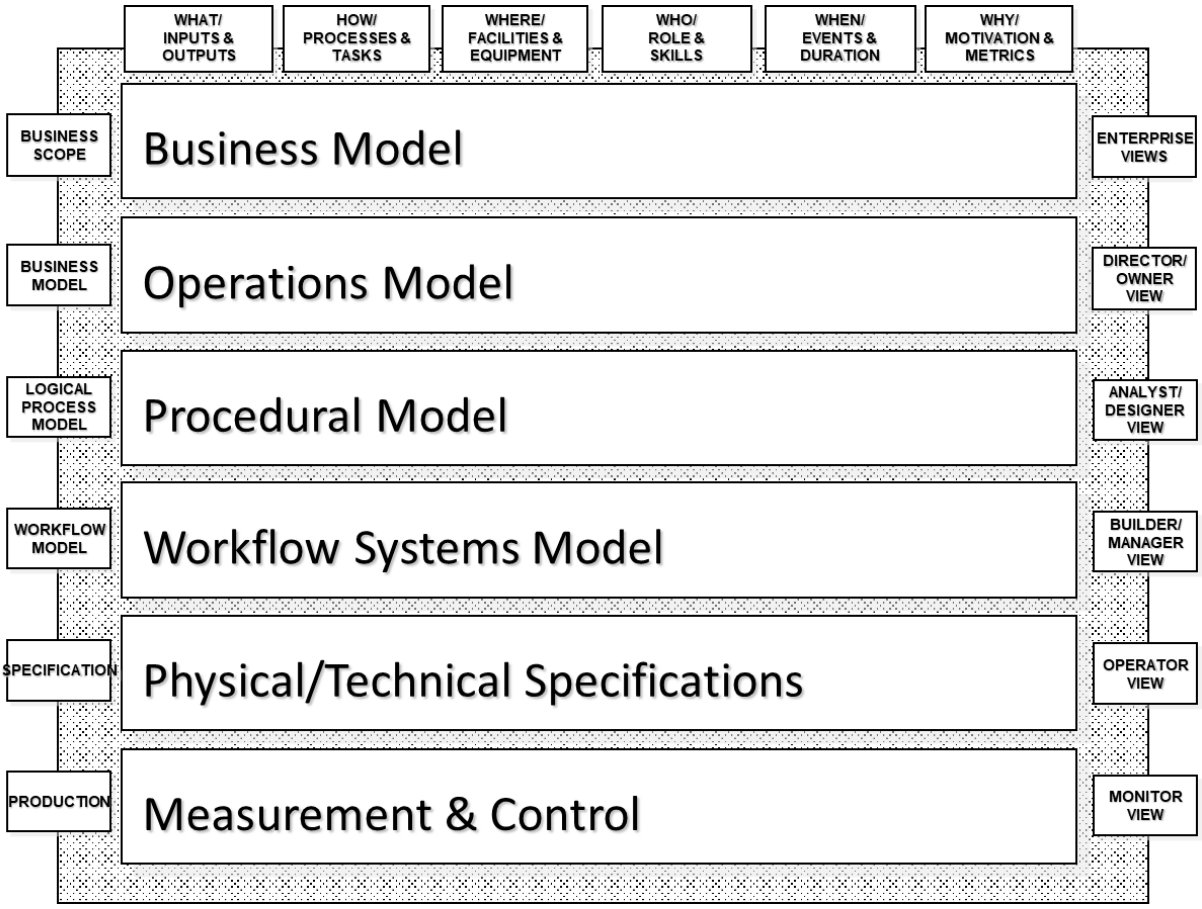


Figure 8.4: Zachman Framework: Model Levels in Context of Business Architecture

8.3.2 Levels of Models

The horizontal dimensions of the Zachman Framework represent views of a business from different perspectives. Models supporting the perspectives or views of an enterprise's processes can be developed and maintained for different audiences or purposes.

8.3.2.1 *Enterprise Models*

An enterprise view model is typically a highly abstracted business classification model that is used to describe the focus of the organization and to organize the processes in an overall Business Architecture. Some examples of this type of model are the APQC Process Classification Framework, Porter's value chain, and industry-specific frameworks such as those in the energy distribution, oil and gas production, telecommunications, and insurance industries.

These models typically organize processes into categories such as primary, support, and management. Each of these categories can be used to group the major processes of the organization. Here are some examples:

- In Porter's value chain, the primary processes are:

    - Inbound logistics
    - Operations
    - Outbound logistics
    - Marketing and sales
    - After-sales service
- In the APQC Process Classification Framework, the primary (Operations) processes are:
    - Develop vision and strategy (1.0)
    - Design and develop products and services (2.0)
    - Market and sell products and services (3.0)
    - Deliver products and services (4.0)
    - Manage customer service (5.0)
- In a more customer-oriented services model, the primary categories might be:
    - Engage customers
    - Transact business
    - Fulfill customer expectations
    - Service customers

The major business processes are grouped within these categories.

Generally, each of the high-level business processes is then described in more detail by their major components (sub-processes). An enterprise model typically has two or more levels of detail and serves as a high-level business blueprint or Business Architecture. The model may or may not include support and management processes.

These models have uses other than as a general classification and communications tool. The processes can be mapped to *key performance indicators* (KPIs) and strategic goals in a process portfolio and used to prioritize resources and project efforts. They may be mapped into a *system dynamics* type model to formulate strategies for alternate future scenarios or to develop high-level estimates and forecasts.

8.3.2.2 *Business Models*

Business models depict the major events, activities, and results that describe each of the major end-to-end processes, their sub-processes, and their interactions with their environment. Business models also typically describe the support and management processes, as well and how they interact with or support the primary processes.

8.3.2.3 *Operations and Workflow Models*

Operations-level models typically describe how the business model is carried out. These models are detailed — mapped down to activity, task, and procedural level and describe the physical implementation details of the operating processes.

8.3.2.4 *Systems Models*

Systems models depict the triggering events, software processes, data flows, and system outputs required to support business operations.

8.3.2.5 *Measurement and Control Models*

Measurement and control models indicate points in the operation where key performance is measured and control points are monitored.

8.3.3 Business Architecture Approach and Tools

What is important to the BPM practitioner is that Business Architecture is the primary driver (data is the other side of the coin) for the other domains. Business and data should be designed concurrently since data is an input/output to process.

Business Architecture is the formal documentation of an organization's core processes and their supporting roles and responsibilities. It defines the organization's value chains and how its business processes fit together, are managed, and measured.

Business Architecture is used for:

- Aligning business process to process capability to business strategy and goals
- Setting architectural vision based on business strategy
- Establishing guiding principles
- Formal documentation of processes and the supporting roles and responsibilities
- Process measurement for operational performance and benchmarking
- Process integration, alignment, and reuse
- Communication and education
- Enterprise storage and change management of process models

Figure 8.5 illustrates a simple methodology (non-TOGAF) for development of a Business Architecture alignment to strategy.

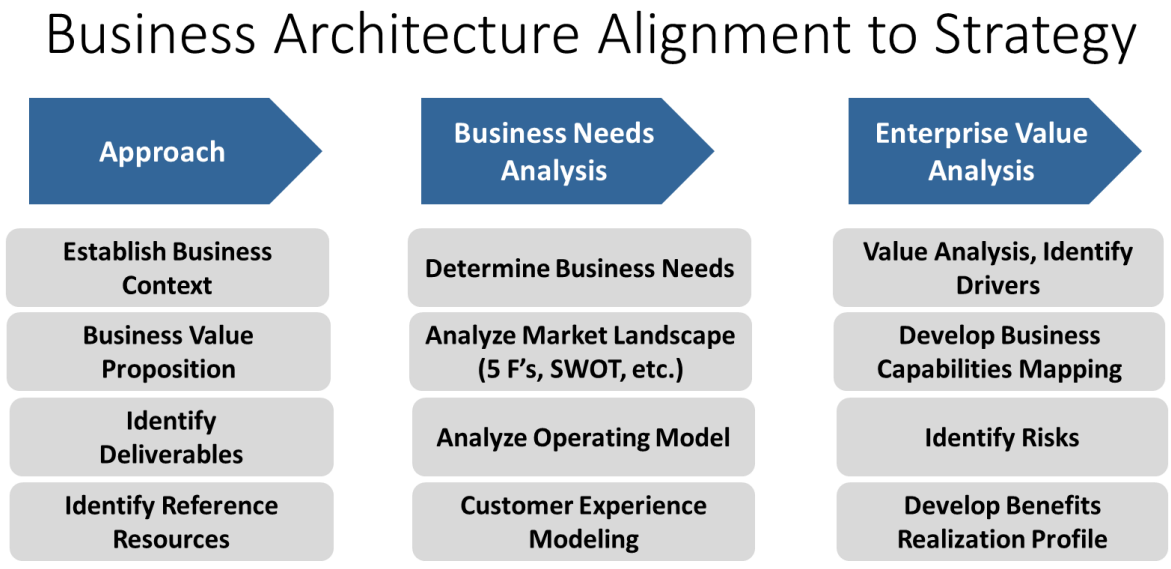


Figure 8.5: Phase 1 and 2 Business Architecture Activities

8.3.3.1 *The Impact Grid for Enterprise Business Architecture*

The Impact Grid is the Enterprise Business Architecture representation of the Enterprise Architecture model adapted from the Zachman EA Framework. *All* factors and elements of the grid are *dynamic* and will *change*.

Figure 8.6 shows the Enterprise Architecture framework from the point of view of all the levels of Business Architecture and how each level is aligned.

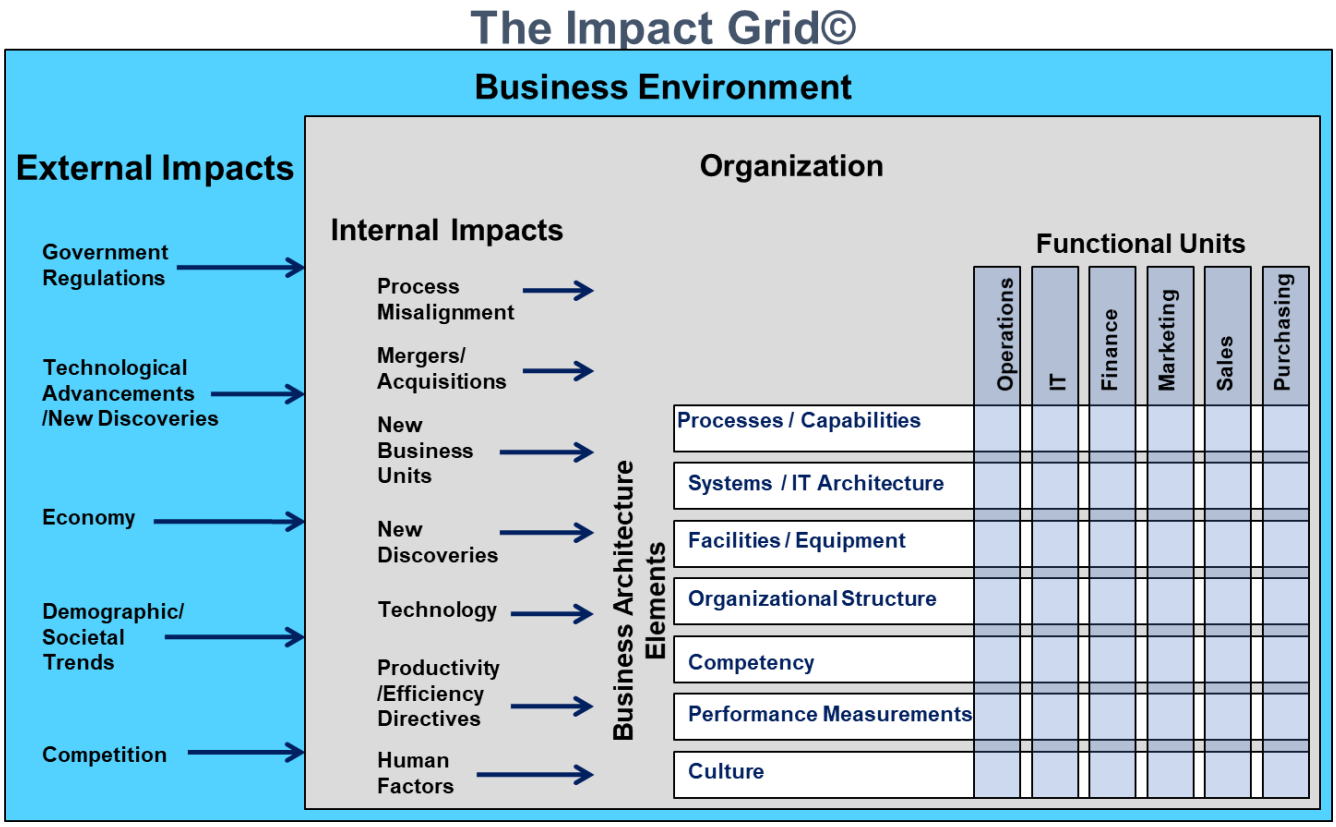


Figure 8.6: Impact Grid for Business Architecture (Source: Jack Hilty and Janice Koerber)

The overarching business environment is represented first by external factors:

- Government regulations
- Technological innovations or advancements
- Demographic and social trends
- Competition and any substitutes represented through competition

The external impacts are unpredictable (generally) and are not under the control of the enterprise. What happens externally influences the enterprise and is likely to require changes internally to respond to those external influencing factors.

The second set of impact factors are represented *internally in the organization*:

- Process misalignments

- Mergers and acquisitions
- New businesses (products or services)
- New discoveries (for example, gene therapies)
- Technology (for example, 3D printing, blockchain)
- Productivity and efficiency directives
- Human factors (for example, upskilling, competencies)

The internal factors are those responses (usually) to the external influences. Internal factors are those that the organization can control.

The *vertical* siloes are the *functional business units* (via Porter's value chain):

- Operations (includes HR)
- IT
- Finance
- Marketing
- Sales
- Manufacturing and supply chain

The functional business units represent the resources that will do the work required to support customers and the strategic plan.

The horizontals represent the Business Architecture elements:

- Processes and capabilities
- Systems and IT architecture
- Facilities and equipment
- Organizational structure
- Competencies
- Performance measurements
- Culture

The Business Architecture elements are those things that will almost always change in response to the other factors in the grid. These elements are the most dynamic within the Impact Grid and require routine review for improvement. There are levels in the organization that require more details. However, we will focus on the business model, since it is generally the revenue generator for the organization.

The Impact Grid is used in conjunction with tools discussed in earlier sections: Porter's value chain analysis, Porter's Five Forces model, and the strategy map. The Impact Grid is for translating the strategy into process capabilities.

8.3.3.2 *The Business Model Canvas*

Another tool used for characterizing the business model is the Business Model Canvas (BMC), which on the surface can seem like a variation of a representation of Porter's value chain model. The Business Model Canvas has nine building blocks, as shown in the following table.

BMC Building Blocks	Definition	Key Questions
Key Partners	Some activities are outsourced, and some resources are acquired outside of the enterprise	• Who are our key partners? • Who are our key suppliers? • Which key resources are we acquiring from our partners? • Which key activities do partners perform?
Key Activities	Activities that create value for the customer	• What key activities do our value propositions require? • Our distribution channels? • Customer relationships? • Revenue streams?
Key Resources	Assets required to offer and deliver value to the customer	• What key resources do our value propositions require? • Our distribution channels? • Customer Relationships? • Revenue streams?
Value Proposition	Value created for the customer in the form of a problem solved or needs met	• What value do we deliver to the customer? • Which one of our customers' problems are we helping to solve? • What bundles of products and services are we offering to each segment? • Which customer needs are we satisfying? • What is the minimum viable product?
Customer Relationships	Relationships with customers within each segment	• How do we get, keep, and grow customers? • Which customer relationships have we established? • How are they integrated with the rest of our business model? • How costly are they?
Channels	Where value propositions are delivered to customers via communication, distribution, and sales	• Through which channels do our customer segments want to be reached? • How do other companies reach them now? • Which ones work best? • Which ones are most cost-efficient? • How are we integrating them with customer routines?
Customer Segments	Dividing customers into subgroups that have similar characteristics	• For whom are we creating value? • Who are our most important customers? • What are the customer archetypes?
Cost Structure	Represents all business elements that result in generating costs	• What are the most important costs inherent to our business model? • Which key resources are most expensive? • Which key activities are most expensive?

Revenue Streams	Result of value propositions delivered successfully to customers	• From what value are our customers really willing to pay? • For what do they currently pay? • What is the revenue model? • What re the pricing tactics?

Figure 8.7 shows an example of a Business Model Canvas, including questions for each business element.

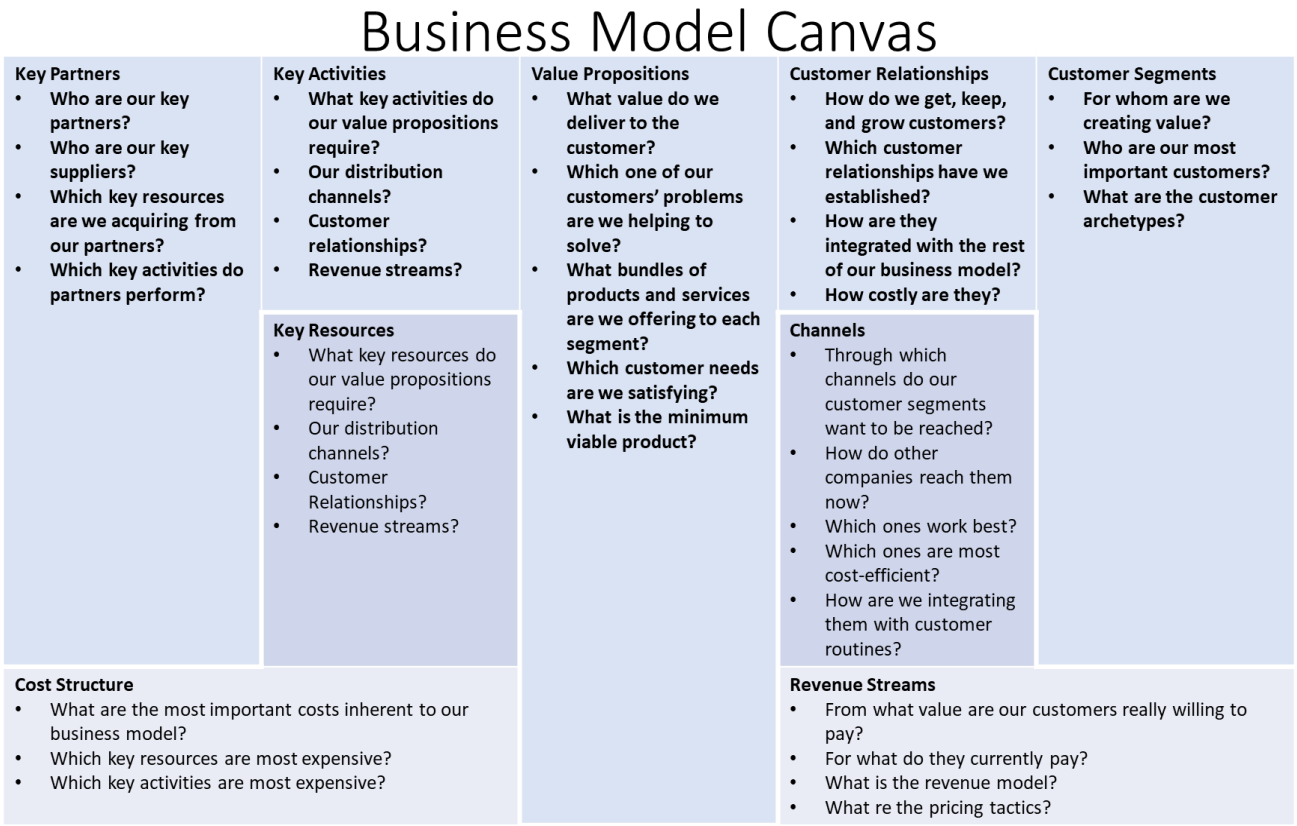


Figure 8.7 Example Business Model Canvas

The Business Model Canvas can be used to:

- Help understand the typical business model for an industry
- Document their existing business model
- Develop a brand-new product, service, or business
- Facilitate a session to develop corporate or departmental strategy
- Elicit high-level requirements for a new product or service when company silos prevent cross-department collaboration
- Recommend a new service or product based on cultural fit or required revenue
- Design or modify a new service or product based on customer feedback or insights

There are five approaches to using the Business Model Canvas:

(1) **Offer-driven approach.** Assumes innovation starts at value proposition and works outward to key resources and channels, then cost structure and revenue streams.
(2) **Resource-driven approach.** Assumes innovation originates from an organization's (key partners) infrastructure or partnerships and works across the canvas.
(3) **Multiple epicenter-driven approach.** Assumes innovation comes from multiple elements that converge on the value proposition.
(4) **Customer-driven approach.** Assumes innovation begins with customer needs, facilitated access, or increased convenience.
(5) **Finance-driven approach.** Assumes innovation is driven by revenue streams or reduced cost structure.

8.3.3.3 *Porter's Competitive Strategy Matrix*

The five approaches used in the Business Model Canvas are similar to Michael Porter's Competitive Strategy Matrix where he defines three strategy types that can attain a competitive advantage. These strategies are cost leadership, differentiation, and market segmentation (or focus). Cost leadership is about achieving scale economies and using them to produce high volume at a low cost.

Strategic Advantage

Strategic Target	Low Cost	Differentiation – Uniqueness Perceived by Customer
Industrywide	**Cost Leadership**	**Differentiation**
Particular Segment	***Cost* Focus**	***Differentiation* Focus**

Figure 8.8 Porter's Competitive Strategy Matrix, adapted (Porter 1985)

Porter's generic strategies are based on the idea that an organization's relative position within its industry determines whether an organization's profitability is above or below the industry average. The fundamental basis of above-average profitability, in the long run, is a sustainable competitive advantage. There are two basic types of competitive advantage: low cost or differentiation. The two basic types of competitive advantage, combined with the scope of activities used to achieve them, lead to three generic strategies for achieving above-average performance in an industry: *cost leadership*, *differentiation*, and *focus*. The focus strategy has two variants: *cost focus* and *differentiation focus*.

Cost Leadership

In cost leadership, an organization sets out to become the low-cost producer in its industry. The sources of cost advantage are varied and depend on the structure of the industry. They may include the pursuit of economies of scale, proprietary technology, preferential access to raw materials, and other factors. A low-cost producer must find and exploit all sources of cost advantage. If an organization can achieve and sustain overall cost leadership, then it will be an above-average performer in its industry, provided it can command prices at or near the industry average.

Differentiation

In a differentiation strategy, an organization seeks to be unique in its industry along some dimensions that are widely valued by customers. It selects one or more attributes that many customers in an industry perceive as important, and uniquely positions itself to meet those needs. It is rewarded for its uniqueness with a premium price.

Focus

The generic strategy of *focus* rests on the choice of a narrow competitive scope within an industry. The focuser selects a segment or group of segments in the industry and tailors its strategy to serving them to the exclusion of others. The focus strategy has two variants: cost, and differentiation.

- **Cost.** In cost focus, an organization seeks a cost advantage in its target segment.
- **Differentiation.** In differentiation focus, an organization seeks differentiation in its target segment.

Both variants of the focus strategy rest on differences between a focuser's target segment and other segments in the industry. The target segments must either have customers with unusual needs or else the production and delivery system that best serves the target segment must differ from that of other industry segments. Cost focus exploits differences in cost behavior in some segments, while differentiation focus exploits the special needs of customers in certain segments.

The Business Model Canvas and Porter's Competitive Strategy Matrix grid are useful tools and can be used in conjunction with other tools such as Porter's value chain analysis, Porter's Five Forces model, and strategy maps. When building out a process capability map, all the process capabilities must be considered in context of the overall strategy of the organization. Both tools and best practices are for translating the strategy into process capabilities.

8.3.3.4 *The Coherence Premium*

The concept of a *coherent business model* builds on the Business Model Canvas. Three major components make up the overall business environment:

(1) **Market**. Includes the markets, industries, customers, market segments, and channels.
(2) **Service**. Includes customer relationships, value propositions, and offerings in products and/or services.
(3) **Operating**. Includes the value chains, business processes, business capabilities, functions, data, applications, and technology.

A capability is something that you do well that customers value and competitors can't do. Yet it's more than activities or functions, it is the interconnection of knowledge, people, processes, tools, and IT that allow an organization to outexecute rivals on some competitive measure — a *coherence premium*. (Leinwand and Mainardi 2010). C.K. Prahalad and Gary Hamel extend the *coherence premium* concept**.** They propose core competencies are in fact a capabilities *system* that creates value in a differentiated way. The idea of coherence is when an organization's capabilities system is consciously chosen and implemented to support a focused strategic purpose that is aligned with the right product and/or service portfolio (2010).

The essence of Business Architecture then is to determine which capabilities will create that value system. The engine of value creation is a system of three to six capabilities that taken together allow an organization to deliver its value proposition effectively and in a differentiated way compared to competitors. The important point is that organizations must cultivate a system of mutually reinforcing capabilities, such that their competitive advantage becomes much more powerful. This is *coherence*. Coherent organizations build the product and service portfolios such that every offering is aligned with the capabilities system. Organizations scan the market to identify new opportunities that will leverage the capabilities system and prune those products or services that don't align (Prahalad and Hamel, 2010).

A *coherent business model* then is one that is synchronized around its market position, the product and service portfolio, and its most distinctive strategic capabilities, all working together as a system. This model has been studied in the consumer-packaged-goods (CPG) industry where high coherence in capabilities is strongly correlated with greater profitability. (With profitability measured by EBIT margin, or earnings before interest and taxes divided by net revenue over a 5-year period). The profitability findings are particularly apparent in mature, post-consolidation markets. Figure 8.9 illustrates the correlation between coherence and EBIT.

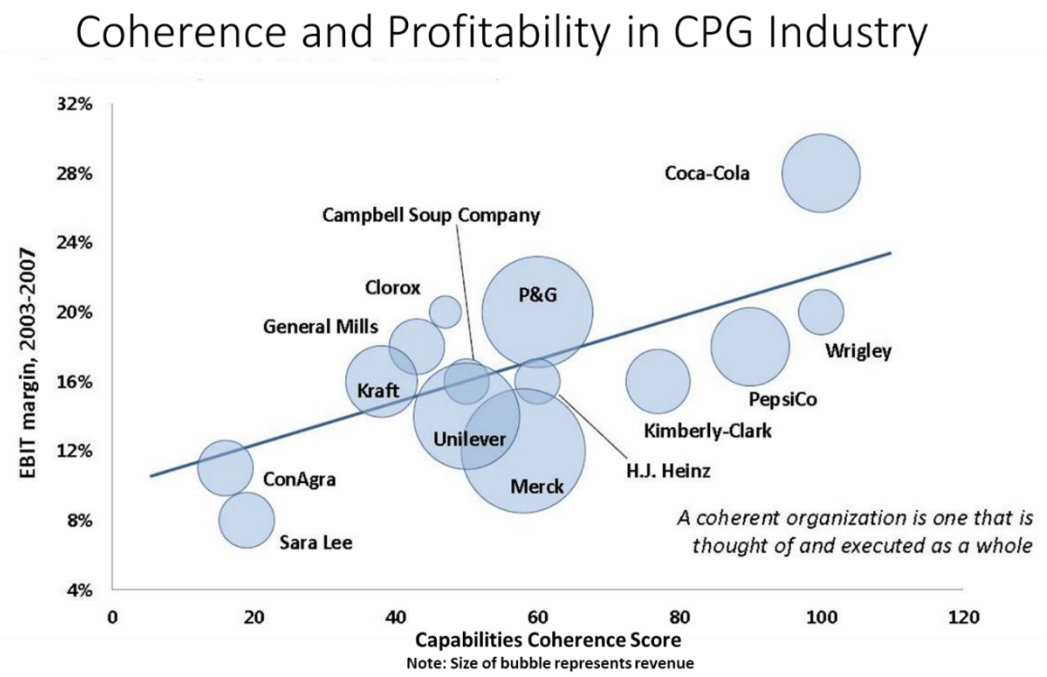


Figure 8.9 The Coherence Premium, adapted (Leinwand and Mainardi 2010)

Figure 8.10 illustrates business process and business capability decomposition. *Business capability* is an ability or capacity that the organization must possess to achieve a specific purpose and that gets developed, implemented, and used by the organization. Business capabilities enable business processes and together are performed by business functions (for example, sales or manufacturing). Business capabilities, like major business processes, are cross-functional. The capabilities are used (by the process) to enable or contribute to the creation of value, either directly or indirectly.

Business processes and *process capabilities* are independent. The diagram is not a hierarchy. Processes and capabilities are two different stacks, such that you don't decompose processes into capabilities and vice versa. There is a many-to-many relationship between processes and capabilities, meaning that each process can use multiple capabilities and each capability can enable multiple processes.

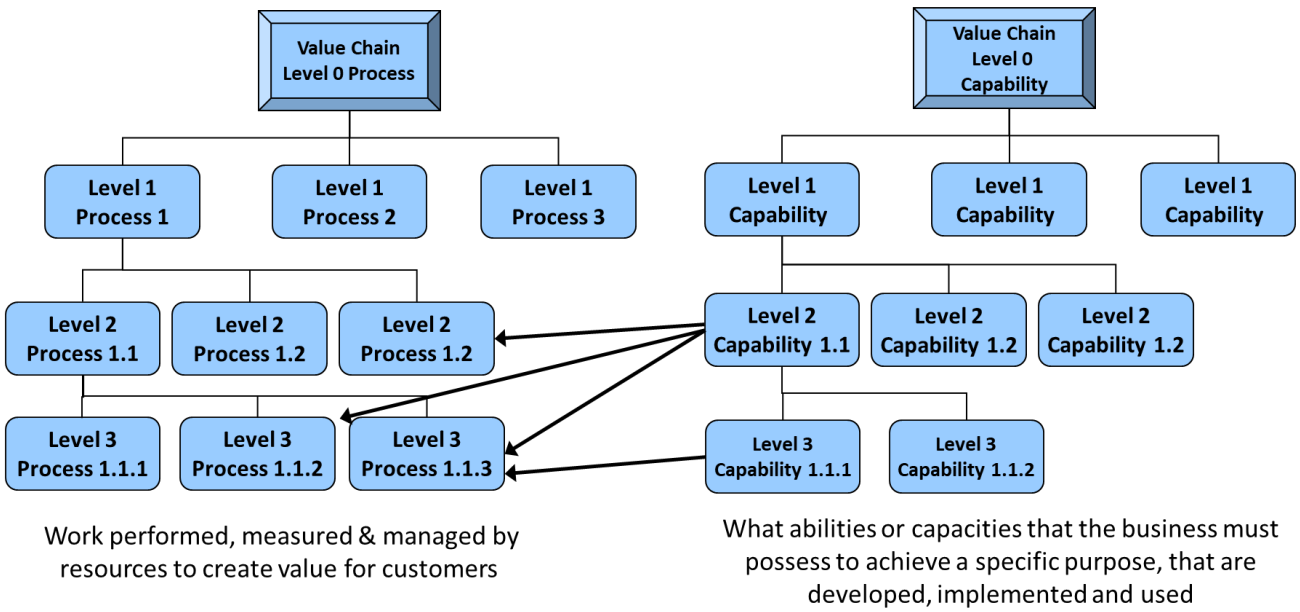


Figure 8.10 Business Process and Capability Decomposition

The phases for Business Architecture align with the BPM life cycle for phase 1 and phase 2 (in a simplified manner).

As discussed earlier in the *Business Process Modeling* section, the Business Architecture approach has corresponding *data*, *application*, and *infrastructure* roles and activities that are done concurrently with the Business Architecture activities. Figure 8.11 illustrates the high-level activities of the other Enterprise Architecture disciplines that are performed concurrently during phases 1 and 2 of the BPM life cycle.

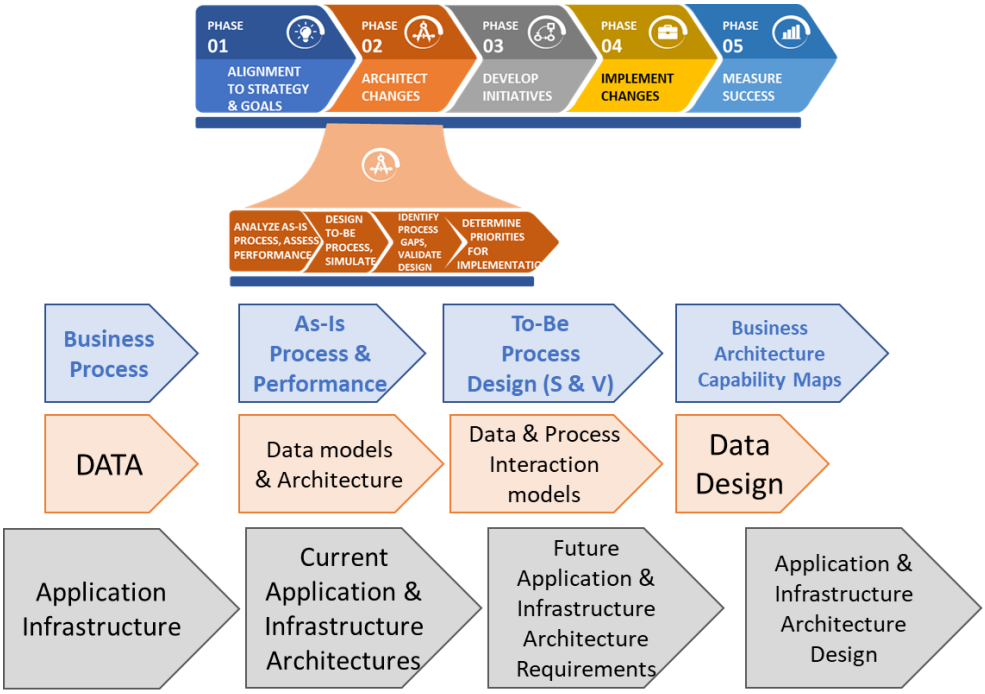


Figure 8.11 Concurrent Activities of Business Process, Data, and Application Infrastructure

Business Architects develop all the appropriate deliverables (artifacts) that make up the business model and all levels down to the workflow model (level 1 to level 5). Figure 8.12 shows a simple example of a Business Capability Map with capabilities marked for strategic relevance.

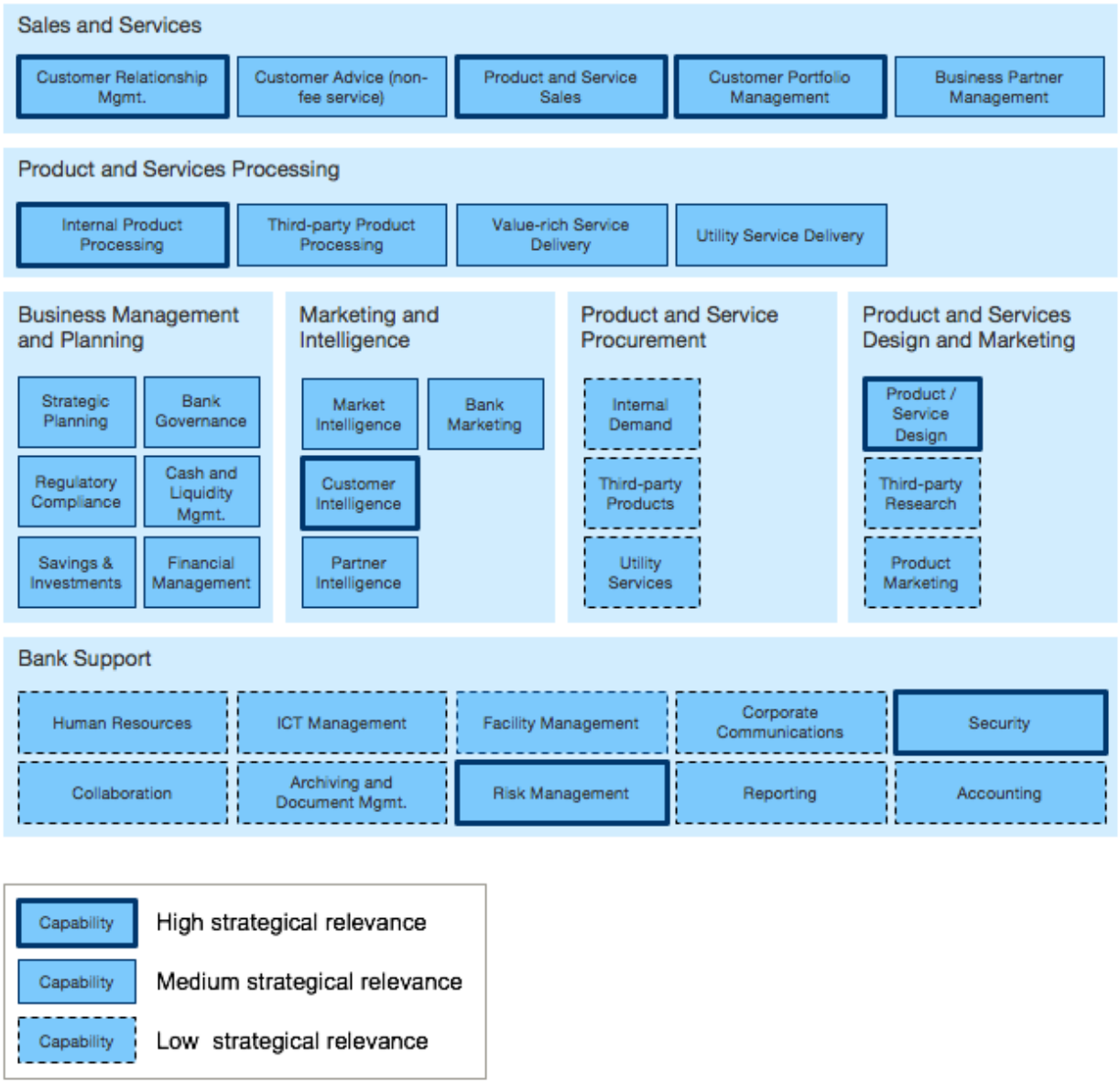


Figure 8.12 Example Business Capability Map with Strategic Relevance (Bondel, n.d.)

The capabilities are aligned to processes performed by business functions. Business Architects must do the following:

- Link the cross-functional processes to process capabilities to set architectural vision and direction based on strategy and goals.
- Map process capabilities to software for either:
    - Available packaged software
    - A plan for custom software (developed in the BPMS) based on:
        - Business processes
        - Rules

- Data requirements

The Business Architecture is part of a larger Enterprise Capability Architecture.

When all four domains (business, data, application, technical) complete their *design* process, the final blueprint is the Enterprise Capability Architecture (Figure 8.13). From this model, projects can be developed and prioritized according to the strategy and goals of the organization. What is noticeably missing is the *organizational design*, which should be done concurrently with the Enterprise Architecture capabilities.

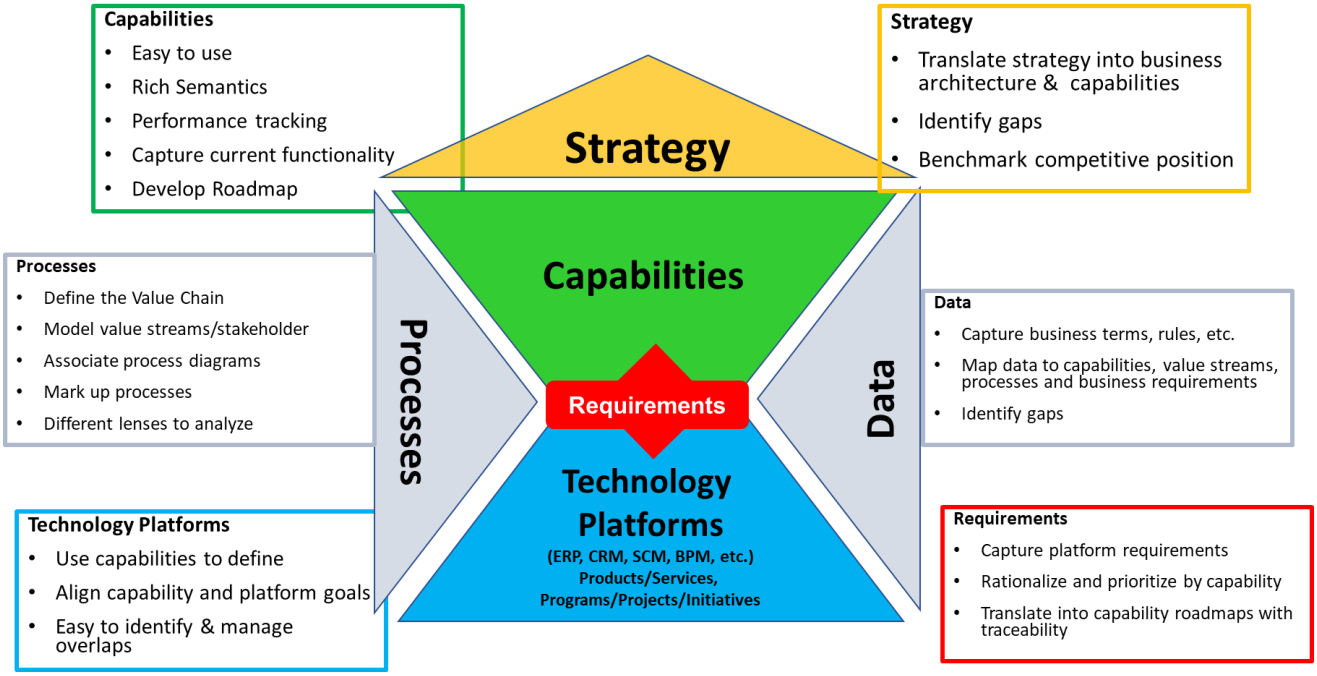


Figure 8.13 Elements of Enterprise Capability Architecture

Coordination of activities from all disciplines can be challenging, especially when you include organizational design (*product and service design* and *business planning*), as illustrated in Figure 8.14.

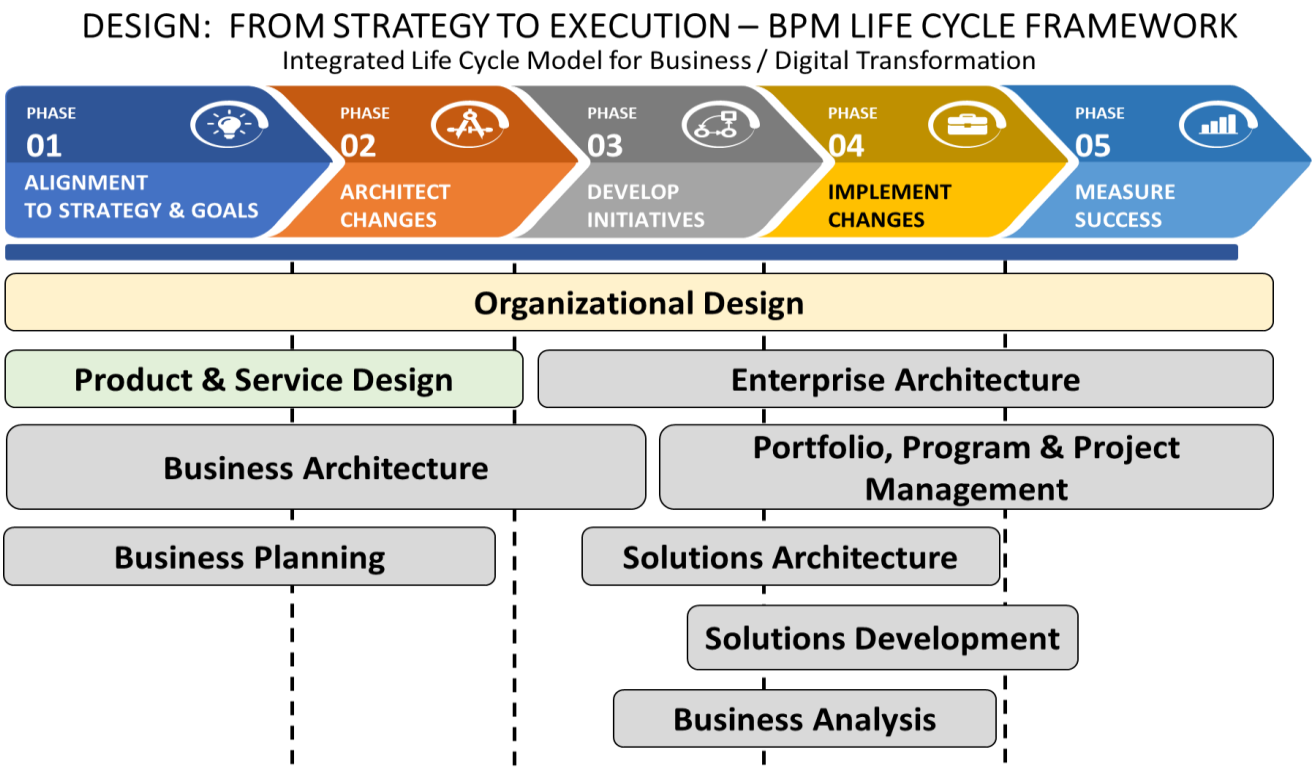


Figure 8.14 BPM Life Cycle Framework, adapted (Martin 2014)

From Figure 8.14 you can see there are a lot of moving parts on both the business and IT sides within the organization, which may account for the over 70% failure rate of enterprise-level change initiatives. It takes a lot of upskilling (and in some cases re-skilling) plus a lot of executive-level leadership support to facilitate any major business change. Ideally, you want to build a Business Architecture, including organizational design, that sets the foundation for continuous innovation of products and services for the customer. Continuous innovation is in contrast to the less desirable *continuous improvement* or *reinvention*, as illustrated in Figure 8.15.

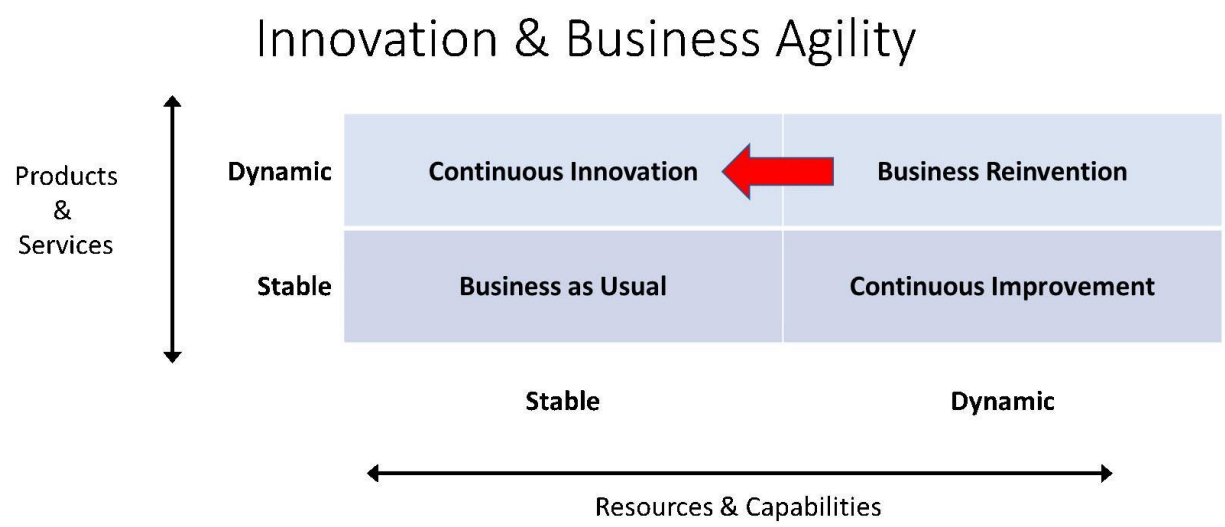


Figure 8.15 Continuous Innovation and Business Agility, adapted (Burlton 2015)

8.4 Enterprise Technologies

Enterprise technology refers to the concept of information technology (IT) resources and data that are shared across an enterprise. The main enterprise-level technologies are *enterprise resource planning* (ERP), *customer relationship management* (CRM), and *supply chain management* (SCM). These systems have been in existence for over twenty years. The impetus for the development of enterprise technologies was to have *one set of common processes and data* that the entire organization can use to conduct business with their customers and suppliers.

The incumbent players in the enterprise application space all have industry *templates*, which are standard processes configurable to an industry, plus a common enterprise data model for that industry. For example, each of the following industries has its own template and common data model:

- Discrete and process manufacturing
- Consumer products
- Retail
- Banking
- Pharmaceutical industries

The enterprise technologies have evolved to cover 80% or more of the common processes for each industry. These standardized systems provide major benefits to those organizations that can implement them and take full advantage of their capability sets. All enterprise technologies offer on-premise and cloud-based solutions.

This guide provides only an overview of the most common enterprise technologies.

8.4.1 ERP

ERP, or enterprise resource planning, is a modular software system designed to integrate the main functional areas of an organization's business processes into a unified system.

An ERP system includes core software components, often called *modules*, that focus on essential business areas such as finance and accounting, HR, production and materials management, customer relationship management (CRM), and supply chain management (SCM). Organizations have to make a choice between licensing all the modules from one ERP provider or choosing *best-of-breed* for ERP, CRM, SCM, and so on. In the August 2019 issue of Logistics Management, Gartner cites that about 42% of companies commit to one ERP vendor for all the modules, whereas 58% prefer to use best-of-breed applications. There are advantages and disadvantages to either choice, which won't be discussed in detail here.

Companies usually choose the most appropriate vendor based on the maturity of the overall platform (all modules) for their respective industry, whether the vendor is continuously adding capabilities to innovate their platform, and total cost of ownership. Clearly, ERP vendors who can provide both process and data integration across all their modules offer the highest value proposition, especially in industries where manufacturing, supply chain, and customer order management are critical for growth. Today, the largest global providers are SAP and Oracle, with many others making up the rest of the market. All vendors have moved to cloud-based offerings; the larger vendors still offer on-premise licensing.

ERP by its very nature, demands horizontal, cross-functional processes such as procure-to-pay, order-to-cash (order fulfillment), concept-to-product (product development), and recruit-to-retire (human resources management) to be aligned with value streams that require horizontal management. The following table lists examples of enterprise value streams and the typical ERP cross-functional names. ERP system modules typically take on the cross-functional names provided by the vendor.

Enterprise Value Streams	Typical Cross-Functional Names in ERP Systems
Prospect to Customer	Customer Engagement
Order to Cash	Order Fulfillment
Manufacturing to Distribution	Operations and Logistics
Request to Service	Customer Service
Insight to Strategy	Strategic Planning
Vision to eBusiness Enterprise	Enterprise Management
Concept to Development	R&D, Product, and Service Evolution
Initiative to Results	Implementation Execution
Relationship to Partnership	Strategic Partnering and Outsourcing
Forecast to Plan	Budgeting, Outlooks, and Forecasting
Requisition to Payables	Procurement or Vendor Management
Resource Availability to Consumption	Resource Management
Acquisition to Obsolescence	Fixed Asset Management
Financial Close to Reporting	Finance & Accounting

Recruitment to Retirement	Human Resource Management
Awareness to Prevention	Quality and Safety Management

Source: Whittle (2004)

8.4.2 CRM

Customer relationship management (CRM) is the combination of practices, strategies, and technologies that companies use to manage and analyze customer interactions and data. CRM is used throughout the customer life cycle with the goal of improving customer service relationships, assisting in customer retention, and driving sales growth.

The core processes are:

- Marketing
- Sales
- Service

CRM systems have integrated processes to create a *customer life cycle*. An example:

(1) Attract
(2) Inform
(3) Customize
(4) Transact
(5) Deliver
(6) Service
(7) Analyze

Figure 8.16 shows how CRM capabilities have evolved.

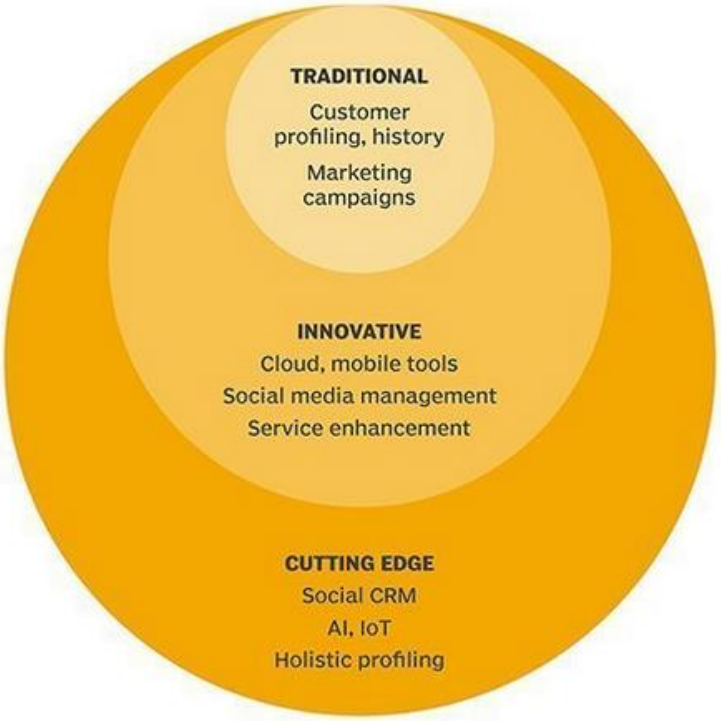


Figure 8.16 Evolving Capabilities of CRM

8.4.3 SCM

Supply chain management (SCM) covers a broad range of processes and activities required to plan, control, and execute a product's flow, from acquiring raw materials and production through distribution to the final customer, in the most streamlined and cost-effective way possible.

SCM encompasses the integrated planning and execution of processes required to optimize the flow of materials, information, and financial capital in the areas that broadly include demand planning, sourcing, production, inventory management and storage, transportation or logistics, and return for excess or defective products. Both business strategy and specialized software are used in these endeavors to create a competitive advantage.

There are also business software vendors that focus specifically on SCM. A few important areas to note include:

- Supply chain planning software for activities such as demand management
- Supply chain execution software for activities such as day-to-day manufacturing operations
- Supply chain visibility software for tasks such as spotting and anticipating risks and proactively managing them
- Inventory management software for tasks such as tracking and optimizing inventory levels
- Logistics management software and transportation management systems for activities such as managing the transport of goods, especially across global supply chains
- Warehouse management systems for activities related to warehouse operations

In summary, enterprise technologies are standardized applications with configurable industry templates with processes and common data models. It is important to note that because of the scope of processes and size of organizations, the average time to implement a business unit can be eighteen to twenty-four months or longer. There is also a failure rate of over 70% (even after twenty years) with many root causes — top reasons include lack of leadership, process design or redesign, and change management.

BPM technology, although it has an enterprise-level scope, is flexible enough to design and implement with timelines anywhere from eight to twelve weeks for a cloud-based solution to less than twelve months for a full on-premise infrastructure.

8.4.4 BPM Technology

Over the last twenty years, BPM technology has moved from simple workflow modeling tools to complex integrated toolsets that provide a complete operating platform and environment. Today's BPM suites can be implemented on-site or in the cloud.

The majority of BPMS environments integrate with the data of legacy applications because the BPMS now have a *service-oriented architecture* (SOA), supporting faster changes.

BPMSs allow rapid redesign of business operations and processes execution. The SOA architecture of BPMS creates a highly modular approach to business process change. Modules are referred to as *services*. This modularity is what allows data about the organization, business models, rules, and more to be reused and simply modified at the model level to regenerate modified applications.

Technology delivers on two integrated BPMS promises: speed of change and control of operations at various levels of detail.

BPM suites have all the baseline modules for modeling and analysis, process repository, rules engines, simulation engines, and performance modeling, monitoring, and reporting. Suites have evolved to include newer technologies like low-code/no-code development, extended collaboration, robotic process automation (RPA), artificial intelligence (AI), machine learning, and blockchain (smart contracts).

Overview of BPM Technology

Newer platforms with closely integrated capabilities are called *Intelligent Business Process Management Suites* (iBPMS).

The evolution of BPM technology, like most technology, has happened quickly. Within the industry, there have seen great strides and early adopters have come along on that journey to see truly revolutionary advances. As more enterprises look to streamline business processes and build leaner, more efficient business models, BPM technology must become more effective. Intelligent BPM software (iBPMS) is the result of this evolution; by leveraging analytics and intelligence capabilities, it improves BPM outcomes. The following table shows core functionalities that define BPM technology.

Functional Area	Purpose	Functions	Products and Modules
Process analysis, process design, modeling and simulation	• Analysis and design of *as-is* and *to-be* processes • Simulation of process variants	• Model processes • Store processes • Access processes • Run simulations	• Process modeler • Process repository • Process portal • Process simulation tool
Process automation	Execution of processes with human activities based on explicit process models	• Model technical processes • User interface design • Access process applications	• Process engine • (Technical) process modeler • (Technical) designer for user interface of process applications • BPMS systems and suites • Web portal for *process applications*
Service automation	Execution of machine processes (without human actors) *based on services* and respective orchestration	• Connect application components • Coordinate sequencing of steps and activities • Store and retrieve service metadata	• Enterprise service bus (ESB) • Orchestration engine • Service registry or repository
Rules processing	Execution of business rules based on an explicit definition	• Design of rules (often separated for IT and business) • Rules simulation • Rule versioning and comparison	• Rules engine • Rules repository • Business rules management system (BRMS)
Event processing	Identification and processing of time-critical events	• Event definition • Identify event, then select and execute appropriate reaction • Post events in standard format	• Event engine • Complex event processing (CEP) system • Event repository
Integration	Standardized exposition of business functions with services by composing technical functions from existing legacy	• Communication between applications • Data, protocol, and format conversions	• Enterprise service bus (ESB) • Enterprise application

	systems and applications	• Connect old and new applications • Design IT services	Integration (EAI) system • Service designer or modeler • Adapter • Messaging system
Process monitoring and control	• Timely monitoring and control of on-going processes • Control of processes of *process management*	• Business activity monitoring (BAM) • Process performance monitoring • Process governance • Service governance (in an SOA)	Process governance workflow engine
Repository	Repository management and automation for the life cycle of business documents	• Document and template definition and design • Document creation and rendering	• Document management system (DMS) • Enterprise content management (ECM) system • Output management system

Business Process Management stages that must be performed by BPM architecture include:

- Model processes
- Model data
- Define formulas
- Define business rules
- Define participants
- Define integrations
- Simulate processes
- Run processes
- Monitor processes

BPM Application Architecture contains the following capabilities:

- A visualization of the processes
- A simulation of the processes
- The ability to monitor activity
- The ability to create and use business rules
- The integration of systems and data
- The possibility of carrying out workflow activities
- The utilization of BPM notation

Figure 8.17 illustrates the core BPM application architecture.

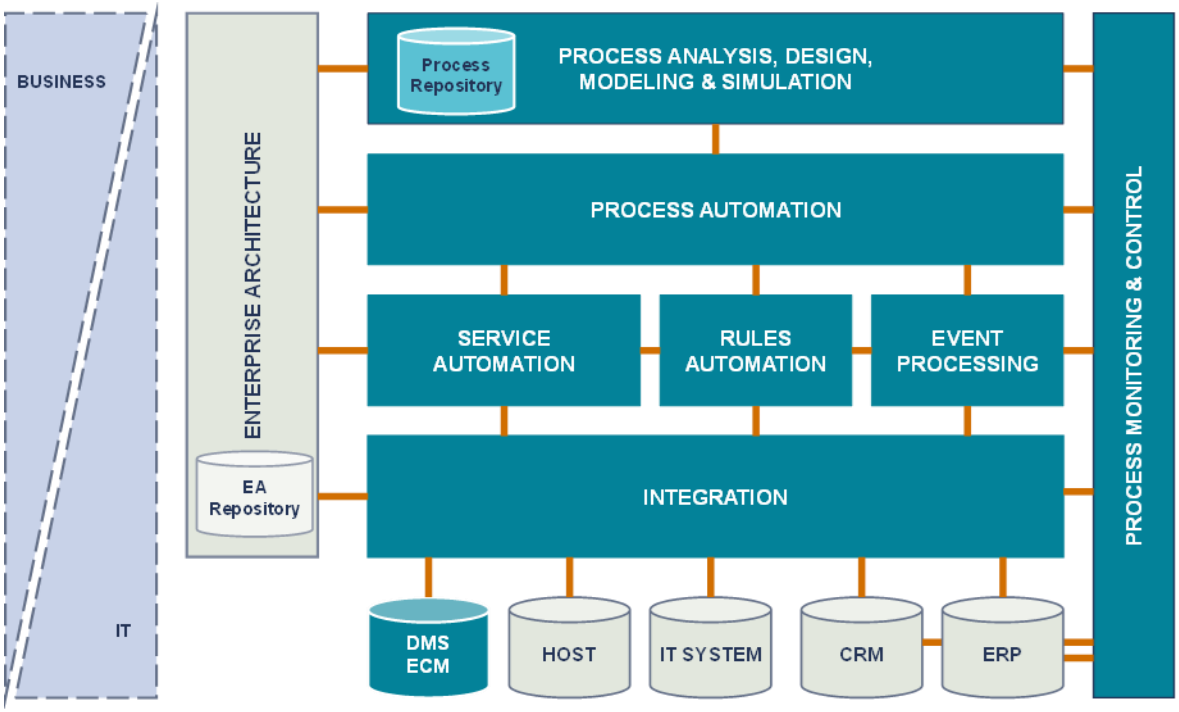


Figure 8.17 BPM Application Architecture

Figure 8.18 illustrates the BPM technical architecture platform.

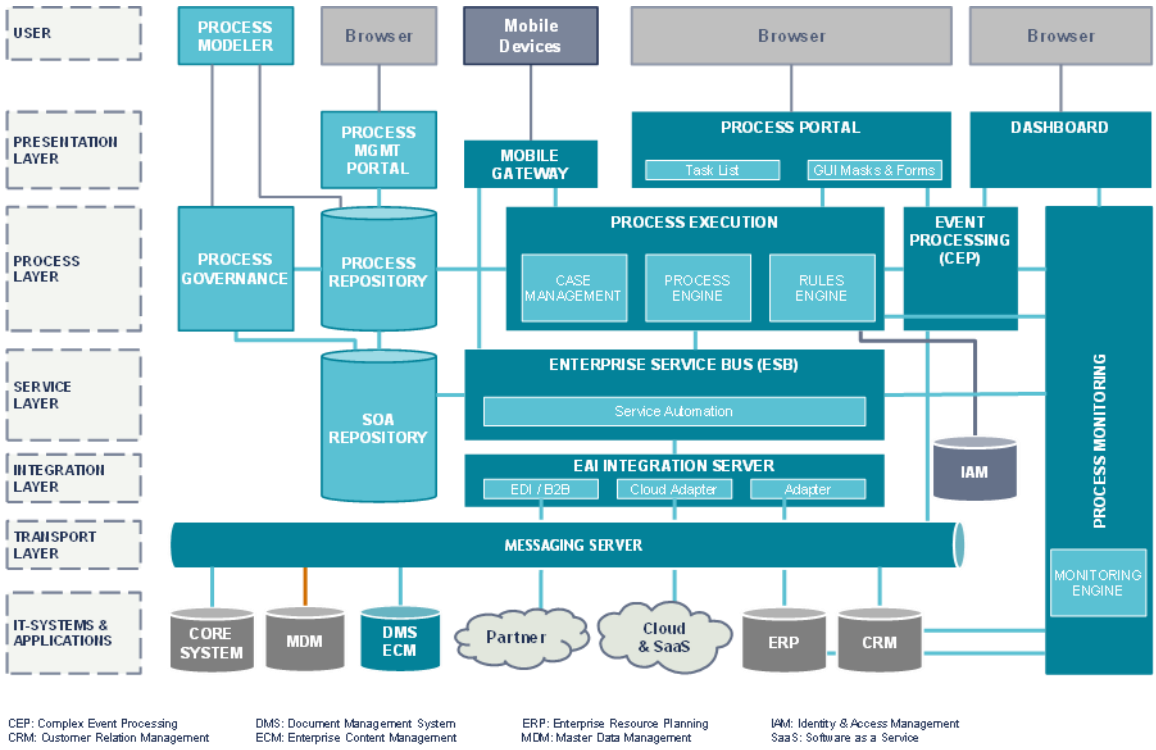


Figure 8.18 BPM Technical Architecture Platform

The technical architecture reflects the accepted layer structure of a BPM infrastructure and/or SOA architecture, as described in the following table.

Layer	Components	Description
User level	• **Web browser** (with web 2.0 capabilities) • **Process modeling software** • **Special clients** ○ As needed for operating underlying architecture components ○ For example, designing process monitoring dashboards	• Layer lists software components that end users execute at workplaces or on mobile devices • Usually a web browser, but mobile terminal devices and their apps are also located in this layer • Includes special user applications (for example, process modeling clients)
Presentation layer	• **Process portal** (generally a web server) ○ Implements masks and forms ○ Task list for user interactions • **Dashboard** for process monitoring	• Layer containing user interfaces and GUIs • Technologies: portals and *composite application frameworks* (CAF) • Connection to mobile (or other) terminal devices realized at this layer

	• **Process instance monitoring** • **Mobile gateway** for integration with mobile terminal devices	
Process layer	• **Process engine** for automated execution of strongly (pre)structured human processes • **Case (management) engine** for weakly structured processes (that is *cases*) of the case management • **(Complex) event (processing) engine** for extremely rapidly run asynchronous event processing • **Rules engine** • **Process repository** • **Process governance (engine)** for automation of (smaller) processes run within BPMS	• Layer of human processes (processes where human actors execute activities) • Previously defined process models are executed on this level • Core is typically a BPMS system or at least a **process engine** • Comprises macro flows and business processes • Used to realize primarily *human-to-human* and/or *human-to-application* coupling • For special types of processes, corresponding processing components (*engines*) are implemented here

8.5 Intelligent Business Process Management Suites (iBPMS)

Intelligent Business Process Management Suites (iBPMS) are dynamic business applications that can quickly adapt to changing business needs, competitive pressure, and market opportunity.

Now it is possible, with full BPMSs and the technical environment they offer, to change models, rules, and information and to generate applications very quickly. iBPMS in simple terms, helps businesses plan and automate their complex business processes by building a dynamic technology environment based on value-added knowledge work.

8.5.1 iBPM Capabilities

iBPMS products have all the core functionalities described in *BPM Technology*. Most newer iBPMS products also have the following capabilities.

- **Advanced analytics**. Looks at data autonomously using sophisticated techniques and tools to discover deeper insights, make predictions, or generate recommendations. See *Advanced Analytics (Big Data)*.
- **Artificial intelligence**. A discipline that tries to develop systems capable of learning and reasoning like humans. See *Artificial Intelligence (AI) and Machine Learning*.
- **Mobile BPM.** Allows technicians who work remotely in the field to access specialized applications for more complete data, faster processing, and reduced redundancies. Developed quickly with minimal coding and integrated with the office via the cloud, these low-code applications support everything from logistics to approval workflows, installations, and inspection processes.
- **Social BPM.** Integration with Facebook, Instagram, LinkedIn, and so on. While this is not yet a best practice, it allows organizations to *listen* to the chatter of social networks. Social BPM is a

double-edged sword, as it could provide feedback (positive and negative) on products or services and force organizations to respond. Social BPM has more utility when used behind the corporate firewall for real-time collaboration between decentralized global teams.

- **Cloud-based BPM.** Trend to move all BPMS to web-based services.
- **Process mining.** Analysis of business processes based on event logs. See *Process Mining*.
- **Robotic process automation (RPA)**. A form of business process automation technology based on software robots (bots). See *Robotic Process Automation (RPA)*.
- **Predictive analytics.** Time-driven analytics. Covered in *AI* (comparison).
- **Internet of things (IoT)**. System of interrelated computing devices and other things with unique identifiers (UIDs) that can transfer data without human-to-human or human-to-computer interaction. See *Internet of Things (IoT)*.
- **Blockchain (smart contracts).** Technology that directly controls the transfer of assets between parties once specific conditions are met; allows automatic enforcement of contractual obligations. See *Blockchain*.
- **Dynamic case management.** Ability to have *exceptions to the rule*, enabling smart decisions faster when handling ad-hoc workloads.

8.5.2 Advanced Analytics (Big Data)

Rather than discussing the evolution of DBMS (database management systems), this section focuses on recent developments like NoSQL. *NoSQL* (Not-only-SQL) emerged to handle large, unstructured, multi-media data in new digital applications. NoSQL can handle the demands of big data such as large volume, variety, and velocity with heavy demands on scalability, performance, and fault-tolerance for modern data-intensive web and service applications. Data-centric application development commences by creating *entity relationship* models of data with entity type and the relationships between the entity types.

The DBA, together with the data analysts, creates the data models. However, emanating from digitization trends, the introduction of NoSQL databases especially for big data management, there are significant changes in designing, managing, and maintaining physical repositories of databases: object-oriented, graphical, document-oriented, and so on. Each has its sweet spot and purpose.

The focus of this new generation of databases is to deal with the explosion of heterogeneous data and the storage and management of this data for innovative Internet applications (especially IoT). Still, by and large, most transactional data for mission-critical systems of record (which require transactional integrity) remains relational. Interestingly, in the early 1990s, we also saw the emergence of intelligent DBMSs. SQL, the de-facto and most popular database language, has been evolving continuously. It has incorporated many declarative AI capabilities. Similarly, NoSQL databases are incorporating analytics capabilities, including for unstructured, multi-media data within the DBMS. Figure 8.19 illustrates the evolution of DBMS to more intelligent DBMS (iDBMS).

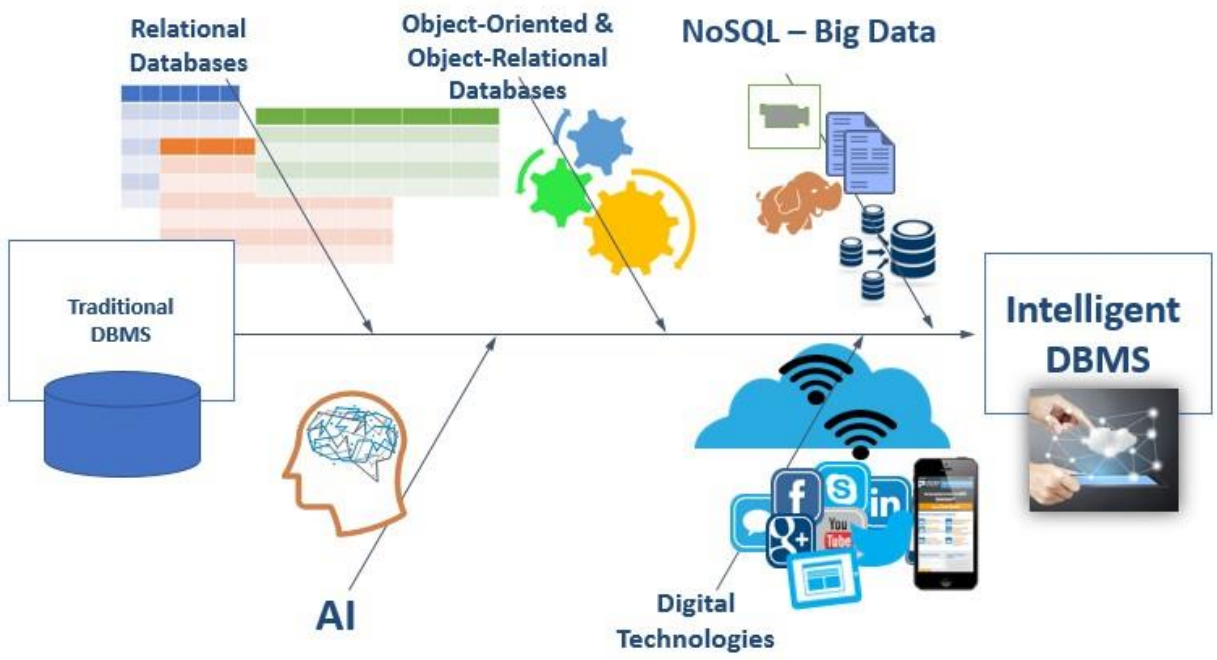


Figure 8.19 Intelligent Database Management Systems (Khoshafian 2019)

Another aspect of database evolution is that *data* and *process* are converging into integrated architectures to support real-time monitoring and control of processes through data. In addition, artificial intelligence is poised to turbocharge both data and process.

8.5.3 Dynamic Case Management

Dynamic case management (DCM) is the handling of case-related work using technologies that automate and streamline aspects of each case. In this context, a case is a collection of information about a particular instance of something, such as a person, company, incident, or problem. It is the ability to have exceptions to the rule, that enables smart decisions faster when handling ad-hoc workloads.

Dynamic case management evolved as a result of studies done in the knowledge worker space. According to a Tallyfy study, two-thirds of a knowledge worker's day is spent in unstructured and often unpredictable work patterns (Wyatt 2018). Figure 8.20 shows a summary of the findings.

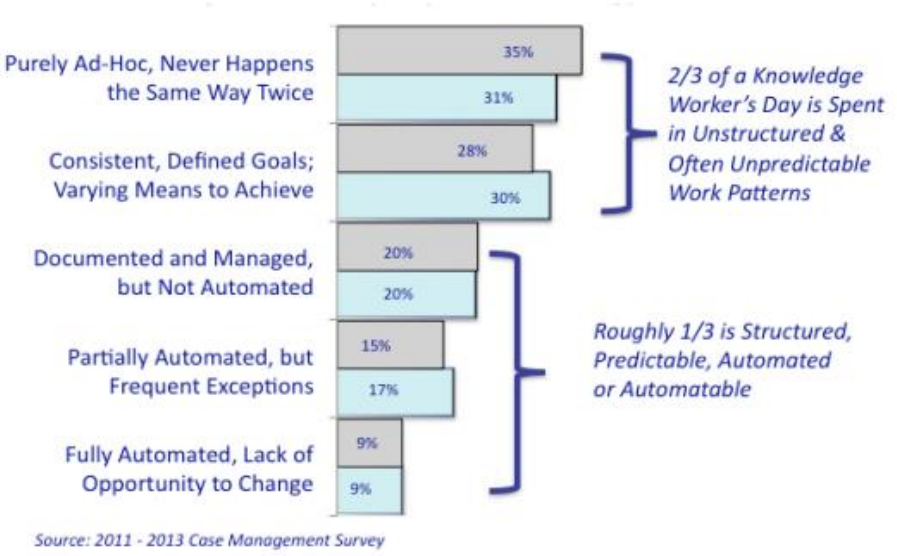


Figure 8.20 Work Patterns of Knowledge Workers (Wyatt 2018)

Barely repeatable processes are representative of the inherent complexity that defines knowledge work, where goals are consistent and well-established, yet the pathways to achieve them are numerous with different variations and different decision points. Often with these types of processes, it is possible to define and apply policies and specific business logic around how that work is performed. This will often require the ability to define and manage specific sets of business rules, as well as high-level patterns of how the process is going to flow, yet have it still be impossible to determine in advance the exact sequence of tasks and activities. In each case, the exact combination and sequence of activities is determined by the unique circumstances of a given case.

Dynamic case management is event driven and is context aware. As the case progresses, a series of activities occurs, and information is generated and/or otherwise added to the case. It is that information and the context around it that determines the path(s) to be taken, and ultimately defines the achieved outcome. It is only when that end goal is reached that the case is completed. For example, when a customer reports a problem, a case is opened and what happens next is the movement toward realizing and resolving the case. But each step is only determined as the previous one is completed, not as part of a predefined sequence. In other words, with *dynamic case management*, goals are predetermined, sequence and pathways are not. Case management processes are goal driven and non-deterministic, and the end point is known at the beginning. However, the pathway for reaching the end is determined by the outcome at each stage as well as the rules and policies applicable to that case and not where the case is at any given time.

Knowledge workers do not need to be told what to, but rather require tools that give them visibility into operations, access to information, and assistance with enabling collaboration. There is great alignment between the benefits offered with dynamic case management and the capabilities needed for knowledge worker productivity. The important point of dynamic case management is identifying the

work patterns that are applicable to case management. Forrester Research has identified three central types of work that fit the dynamic case management model:

(1) Investigative
(2) Service request
(3) Incident management

Investigative

Investigative bodies deal with requests for information or otherwise the need to complete a specific dossier for a particular case. These goal-driven scenarios are typically very dynamic and unpredictable in nature. One of the critical factors with Investigative Case Management is the ability to delegate tasks to other investigators and be able to synchronize the results within the case folder. For example, the gathering and processing of evidence in a criminal investigation.

Examples

Regulatory queries, IT governance, audit requests, mergers and acquisitions, and eDiscovery.

Applicable Industries
Government, legal, law enforcement, regulated industries such as banking, healthcare, and pharmaceutical.

Service Request

Service delivery requires a balance of *control* and *facilitation* to ensure both consistency and efficiency. It ultimately requires the ability to apply criteria and parameters while making constant course corrections through the delivery life cycle. Managing service requests is less likely to involve parallel activities, but will almost certainly involve multiple roles and hands-offs. The ability to maintain continuity of the case between hands-offs is critical.

Examples

Benefits administration, customer service, claims processing, loan originations, and underwriting.

Applicable Industries
Insurance, banking, healthcare, IT services, contact centers, and other customer-facing organizations.

Incident Management

Incidents such as accidents or complaints are unpredictable in both the defining details and resulting ramifications. For this reason, applying a flexible and dynamic case approach can help greatly in resolving incidents. Similar to investigative case management, the ability to maintain and demonstrate the *chain of custody* of information gathered during or used in the course of incident resolution is a critical aspect of dynamic case management used for incident management.

Examples:

Complaint management, dispute resolution, quality management, adverse event reporting, and medical records.

Applicable Industries

Government and regulators; regulated industries such as banking, healthcare, medical devices, and pharmaceutical.

In service roles or customer support roles, managing the assignment of service requests tends to be part of *service request management*, particularly where it augments (or increasingly is replacing) the common *workforce optimization* (WFO) applications used in service industries. If the functions of planning and assigning staff revolve around fieldwork that is not part of service delivery, then it is most likely around an investigative process.

Incident Management

Incident management deals with supporting processes where things need to be handled in a particular way, but not in a way that can be fully automated. The work of incident management requires the following things, but is not overly prescriptive in every aspect of it.

- Application of:
    - Policy
    - Rules
    - Tracking
- Audit trails
- Insight into how work is performed including:
    - Consistency
    - Traceability
    - Visibility

Incident management may involve standard processes such as the creation, formatting, and development of documents, but it's not something for which you can apply a fully automated process. As a result, the work pattern follows a case management type life cycle, but it's less about subjectivity or the knowledge worker. It's more about allowing dynamic processes to be performed according to prescribed policies and procedures.

Not every aspect of incident management falls into that category. What is common is requiring multi-channel interaction across multiple devices, being able to support cloud and mobile access, having fine-grained tracking and reporting around how information is captured and used, what rules are applied, and how decisions are made. Typically, incident management is event-driven rather than discovery-oriented, in contrast to investigative case management.

Service Requests

Services requests and service request management are inherently event-driven. Examples include a help desk scenario where service request calls come in and are logged. Customer onboarding and employee onboarding are also both event-driven and can be treated as service requests.

Investigative Case Management

Investigative case management is the activity that showed up consistently in both surveys as being the least applicable to dynamic case management. In reality, as you deconstruct both what's involved with investigative case management and how that might be applied in organizations, it's something that is very broadly applicable. There are some obvious aspects of it, such as where it's being used in a criminal investigation, in a fraud investigation, and in an audit scenario. In all these cases, it's goal-driven and it has a definitive life cycle.

The adaptive nature of dynamic case management helps knowledge workers apply know-how and make decisions that lead to achievement of identified goals. Better records and data management, achieved by connecting context and outcomes with actual information, is at the heart of the effectiveness of dynamic case management.

Dynamic case management allows workers to identify cases, access case information based on the context of what occurred, and to manage information so different files can be cross referenced and linked between cases. Better access to relevant data ultimately allows workers to capture and manage the context and knowhow from activities associated with a case. Also, with DCM, a given case may live on in perpetuity, retaining its last state until another event occurs to re-launch it; or it can also be used to launch another case.

Dynamic case management does not predefine whether work is virtual or physical, but pulls together all the endpoints, information, and environments. DCM provides a long-term record of how work is done, as well as the guidance, rules, visibility, and input that allow knowledge workers to be more productive. Dynamic case management as a system of record contains *what happened,* including email, voicemail, traditional documents, GIS documents, video and so on. The DCM system pulls records together in a virtual folder to have one version of the truth, and ultimately provides a permanent record of that case.

Dynamic Case Management Enables a System of Engagement and a System of Record (SOR) For All Forms of Content as illustrated in Figure 8.21.



Figure 8.21 A Dynamic Case Management System (Wyatt 2018)

Dynamic case management is a superset or master system of record, capturing both the *what* (data, files, and records or links to their physical sources) and the *how* (metadata and audit trails, as well as the context of decisions and actions).

In summary, dynamic case management allows productivity improvements to be measured in both financial and non-financial terms, including reduced re-work and improved customer and employee satisfaction. In part, by bringing areas of work previously *under the radar* when performed in purely ad-hoc environments into greater visibility, DCM offers the ability to prioritize activities across multiple cases, balancing workloads, as well as monitoring quality, timeliness and speed.

8.5.4 Process Mining

Process mining uses event logs to perform an automated analysis of processes, and is a capability built into iBPMS platforms. Chapter 4 covered basic concepts in the *Process Mining* section. This section delves more deeply into the technology aspects of process mining.

The Institute of Electrical and Electronic Engineers (IEEE) Task Force on Process Mining, established in 2009, published a manifesto in late 2011 to promote process mining as a new tool to improve the (re)design, control, and support of business operating processes. Also in 2011, one of the fathers of process mining, Professor Wil van der Aalst, published the first book on process mining. Updated in 2016, the professor's book, *Process Mining: Data Science in Action,* is recommended reading.

The application of process mining in an organization offers the following capabilities:

- Automated discovery of process models, exceptions, and instances of processes (cases) together with basic frequencies and statistics
- Automated discovery and analysis of customer interactions
- Alignment of customer interactions with internal processes
- Different perspectives on operations, not just a process perspective

- Monitoring of key performance indicators using dashboards in real time
- Compliance verification capabilities and gap analysis
- Predictive analysis, prescriptive analysis, scenario testing, and simulation with contextual data
- Improvement of existing or previous process models using additional data from saved records
- Data preparation and data cleansing support
- Single process mining panel that shows a combined view of process models that interact with each other
- Visualization of how processes contribute to business value (such as business operating models) — contextualization of processes
- Effective cooperation between business and IT
- Standardization of business processes
- Improvement of operational excellence by optimizing processes

As noted earlier, process mining exploits the information recorded in event logs to perform an analysis of the real process afterward. There are three main types of process mining:

(1) **Discovery.** Takes an event log and produces a process model without using any prior information using process mining algorithms.
(2) **Conformance.** Real processes and models are compared and resulting coincidences or differences are identified. The results are used to diagnose deviations or inefficiencies between the process model and ideal processes.
(3) **Enhancement** (extension). Process models are adapted and improved according to the data of the real process.

All three types of process mining rely on pulling data from the event logs of other enterprise software systems for analysis as depicted in Figure 8.22.

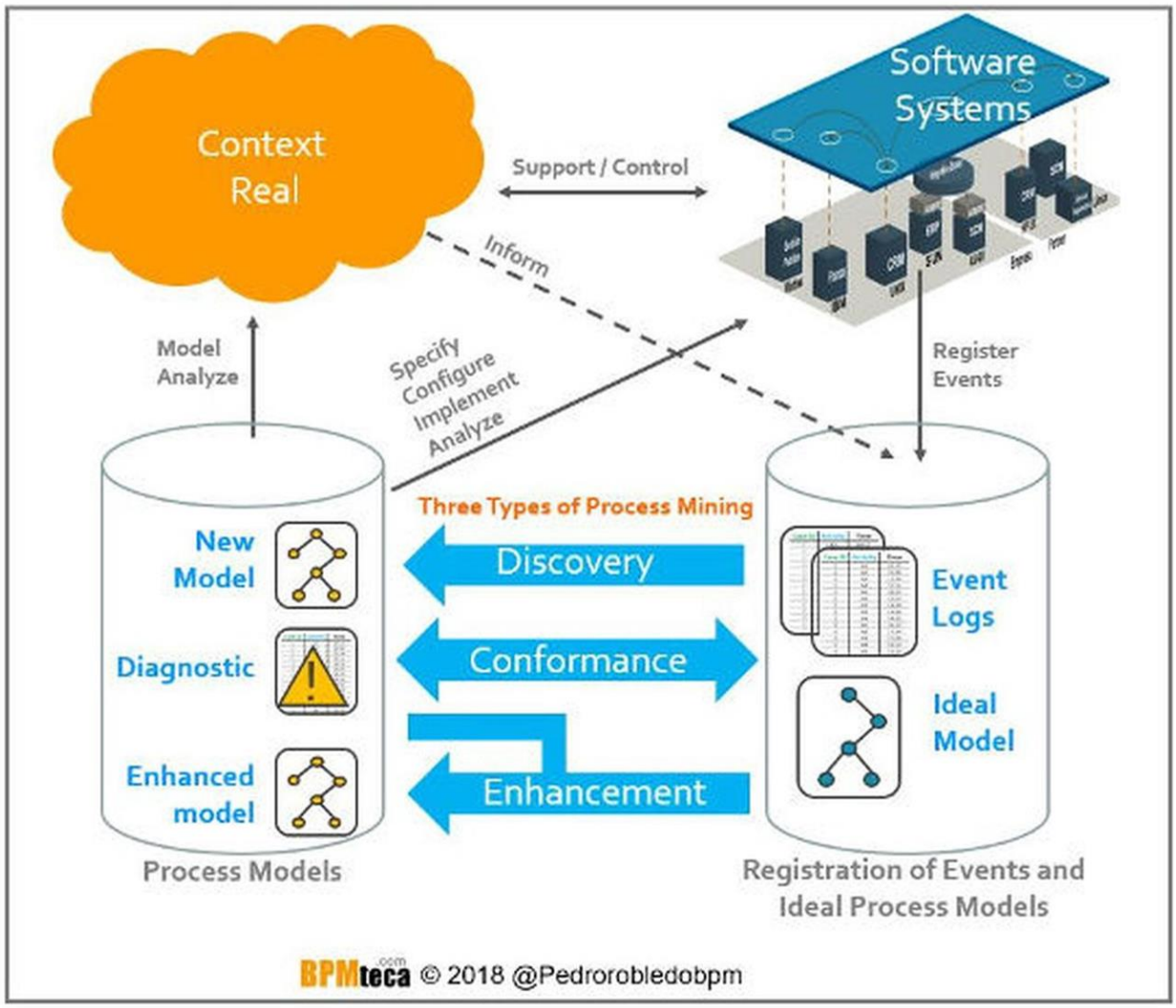


Figure 8.22 Process Mining (Robledo 2018)

Process mining consists of two main steps:

- **Step 1:** Process selection and prioritization. Clearly establishes the improvement objectives and identifies where the business value is created in different parts of the organization and how high-level processes affect the creation of value.
- **Step 2:** Capture of the process information to be improved to represent it as a process model.

In his book *Process Mining: Fundamentals and Methodology of Application*, Santiago Aguirre Mayorga provides a methodology for redesigning and improving business processes using process mining. The methodology consists of four stages: project definition, data preparation, process analysis, and process redesign. The four stages are divided into nineteen steps, as shown in the following table.

Methodology Process Mining			
Stage 1: Project Definition	**Stage 2: Preparation of Relevant Data**	**Stage 3: Process Analysis**	**Stage 4: Process Redesign**
1. Define problem 2. Determine scope of process 3. Understand process flow 4. Analyze gaps and indicators 5. Determine project objectives or questions	6. Locate and select data 7. Extract data from sources (ERP, CRM, BPM, workflow, and so on) 8. Analyze data quality and perform data cleaning 9. Prepare and transform data	10. Discover the *real* process model 11. Verify compliance 12. Analyze process performance 13. Analyze social network 14. Analyze findings 15. Find causes of problems	16. Determine alternatives for improvement 17. Evaluate alternatives 18. Implement improvement alternatives 19. Measure results achieved

(Aguirre Mayorga 2016)

There are over twenty iBPMS vendors who have process mining capabilities, with the markets dominated by US and Germany based vendors. Hyland, Kofax, Worksoft and TimelinePi are in the US and Celonis, Alana, PafNow, Scheer, Signavio, Software AG are in Germany.

The organizational benefit of using iBPMS is agility – meaning the ability to change processes faster than ever, with reduced dependence on the IT department, comprehensive and accessible analytics to help all system users make data-backed decisions, and rapid delivery of processes with an ability to change process elements (with no pause to the process).

8.5.5 Rules Engines and Business Rule Management Systems (BRMS)

Business and technical rules define how work is to be performed in each activity or step in a workflow or, at a higher level, a process. Rules are the *institutional knowledge* of the organization and provide a real competitive differentiator. They define who will do something, what they will do, when they will do it, why they will do it, how they will do it, and how it will be controlled. From a technical perspective, rules are the logic of the organization.

Rules engines are tools that support the identification, definition, rationalization, and quality of business and technology rules. Rules engines also provide a repository that allows rules to be checked against one another for definition or context problems, and thus checked for redundancy and definition quality. Although these engines tend to be fairly technical in nature, with the definition of rules requiring both training and experience in technology and in business, new features and patterns area allow rules to be defined and configured using visual and more user-friendly notations.

In practice, rules are looked at as if-then statements: ***if*** (an event or value), ***then*** do something. Because the list of things that must be considered in any decision can be fairly long and complex, rule definition can be a serious undertaking.

Business rules can be found in many locations in business process. Typically, rules occur at gateways of the process flow, locations where branching decisions for the next step are made. Rules tend to fall into the following categories:

- Business operation rules
- Decision rules
- Flow sequencing rules
- Procedural and policy rules
- Data use and security rules
- Access security rules
- Monitoring and reporting rules
- Technical rules associated with data calls, data transformation, application interfaces, and so on.
- Legal rules
- Financial rules
- Monitoring and measurement rules
- Regulatory rules

These rule categories must be customized to each organization and used to create the internal architecture of a rules repository. This setup step and other definition functions allow the rules engine to work at an optimal level in each organization.

Business rules are often not well defined or organized in current procedural manuals. Few organizations really understand their operating rules or have them formalized—especially low-level business execution and decision rules.

The following table provides a general classification scheme for BRMS rules.

Group	Definition	Example
Mandatory constraint	A complete statement that expresses *absolute* conditions that must be fulfilled or not fulfilled so that a certain business event can run properly.	A customer *must* not have more than ten open purchase orders at the same time.
Guideline	A complete statement that expresses a *warning* about the occurrence or non-occurrence of certain circumstances.	A customer *should* not have more than ten open purchase orders at the same time.
Action enabler	A complete statement that tests certain conditions and triggers a (further) business event, a message, or another activity in case of a successful test.	• If a customer order is valid, perform purchase order. • If a customer has status *high risk*, inform responsible account manager.
Computation	A complete statement that represents an algorithm for the computation of a certain value.	Amount *total liability* is computed as sum of all liabilities of all partial debentures of the issuer.
Inference	A complete statement that tests existence of certain conditions and infers validity of a (new) fact in case of a successful test.	• If customer has no open invoices, status equals *premium customer*. • If a customer status is *premium customer*, customer qualifies for special 20% discount.

Rules modeling, definition, and coding are critical to the way a generated application will execute. If the rules are too complex (for example multiple layers of logic; a long string of evaluations; multiple system integration calls), execution can be slow. If too many rules that have performance issues are placed in a row, execution of the application will be slow. For these reasons, modeling and use of rules should be carefully checked and standards customized from a list of best practices provided by the vendor.

Rules are virtually everywhere in companies. In some cases, they can be found in procedural manuals or in policy manuals. In other cases, they are in memos, notes, emails, and just folklore. They are also embedded in legacy applications and in the implementation of licensed or purchased software. Rules are everywhere in the organization, but they are almost never in one place.

Regardless of who or what is driving the move to identify, define, model, and rationalize rules, the technology must be able to accept entries from multiple business units and merge the rules to create common definitions, versions, synonyms, antonyms, and so on, as it brings rules into a common repository and ensures their quality. This communal use has implications for access, security, and change abilities. So, it is important that a rules engine be able to conform to the realities of the way you need to use it in your organization.

8.5.5.1 *Rules Repositories and Engines*

Defining rules for entry into a rules engine for storage and use in a rules repository is not a simple activity. Rules are complex, and their definitions need to be complete before entry. Rules seldom stand alone and must be defined in complete sets of decisions and organized in a structure that supports the way they will be executed by an operation or program.

Definition pre-work must be considered in the setup of the rules engine and the rules repository. The better rules engines will do a variety of complicated syntax, relationship, and other testing as the rule is entered. However, the rule must be defined correctly and checked, because it will be used to generate BPM applications and to run the organization.

Rules Repositories

A *rules repository* houses business and technical rules and their definitions. Rules repositories are commonly used to:

- Capture an organization's institutional knowledge in a central place
    - Define rule templates for specific customer interactions, such as action compliance, cross-sell, up-sell, and more including:
        - Scorecard (based on scoring and ranking)
        - Decision tree (based on *if-then* logic)
        - Decision map (based on one or two explicit input values)
        - Decision table (based on a series of test conditions to be evaluated)
    - Create, align, test, and deploy rules
    - Store rules for company-wide access
- Find currently defined rules and their definitions:
    - Direct flow logic and execution steps in business modeling

    - Use in BPMS applications generation
    - Design legacy application modification
    - Determine legacy application interfacing design and needs
- Support rule execution by programs and manage rule use
    - Eliminate rule conflicts and redundancy
    - Identify rules that no longer meet legal requirements
    - Improve rule quality — clarity, consistency, and editing
- Analyze service level agreements (SLAs), key performance indicators, Six Sigma formulae, and more
- Manage quality and integrity of rules and rule sets
    - Manage changes to rules
    - Manage the creation of new rules
    - Provide a picture of everywhere a rule is used to determine how it should change
    - Test rule use
    - Manage access to rules
- Build what-if analytics to analyze inter-related rules and rule use
    - Build historical and runtime analytics
    - Deploy rules to target programs and BPM use
- Validate that the right data is being used by rules
- Use, edit, and test data; use of legacy data

Rules Engines

A rules engine is a software component that allows non-programmers to add or change rule logic. Rules engines benefit organizations by allowing them to:

- Externalize rules in a standard format, using a standard vocabulary
- Store rules in a central location (rules repository)
- Expedite program changes by having all rules and their uses cross-referenced in a single place
- Create flexible rule definitions (legacy applications, interviews, documents)
- Improve rule definition quality (consistency in rule reuse)
- Support rule definition and testing (for redundancy, *holes*, logic, and so on)
- Apply version control
- Improve rule visibility
- Evolve applications and business operations faster by dealing with external rules
- Make a change in one place and have it applied everywhere the rule is used

Decision Modeling and Notation

There is an emergent Decision Modeling and Notation standard (DMN), complementary to the BPMN standard, that will create a standard approach for describing and modeling decisions within organizations. DMN will allow business rules to be interchangeable across organizations and to be built in a more user-friendly environment. BRMS tools and BPMS Suites with business rules capabilities are likely to embrace the DMN standard for rules definition and execution.

8.5.6 BPMS Vendors

Gartner Group periodically publishes a list of the top BPMS vendors reviewed with the highest ranking at the top. Following is a snapshot of the 2018 Q4 results, first in a *magic quadrant* figure, followed by a table showing vendors and their review rankings.



Figure 8.23 Gartner Magic Quadrant for iBPMS

Vendor ranking is dynamic and changes based on reviews over the last rolling twelve months. For a current Gartner-reviewed iBPMS list see: www.gartner.com/reviews/market/business-process-management-platforms.

Product	Vendor	Reviews	Overall Rating (Out of 5)
Ultera	IPD Canada Corporation	1	5
Intalio|Create	Intalio	1	5
Engage Process Suite	Engage Process	1	5
PMG Digital Business Platform	PMG	7	4.9
Promapp	Promapp	3	4.8
Bonita BPM	Bonitasoft	3	4.7

Workflow Automation	Nintex	10	4.7
Emakin	6Kare	3	4.7
AuraPortal	AuraPortal	1	4.5
ActiveMatrix BPM	TIBCO Software	1	4.2
webMethods Integration Platform	Software AG	21	4.2
Bizagi BPM Suite	Bizagi	11	4.0
IBM Operational Decision Manager	IBM	2	4.0
OpenText AppWorks Platform	OpenText	1	4.0

Most of the BPMS vendors listed are iBPMS capable, as the trend to add more AI and ease of use (low-code or no-code development) continues and adoption of the technology moves from IT to the business unit. Industries that are ideal for low-code BPM are:

- Education
- Finance and Insurance
- Government
- Healthcare
- Manufacturing
- Tech and Telecom

8.6 Newer Technology Platforms

This section covers emerging BPM technologies. All these technologies will enhance existing processes and accelerate processing of the massive quantity of data collected to exponentially improve insights for decision making. The improvements will allow leaders to take immediate action based on data insights.

8.6.1 Robotic Process Automation (RPA)

Very simply, RPA refers to the use of software *robots* that mimic tasks usually performed by humans. These robots are especially helpful for automating rule-based processes that require interaction with multiple, disparate IT systems. From a technical standpoint, RPA is an application of technology, governed by business logic and structured inputs, aimed at automating business processes. A more sophisticated definition: *robotic process automation* (RPA) is the use of software with artificial intelligence (AI) and machine learning capabilities to handle high-volume, repeatable tasks that previously required humans to perform. These tasks can include queries, calculations, and maintenance of records and transactions (Rouse 2019). According to Gartner, RPA is part of *intelligent automation*, and by 2020, automation and artificial intelligence will reduce employee requirements in business shared-service centers by 65%.

Interestingly, many COOs working for financial services firms were at the vanguard of RPA adoption, figuring out ways to use software to facilitate business processes without increasing headcount or costs. According to Deloitte, one bank redesigned its claims process by deploying eighty-five bots to run thirteen processes, handling 1.5 million requests per year (Boulton 2018). The bank added capacity equivalent to more than 200 full-time employees at approximately 30% of the cost of recruiting more staff. By automating low-value tasks, bots are typically low-cost and easy to implement, requiring no

custom software or deep systems integration. Enterprises can also supercharge their automation efforts by injecting RPA with cognitive technologies such as machine learning (ML), speech recognition, and natural language processing, automating higher-order tasks that in the past required the perceptual and judgment capabilities of humans.

iBPMS enables enterprise-class software automation solutions that run unattended by people. Benefits of automation include:

- Unwinds legacy of people-based quick fixes
- Performs laborious and repetitive tasks reliably
- Scales up and down to match peak loads
- Emulates business user behavior
- Shifts control directly to the organization rather than coders
- Delivers ROI in weeks through a rapid, Agile approach

8.6.1.1 *What RPA Solves*

RPA can help solve problems that occur in typical business environments. The typical enterprise consists of:

(1) **An ever-changing business climate.** An enterprise needs to continuously evolve its product, sales, marketing, and so on, for processes to grow and stay relevant

(2) **Multiple, disparate systems**. The typical enterprise uses multiple and disconnected IT systems to run its operations. When business processes change, these IT systems are not changed frequently due to budget, timing, and implementation complexity issues.

(3) **HR-based quick fixes.** To overcome technical and organizational debt, a human workforce is hired to fill the gap between systems and processes. For example, an organization makes changes in its Sales process. To confirm the booking of a sale now requires more manual intervention. They hire more people to check the invoice and payment details and process the sales order. This process inefficiency is illustrated in Figure 8.24.

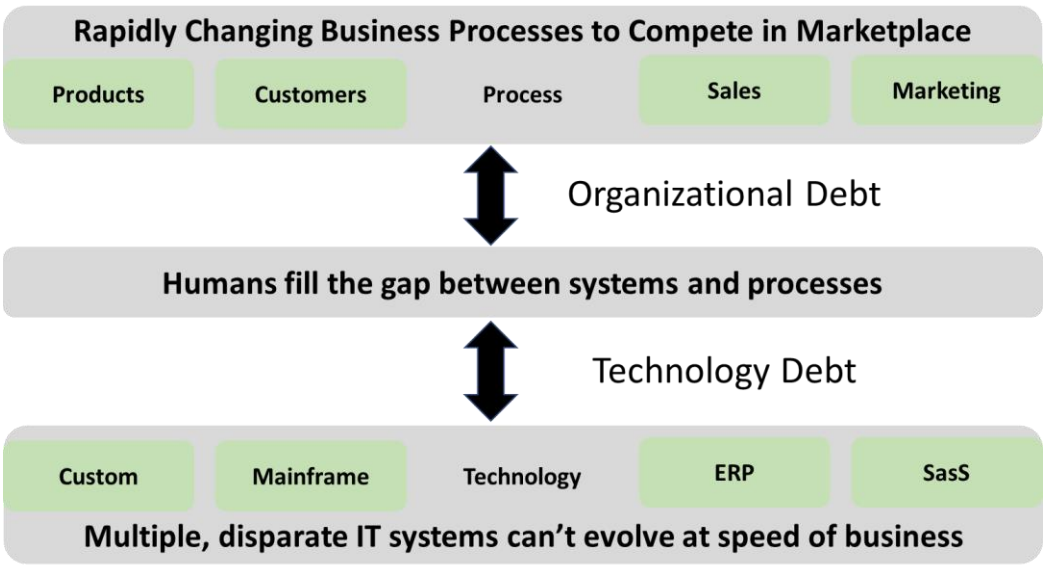


Figure 8.24 Current Process and IT Systems Held Together with Human *Glue*

With any change in the business process, an organization would need to hire new employees or train existing employees to map IT systems and business processes. Both solutions consume time and money. With robotic process automation, the organization can deploy virtual workers (bots) who mimic human workers. In case of a change in process, a change in a few lines of software code is always faster and cheaper than retraining hundreds of employees. Figure 8.25 shows how RPA (with humans coding) enables agility in business process change without changing existing IT systems.

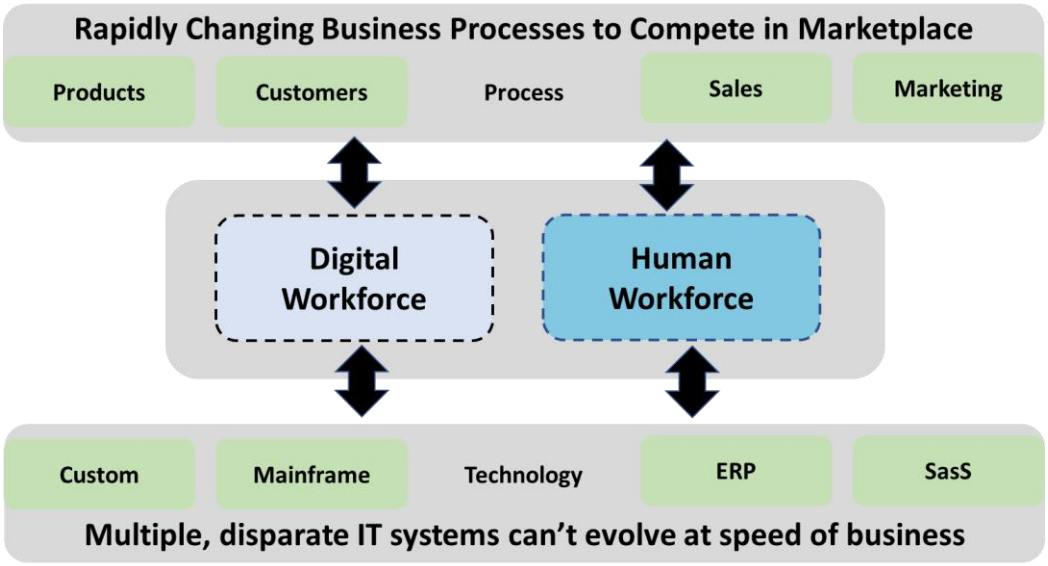


Figure 8.24 RPA (Digital and Human Workforce)

Robotics process automation is advantageous for the following reasons:

- A human can work an average of eight hours a day, whereas robots can work twenty-four hours
- Average human productivity is 60% with a few errors; robot productivity is 100% with no errors
- Robots handle multiple tasks very well compared to humans

The approach to automation is driven by a business need that focuses on cost savings, increasing quality, and accelerating the enterprise. Benefits of RPA are seen in three main areas:

(1) Protect and leverage investments

- Supports strategic platform upgrades and regulatory change
- Digitally enables legacy systems for customer self-management
- Enhances usability and eases change in new system deployment
- Works with existing IT architecture (product and platform agnostic)

(2) Time dividends for knowledge workers

- Improves quality by shifting focus from readying data to exploiting it
- Captures benefits without costly BPR, creating bandwidth for value proposition reengineering (VPR) and growth
- Provides more accurate and timely reporting and insight

- Accelerates innovation in product and customer engagement without reliance on IT development queue

(3) Optimization of delivery and outcomes

- Allows zero-defect handling and improved exception management with audit trail
- Scales virtual workforce to peak loads without penalty (24/7 operations)
- Reduces high-frequency repeated tasks by 50% to 70%.
- Reduces costs
  - One third the cost of offshore FTE
  - One tenth the cost of local US FTE

FTE stands for *full-time equivalent*, which means the amount of resources equal to one person employed full time in an organization.

8.6.1.2 *RPA Technology Landscape*

The technology landscape for Business Process Management continues to evolve with more advanced capabilities. There are several newer technologies being integrated into BPMS that enable automating business processes, as outlined in the table that follows. The table compares classic enterprise tools to robotic process automation tools. Automation technologies include:

- Robotics process automation
- Robotics desktop automation
- Cognitive, machine learning, and artificial intelligence

	Business Process Management	Data Integration	Robotic Process Automation	Desktop Acceleration
Description	Tool for designing business process models, data flow models, and business rules. Can optimize, monitor, and maintain processes that need to occur to achieve a task.	Tool that integrates and consolidates all data types from internal and external sources into target destinations such as databases, data-marts, data-warehouses, and files.	Software that captures and interprets existing applications for processing a transaction, manipulating data, triggering responses, and communicating with other digital systems.	Call center tool that focuses on assisting and accelerating user productivity through manually triggered desktop routines.
Sample Vendors	Pega, IBM, Appian	Informatica, Oracle, IBM, SAS, Microsoft	Blue Prism, Automation Anywhere, Pega Robotics, UIPath	Pega Robotics, UIPath
Implementation Characteristics	• IT-led implementation • 12-18 months to go-live • ROI in 2 to 5 years	• IT-led implementation • 12-18 months to go-live • ROI in 2 to 5 years	• Agile, Business-led, IT Support • 3-4-month implementation • 2-3-week release cycles • ROI < 1 year	• IT-led implementation • 3-6-month implementation • 1-3-month release cycles • ROI 1-2 years
Strengths	• Tight control and full	• Supports high speed, high volume, low-	• Rapid implementation	• Call center automation

	transparency of activities • Real-time monitoring • Potential for significant uplifts in MI, quality, and consistency • Enterprise class	latency, resilient integration • Enterprise class	• Supports volatile processes • Low investment cost • MI, quality, consistency, and compliance • Enterprise class	• Attended automation requires multiple human handoff points and manual trigger • Unified UI on top of legacy systems
Weaknesses	• High investment cost • Complex integration • Uses workarounds for unstructured processes • Slow release cycles	• High investment cost • High cost of change due to Integration-test scope • Slow release cycles	Challenges supporting low-latency systems with (very) high volume use cases	• Back office automation • Unattended automation • Scalability through physical users rather than via virtual workforce
Realization	Long-term benefit realization	Long-term benefit realization	Rapid benefit delivery	Medium term realization

Robotic process automation (RPA) is currently the next evolutionary step in business process automation. RPA is a rules-driven concept that can:

- Save an enterprise on human effort
- Reduce costly errors and improve quality
- Do more faster and shorten critical path
- Increase value add of talent and lower attrition risk
- Realize increased speed to value and improved auditability of manual processes

Combining RPA with cognitive technologies such as machine learning, speech recognition, and natural language processing, the enterprise can automate higher-value tasks that in the past required the perceptual and judgment capabilities of a human. RPA allows the digital enterprise to move closer to *straight through processing* (STP) powered by an intelligent digital workforce.

Figure 8.25 illustrates the evolution of RPA capabilities within BPM technologies.

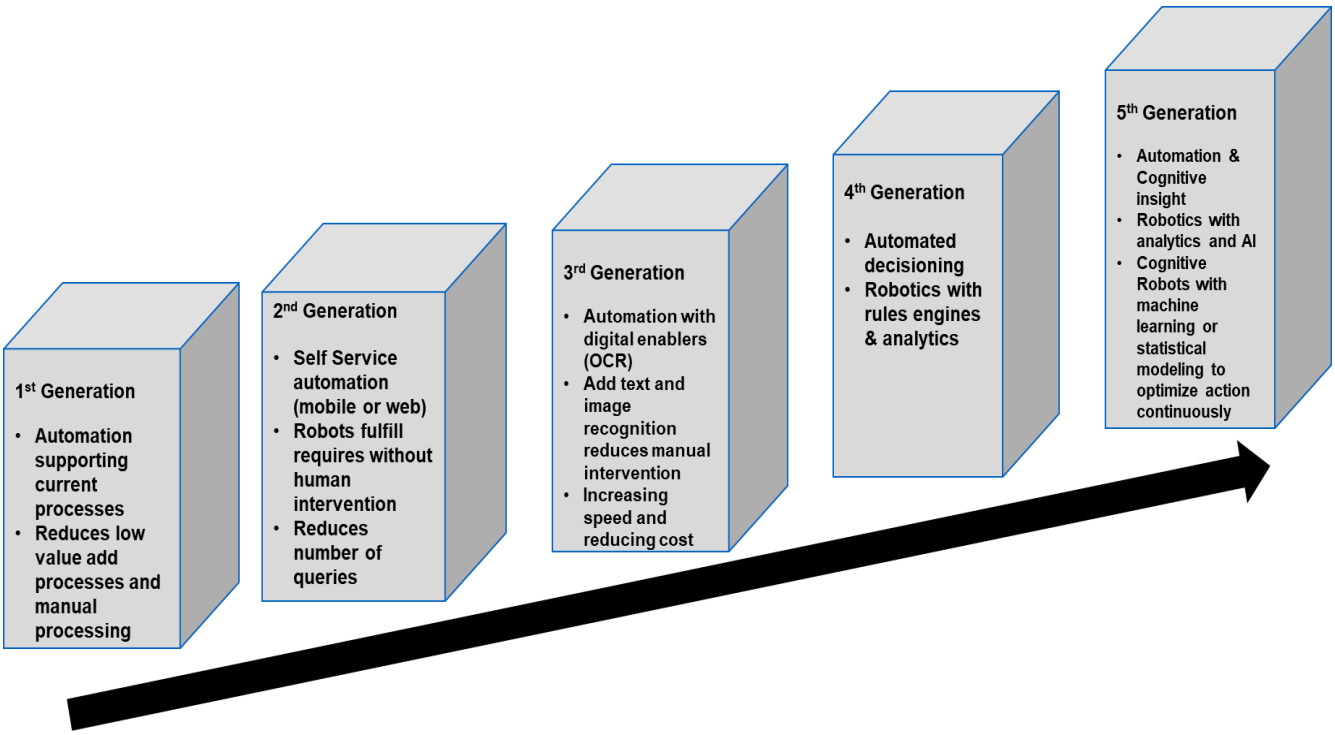


Figure 8.25 Evolution of RPA Capabilities in BPM Technologies

Robotics:

- Rules-based automation
- Single sign on integration
- Windows desktop application interaction
- Web interaction
- Mainframe interaction
- Citrix or remote servers
- OCR image recognition
- Intuitive, wizard driven, and user friendly
- Audit and activity logging
- Business activity monitoring

Cognitive:

- Structured, semi, and unstructured data
- Machine learning
- Natural language processing
- Speech recognition
- Artificial intelligence
- Supervised model learning
- Algorithm-based decisions
- Intelligent information extraction
- Online learning
- Automated model tuning

Attended

- Scripting of individual tasks
- Runs on each agent's desktop
- Increases efficiency of workers
- Consolidates information and provides consistent customer experience
- Streamlines work and optimizes processes

Unattended

- Large scale unattended processing
- Must respond to fluctuation in system response, unknown events, and unanticipated business scenarios without interruption
- Considers security, scheduling, audit, and exception management
- Secure, centralized collection of management information, audit records, and process logs
- Few humans could support many robotic solutions

Machine Learning

- Aids or replaces subjective decision making based on large data samples
- Interprets contextual information and provides consistent reasoning
- Helps streamline processes and route inquiries
- Applies human-like reasoning in large volumes (for example, transaction monitoring, fraud identification, and call filtering)

RPA best practices call for design of software robot systems to integrate with cognitive platforms (Le Clair et al. 2016). The following table summarizes recommendations based on the requirement of subjectivity of tasks.

	Process Automation		Cognitive	
Requirement	**Assist** Assist staff with process execution at their workstations	**Replace** Remove staff from process execution in the database	**Assist** Assist staff with decision making by filtering and providing quality data	**Replace** Remove staff with cognitive learning in the data center
Approach	Attended	Unattended		Machine learning

8.6.1.3 *Automation versus RPA*

Automation existed even before RPA came into the picture. Though multiple overlaps exist between these two, unlike RPA, automation is the invention of a new technology to solve real-life problems with the need for human intervention.

Refer to the following table for the differences between automation and RPA.

Parameter	Automation	RPA
What does it reduce?	Reduces execution time	Reduces number of people working on something
What does it automate?	Automates repetitive test cases that is a product	Automates the repetitive business process that is product as well as business
Programming knowledge	Required to create test scripts	Mostly not needed as it is wizard-driven

Software environment	Limited	A wide range
Application	Used for QA, production, performance, and user acceptance testing (UAT) environments	Usually used in production environments

8.6.1.4 *Process Selection Criteria for RPA*

Choosing the right process for RPA is critical for success of any RPA implementation. The following table provides eight process parameters from which to choose a process for RPA. Keep in mind that the processes should be currently done manually by humans.

Process Parameters	Favorable for RPA	Unfavorable for RPA
Decision Making	Rule based	Judgement based
Input data	Structured data	Unstructured input
Data format	Digitized	Non-digitized
Output consistency	Standardized	Many exceptions
Stability	Stable over time	Frequent changes
Management	Centralized	Decentralized
Errors	Frequent errors	Rare errors
Frequency	Continuous	Periodic

The decision criteria should focus on the suitability of implementing RPA, the overall cost of implementation. and finally, the return on investment.

8.6.1.5 *RPA Value Proposition*

There are several value-adding benefits of implementing RPA, including the following:

- **Cost savings**. Ranges from 20%-60% of baseline FTE cost.
- **ROI**. Programs take roughly nine to twelve months to implement; ROI in less than one year.
- **Accuracy**. Double-digit reduction in error rates.
- **Consistency**. Identical processes and tasks eliminate output variation.
- **Increased speed and productivity**. Removes non-value-added activities to those requiring more judgment.
- **Low-risk, non-invasive**. Fills gaps between existing systems.
- **Super scalable**. Instant ramp up and down to meet demand.
- **Reliability and compliance**. Services 24/7/365 with fully maintained logs for compliance.

Additional benefits include:

- Large numbers of processes can easily be automated.
- Automation of repetitive tasks saves precious time and resources.
- Programming skills are not needed to configure a software robot. Non-technical staff can set up a bot or record steps to automate a process.
- Supports all regular compliance processes with error-free auditing.
- Rapid modeling and deployment of automated processes.

- Defects are tracked for each test case story and the sprint.
- Effective, seamless build and release management.
- Real-time visibility into bugs; defect discovery.
- No training required when humans not performing process.
- Software robots do not get tired.
- Productivity increases, which helps to increase scalability.

8.6.1.6 *RPA Tool Selection*

Selection of an RPA tool should be based on the following four parameters:

(1) **Data**. Ease of reading and writing business data into multiple systems.
(2) **Type of tasks mainly performed**. Ease of configuring rules-based or knowledge-based processes.
(3) **Interoperability**. Tools should work across multiple applications.
(4) **AI**. Built-in AI support to mimic human users.

8.6.1.7 *Implementation of RPA*

Implementation of RPA follows typical project phases including planning, development, testing, and support and maintenance. The following table outlines an RPA implementation.

Phase	Description	Questions and Tasks
Planning questions	Identify processes to automate.	• Is the process manual and repetitive? • Is the process Rule-based? • Is the input data is in electronic format and is readable? • Can existing system be used as it is with no change?
Planning tasks	Complete planning tasks.	• Set up a project team, finalize implementation timelines and approach. • Agree on solution design for performing RPA processes. • Identify logging mechanism that should be implemented to find issues with running bots. • Clear roadmap should be defined to scale up RPA implementation
Development	Being wizard driven, the development phase of implementation is quick.	Develop automation workflows per agreed-upon plan
Testing	Verification of processes automated.	Run testing cycles for in-scope automation to identify and correct defects
Support and maintenance	Ongoing support of processes automated.	• Provide continuous support after going live Help with immediate defect resolution • Follow general maintenance guidelines • Define roles and responsibilities with business and IT support teams

8.6.1.8 *General Uses of RPA*

RPA has general applications that are industry-independent, as shown in the following table.

RPA General Use	Description
Emulates human action	Emulates human execution of the repetitive process using various applications and systems.
Conduct high-volume repeated tasks	Robotics process automation can easily simulate rekeying of data from one system to another. It performs tasks like data entry, copying, and pasting.
Perform multiple tasks	Operates multiple and complex tasks across multiple systems. This multi-tasking helps to process transactions, manipulate data, and send reports.
Virtual system integration	Transfer of data between disparate and legacy systems by connecting them at the user interface level instead of developing new data infrastructure.
Automated report generation	Automates the extraction of data to come up with accurate, effective, and timely reports.
Information validation and auditing	Resolves and cross-verifies data between different systems to validate and check information to provide compliance and auditing outputs.
Technical debt management	Helps to reduce technical debt by reducing the gap between systems, preventing the introduction of custom implementations.
Product management	Helps to bridge the gap between IT systems and related product management platforms by automated updating of both systems.
Quality assurance	Beneficial to QA processes that cover regression testing and automating customer use case scenarios.
Data migration	Allows automated data migration through systems. Not possible using traditional mediums like documents, spreadsheets, or other source data files.
Gap solutions	Fills gaps in process deficiencies. Includes many simple tasks such as password resets, system resets, and so on.
Revenue forecasting	Automatic updating of financial statements to predict revenue forecasting.

8.6.1.9 *Industry-Specific Uses of RPA*

The following table shows how RPA can be used in different industries and functional areas.

Industry	Usage
Healthcare	• Patient registration • Billing
HR	• New employee joining formalities • Payroll process • Hiring shortlisted candidates
Insurance	• Claims processing and clearance • Premium information
Manufacturing and retail	• Bills of material • Calculation of sales
Telecom	• Service order management • Quality reporting
Travel and logistics	• Ticket booking • Passenger details • Accounting
Banking and financial services	• Cards activation

	• Frauds claims • Discovery
Government	• Change of address • License renewal
Infrastructure	• Issues processing • Account setup and communication

8.6.1.10 *Five Reasons RPA Deployments Fail*

Many RPA pilot projects stall due to a mix of planning, personnel, and implementation issues, according to CIO Magazine. The five reasons RPA projects fail are:

(1) **Management hesitation.** RPA is disruptive; most managers don't want to disrupt their business.
(2) **Lack of training.** Spend time and money to get a broad base of staff trained. Failure occurs more frequently if only a handful of people are trained.
(3) **Wrong use cases.** Create a balance between starting *small* and starting *smart* to deliver both a *wow* factor and a ROI.
(4) **Excluding IT and security input.** IT is a critical component to building a sustainable and secure model that isn't entirely dependent on third parties. IT is needed for the longer-term maintenance of RPA infrastructure and the individual bots that get developed.
(5) **Excluding the app developers.** The application development team will own the application and the change control process after deployment, so their involvement is needed (Violino 2018)

8.6.1.11 *Best Practices for RPA*

Just as there are reasons RPA implementations fail, there are best practices that will help ensure success. CIO Magazine outlines the following eight factors in its July 2018 issue.

(1) Do your research

- Choose the right technology solution to meet your organization's specific needs.
- Create a solid business case for RPA, including return on investment (ROI) metrics.
- Assess current processes and organizational issues to avoid political problems.

(2) Educate staffers about RPA

- RPA programs require transformation from within.
- Transformation is challenging, given current media attention around robotics, cognitive computing, and other AI-spectrum technologies.
- RPA technologies will de-skill existing organizations; humans are not eager to train robots that might replace them.

(3) Determine where the technology will work best

- Identify processes most likely to have a positive business impact.
- Focus on value-add process will equal greater success in modernizing business processes.
- Great candidates for RPA are those tasks that are repetitive and frequent.

(4) Keep it simple and modular

- Build bots as common and reusable objects.
- Build as many generic components as possible and externalize all variables and logic to minimize failure points.

(5) Don't neglect data security

- Transactions are processed with incredible speed.
- Speed means service security is critical so that processes cannot be manipulated once implemented.

(6) Test implementations regularly

- RPA work is not done once systems have been deployed.
- Test automation tools on a regular basis to find and address any weaknesses.

(7) Develop a cross-functional Center of Excellence (CoE)

- Create a team to share experiences and best practices
- This CoE will reside within the BPM CoE.
- CoE is likely to be a subgroup of specialists.

(8) Prepare for future advances and challenges

- Keep up with RPA advances like increased cognitive capabilities
- Should be in charter of the BPM CoE strategy (Violino 2018)

8.6.1.12 *Digital Procurement Research Using RPA*

Procurement tends to be more of a transactional process — procure to pay, source to manufacture, and so on — which makes it a good choice for RPA. Hackett Group published a study on using RPA for procurement with some compelling results:

> *By deploying smart automation technologies such as robotic process automation, smart data capture, and cognitive automation, typical procurement organizations should expect a 17% cost reduction, while world-class procurement organizations can reduce an already competitive cost structure by an additional 21% (Gibbons and Sawchuk 2019).*

Through full deployment of digital tools, typical procurement organizations can reduce operational costs by up to 45%, achieving efficiency levels below those of today's world-class procurement organizations. According to the research, world-class procurement organizations, which spend 22% less than their peers, can also reduce costs by an additional 33% with comprehensive digital transformation (Burnson 2019).

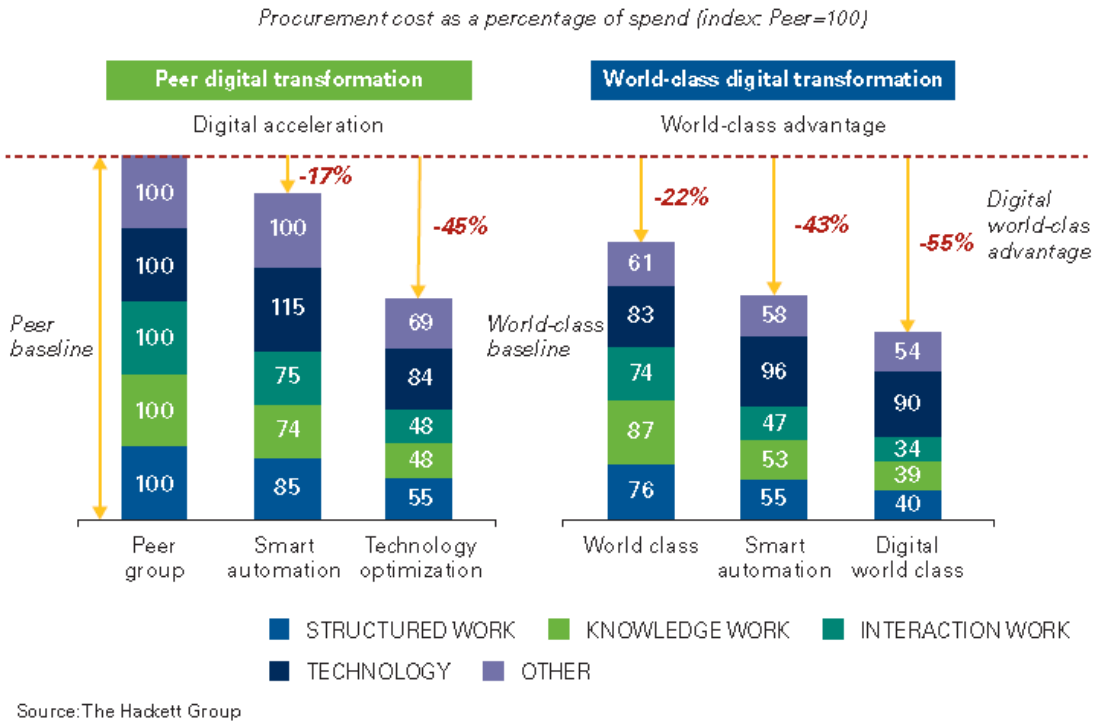


Figure 8.26 Procurement Smart Automation Efficiency Opportunity (Gibbons and Sawchuk 2019)

iBPMS has become more intelligent and advanced. Business rules and AI analytics capabilities are unified within the BPMS, and intelligent BPM is now a reality. Intelligent Business Process Management (iBPM) is a digital transformation discipline that includes an automation technology component. The associated automation platform aligns business objectives to execution. There are several trends that have influenced the evolution of iBPM, making it the core engine of transformation for digital enterprises. Two of these trends are *process participants* and *process intelligence*.

Robotic automation is available in some iBPMS platforms (also called digital process automation platforms). Next-generation iBPMSs support the entire spectrum of work automation: structured, cognitive, and AI-assisted. Also significant is the emergence of dynamic case management to handle ad-hoc work and provide a more powerful model (compared to flowcharts and swim lanes) to work orchestration.

Figure 8.27 outlines the evolution of RPA in iBPMS.

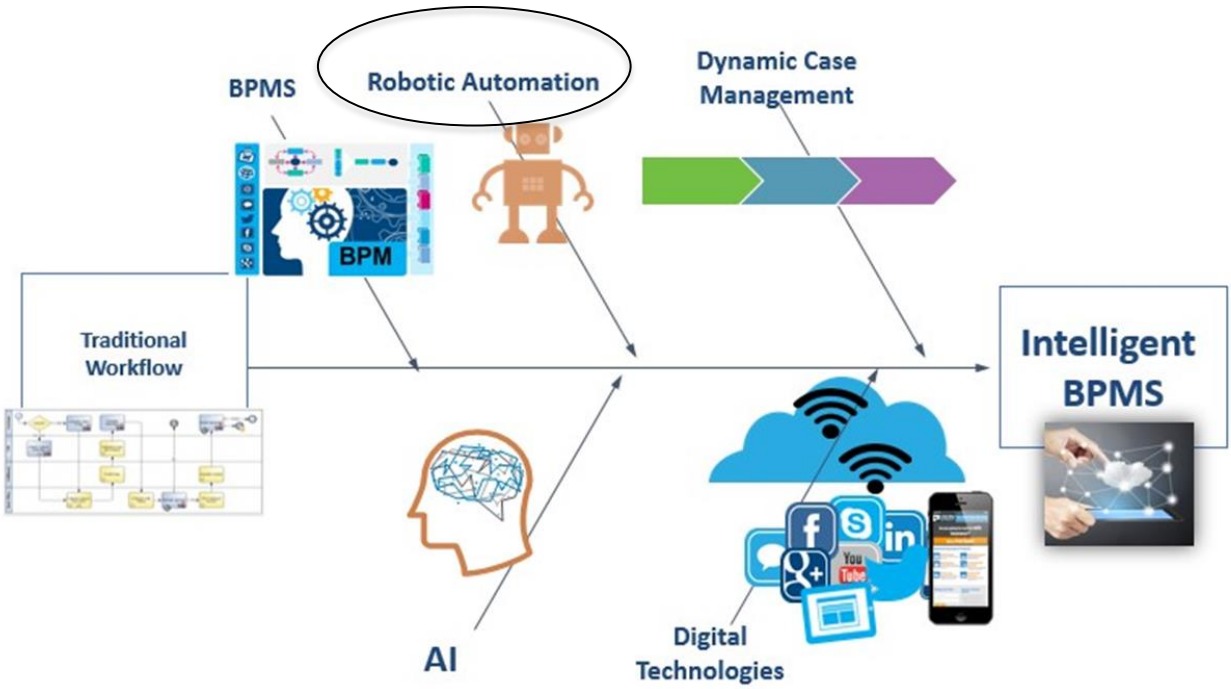


Figure 8.27 Evolution of iBPMS (Khoshafian 2019)

8.6.2 Blockchain

Blockchain is almost ubiquitous in digital magazines, blogs, and so on. There are many definitions that have been put forth. It's important to define blockchain first before embarking on a dissertation on the subject. Very simply, a blockchain is a single version of the truth, represented in a data structure that makes it possible to create a decentralized, immutable, secure, time-stamped, digital ledger of data and share it among a network of independent parties. From a Business Process Management perspective, blockchain will reinvent business processes at the transactional level for capturing the data (inputs and outputs) generated by the processes being transacted.

There are several different types of blockchains: private, public, and permissioned blockchains. You will also see blockchain referred to as digital ledger technology (DLT). Following are brief explanations of blockchain types:

Public blockchains. Public blockchains are large distributed networks that are run through a native token. They're open for anyone to participate at any level and have open-source code that their community maintains.

Permissioned blockchains. Permissioned blockchains control roles that individuals can play within the network. One method might be that the consensus process is controlled by a preselected set of nodes. They're still large and distributed systems that use a native token. Their core code may or may not be open source.

Private blockchains. Private blockchains tend to be smaller and do not utilize a token. Their membership is closely controlled. These types of blockchains are favored by consortiums that have trusted members who centrally control the permissions and trade confidential information.

The following table compares public versus private blockchains.

	Public	Private
Access	Open read/write access to database	Permissioned read/write access to database
Speed	Slower	Faster
Security	Proof-of-work/ Proof-of-state	Pre-approved participants
Identity	Anonymous/ Pseudonym	Known identities
Asset	Native assets	Any asset
Costs	Expensive	Cheaper

Adapted from (Voshmgir 2019)

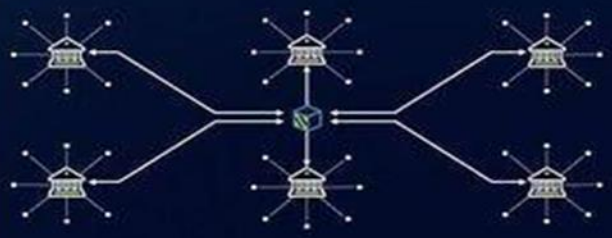
All three types of blockchains use cryptography to allow each participant on any given network to manage the ledger in a secure way without the need for a central authority to enforce the rules. The removal of central authority from database structure is one of the most important and powerful aspects of blockchains.

As of May of 2019, there are four types of blockchains, as noted in Figure 8.28. Current thinking is that hybrid blockchains will most likely dominate ecommerce by combining a permissioned blockchain with a public blockchain. Companies can secure background transactions with business partners while also sharing product information with consumers on an open ledger. Essentially, the hybrid blockchain will be set up where one is public or consumer-facing and the other is permissioned for corporate transactions behind the scenes.

Types OF BLOCKCHAINS

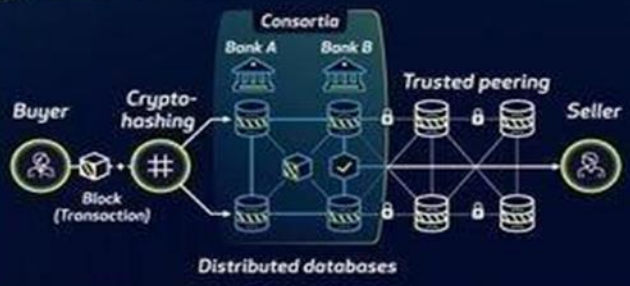
There are ***four different types*** of blockchain, each with unique characteristics:

1 Federated



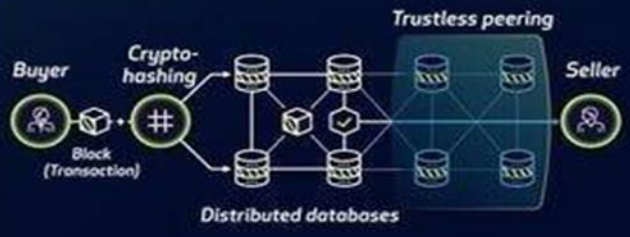
- Operates under the ***leadership of a group***
- ***Access is limited*** to those given permission by the group
- Due to limited membership, they are ***faster***, can ***scale higher,*** and offer ***more transaction privacy***
- Distant ***cousin to intranets*** of the 1990s

2 Permissioned/private



- ***Access might be public or restricted,*** but only a few users are given permission to view and verify transactions
- Ideal for ***database management*** or ***auditing services***, where data privacy is an issue
- ***Data handling is simplified***, as there are fewer gatekeepers
- ***Compliance can be automated***, as the organization has control over the code

3 Permissionless/public



- ***Open-source*** and available to the ***public***
- ***Transactions are transparent*** to anyone on the network with a block viewer, ***but anonymous***
- ***The ultimate democracy*** - this fully distributed ledger disrupts current business models by removing the middleman
- ***Minimal costs involved:*** no need to maintain servers or system admins

4 Hybrid



- ***A public blockchain***, which hosts a private network with ***restricted participation***
- The private network ***generates blocks of hashed data*** stored on the public blockchain, but without sacrificing data privacy
- ***Flexible control*** over what data is kept private and what is shared on the public ledger
- Hybrid blockchains offer the benefits of ***decentralization and scalability,*** without requiring consensus from every single node on the network

Source: Brave New Coin, Entrepreneur

Figure 8.28 Types of Blockchains (Scribani 2018)

Blockchains are comprised of three core parts: blocks, chains, and networks.

Block. A list of transactions recorded into a ledger over a given period. The size, period, and triggering event for blocks is different for every blockchain. Not all blockchains are recording and securing a record of the movement of their cryptocurrency as their primary objective. But all blockchains do record the movement of their cryptocurrency or token. Think of the transaction as simply being the recording of data. Assigning a value to it (such as happens in a financial transaction) is used to interpret what that data means.

Chain. A hash that links one block to another, mathematically *chaining* them together. This is one of the most difficult concepts in blockchain to comprehend. It's also the magic that glues blockchains together and allows them to create mathematical trust. The hash in the blockchain is created from the data that was in the previous block. The hash is a fingerprint of this data and locks blocks in order and time.

Although blockchains are a relatively new innovation, hashing is not. Hashing was invented over thirty years ago. This old innovation is being used because it creates a one-way function that cannot be decrypted. A hashing function creates a mathematical algorithm that maps data of any size to a bit string of a fixed size. A bit string is usually 32 characters long, which then represents the data that was hashed. The Secure Hash Algorithm (SHA) is one of some cryptographic hash functions used in blockchains. SHA-256 is a common algorithm that generates an almost-unique, fixed-size 256-bit (32-byte) hash. For practical purposes, think of a hash as a digital fingerprint of data that is used to lock it in place within the blockchain.

Network. The network is composed of *full nodes*. Think of them as the computer running an algorithm that is securing the network. Each node contains a complete record of all the transactions that were ever recorded in that blockchain.

Blockchains are decentralized, such that it is a peer-to-peer system with no central authority managing data flow. One of the *key ways* of removing central control while maintaining data integrity is to have a large, distributed network of independent users. Decentralization means that the computers that make up the network are in more than one location. These computers are often referred to as *full nodes*.

Blockchains differ in their consensus mechanisms, which are the rules by which the technology will update the ledger. Blockchains create permanent records and histories of transactions, but nothing is permanent. The permanence of the record is based on the permanence of the network. In the context of blockchains, this means that a large portion of a blockchain community would all have to agree to change the information, but they are incentivized not to change the data.

Broadly, a blockchain is a ledger on which new transactions are recorded in blocks, with each block identified by a cryptographic hash of that data. The same hash will always result from that data, but it is impossible to re-create the data from the hash. Similarly, if even the smallest detail of that transaction data is changed, it will create a wildly different hash, and since the hash of each block is included as a data point in the next block, subsequent blocks would also end up with different hashes. When data is

recorded in a blockchain, it's extremely difficult to change or remove it. Each block is identified by a cryptographic hash of that data (record). This cryptographic representation is what makes the ledger tamper-proof.

When someone wants to add a record to a blockchain, also called a *transaction* or an *entry*, users in the network who have validation control verify the proposed transaction. This is where things get tricky because every blockchain has a slightly different spin on how this should work and who can validate a transaction.
Finally, security also comes from the fact that multiple computers, called *nodes*, store the blockchain, and so to change the ledger, one would need to gain control of at least 50% of the computing power in order to change the record — a difficult feat, especially for a public blockchain.

Note that the terms *Bitcoin* and *blockchain* are often used interchangeably, but they're not the same. Bitcoin has a blockchain. The Bitcoin blockchain is the underlying protocol that enables the secure transfer of Bitcoin. The term Bitcoin is the name of the cryptocurrency that powers the Bitcoin network. The blockchain is a class of software, and Bitcoin is a specific cryptocurrency.

Figure 8.29 shows how a blockchain comes to an agreement (consensus).

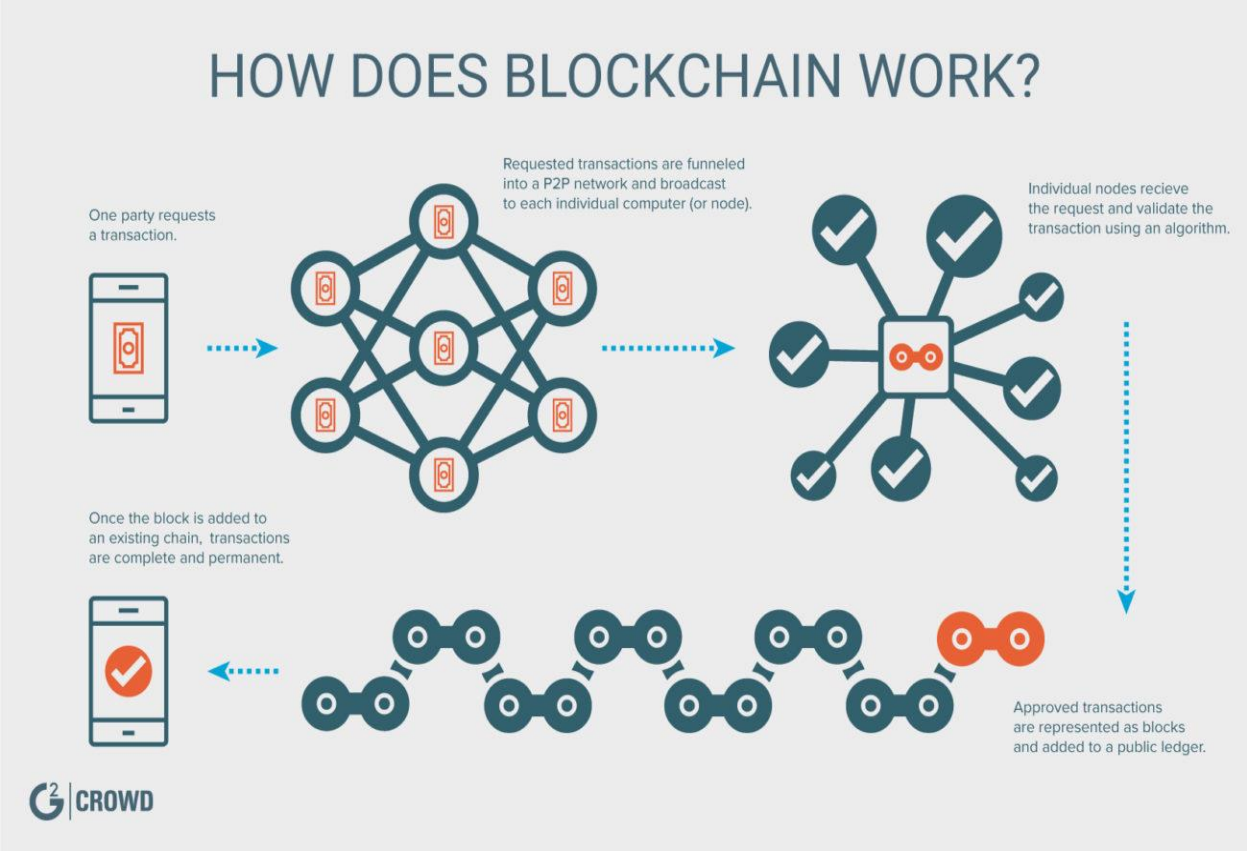


Figure 8.29 How Blockchains Work (G2 Crowd 2018)

Blockchains are powerful tools because they create honest systems that self-correct without the need of a third party to enforce the rules. They accomplish the enforcement of rules through their consensus algorithm.

Figure 8.30 shows a summary of the fourteen different types of consensus algorithms used in blockchain.

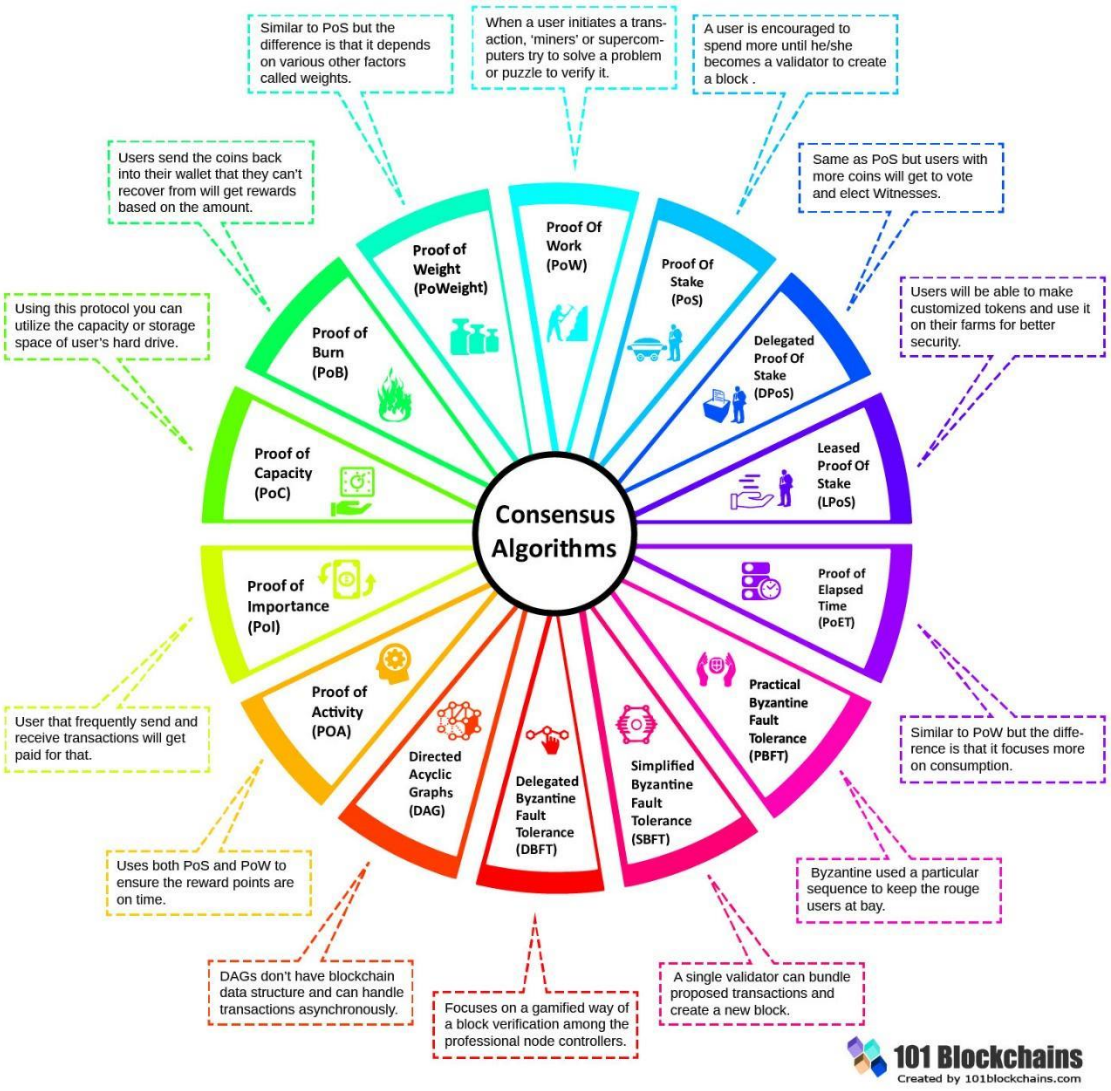


Figure 8.30 Fourteen Consensus Algorithm Types (Anwar 2018)

The following table describes each of the fourteen consensus algorithm types.

Algorithm Type	Description
Proof of Work (PoW)	When a user initiates a transaction, *miners* or supercomputers try to solve a problem or puzzle to verify it.
Proof of Stake (PoS)	Users encouraged to spend more until they become validators to create blocks.
Delegated Proof of Stake (DPoS)	Same as PoS, but users with more coins get to vote and elect witnesses.

Leased Proof of Stake (LPoS)	Users can make customized tokens and use them on their terms for better security.
Proof of Elapsed Time (PoET)	Similar to PoW, but focuses more on consumption.
Practical Byzantine Fault Tolerance (PBFT)	Byzantine uses a particular sequence to keep rogue users at bay.
Simplified Byzantine Fault Tolerance (SBFT)	A single validator can bundle proposed transactions and create a new block.
Delegated Byzantine Fault Tolerance (DBFT)	Focuses on a gamified way of a block verification among professional node controllers.
Directed Acyclic Graphs (DAG)	DAGs don't have blockchain data structure and can handle transactions asynchronously.
Proof of Activity (PoA)	Uses both PoS and PoW to ensure reward points are on time.
Proof of Importance (PoI)	Rewards users who actively transact on the network, building on proof-of-stake.
Proof of Capacity (PoC)	Using this protocol, you can utilize the capacity or storage space of a user's hard drive.
Proof of Burn (PoB)	Miners send coins to a verifiably un-spendable address to *burn* them. In exchange, they receive a reward in the blockchain's native currency token.
Proof of Weight (PoW)	Similar to PoS, but depends on other factors called weights.

Six categories of blockchain use cases include static registry, identity, smart contracts, dynamic registry, payment and infrastructure, and other, as shown in Figure 8.31.

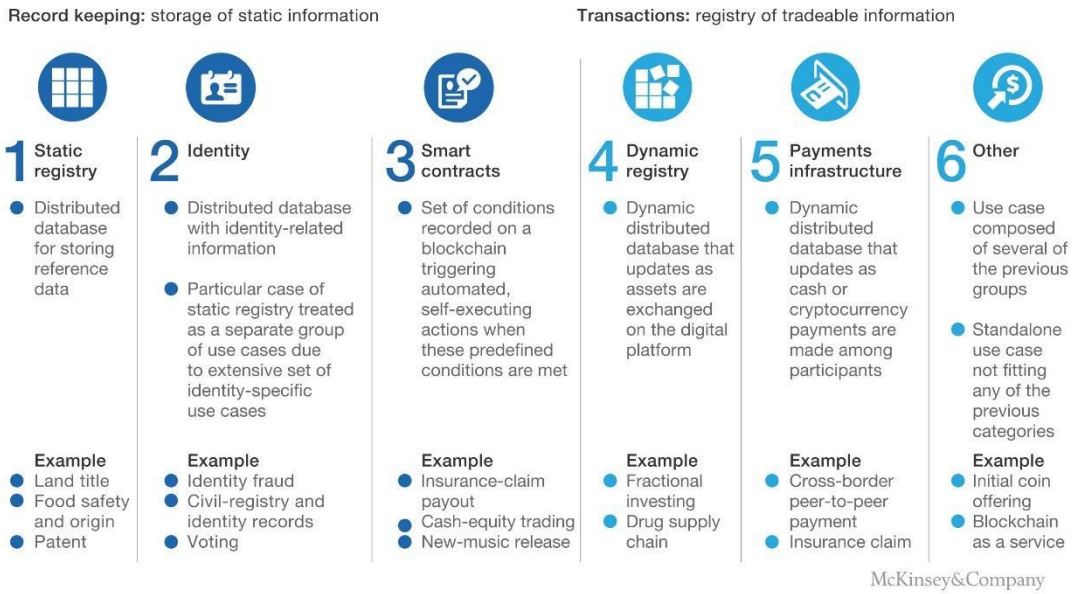


Figure 8.31 Six Categories of Blockchain Use Cases (Carson, et al. 2018)

Additional categories may be added as blockchain technology evolves.

One question to ask is whether you need a complete blockchain, and then if you need a *digital token* or a *smart contract*. Figure 8.32 is a flow chart that may help you answer those questions.

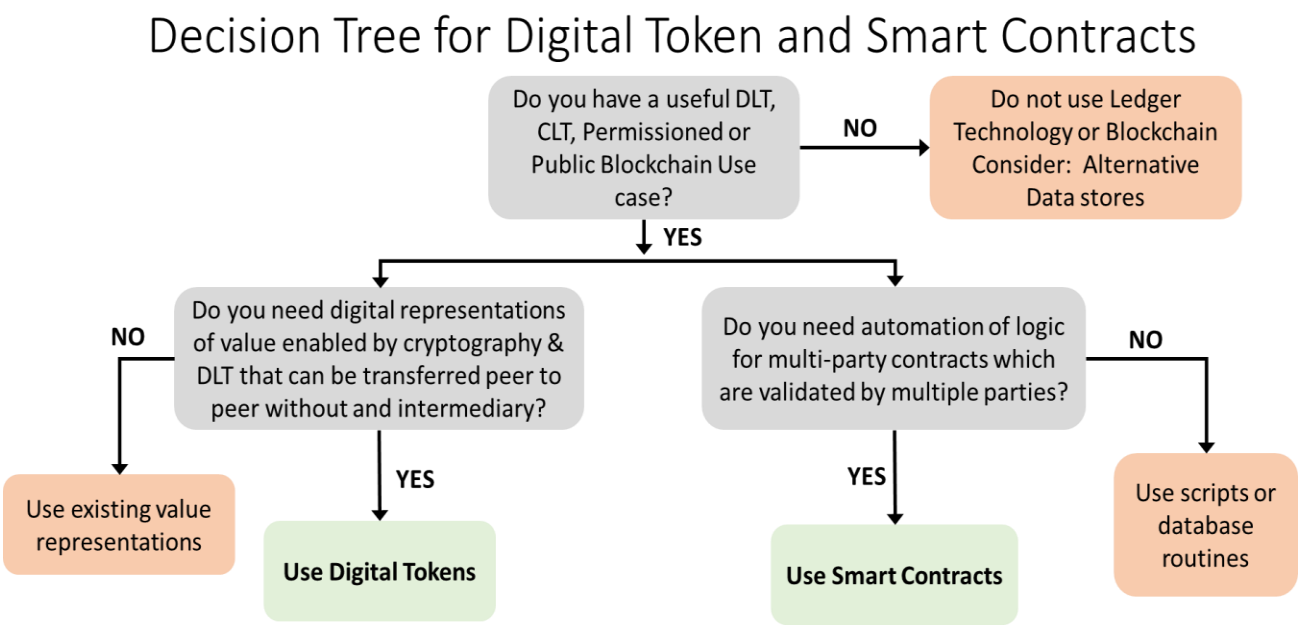


Figure 8.31 Digital Ledger Technology (DLT) and Contract Ledger Technology (CLT)

The feasibility of blockchain by industry depends on the type of asset, technology maturity, standards and regulation, and the ecosystem. Figure 8.32 charts the feasibility of blockchain usage by industry.

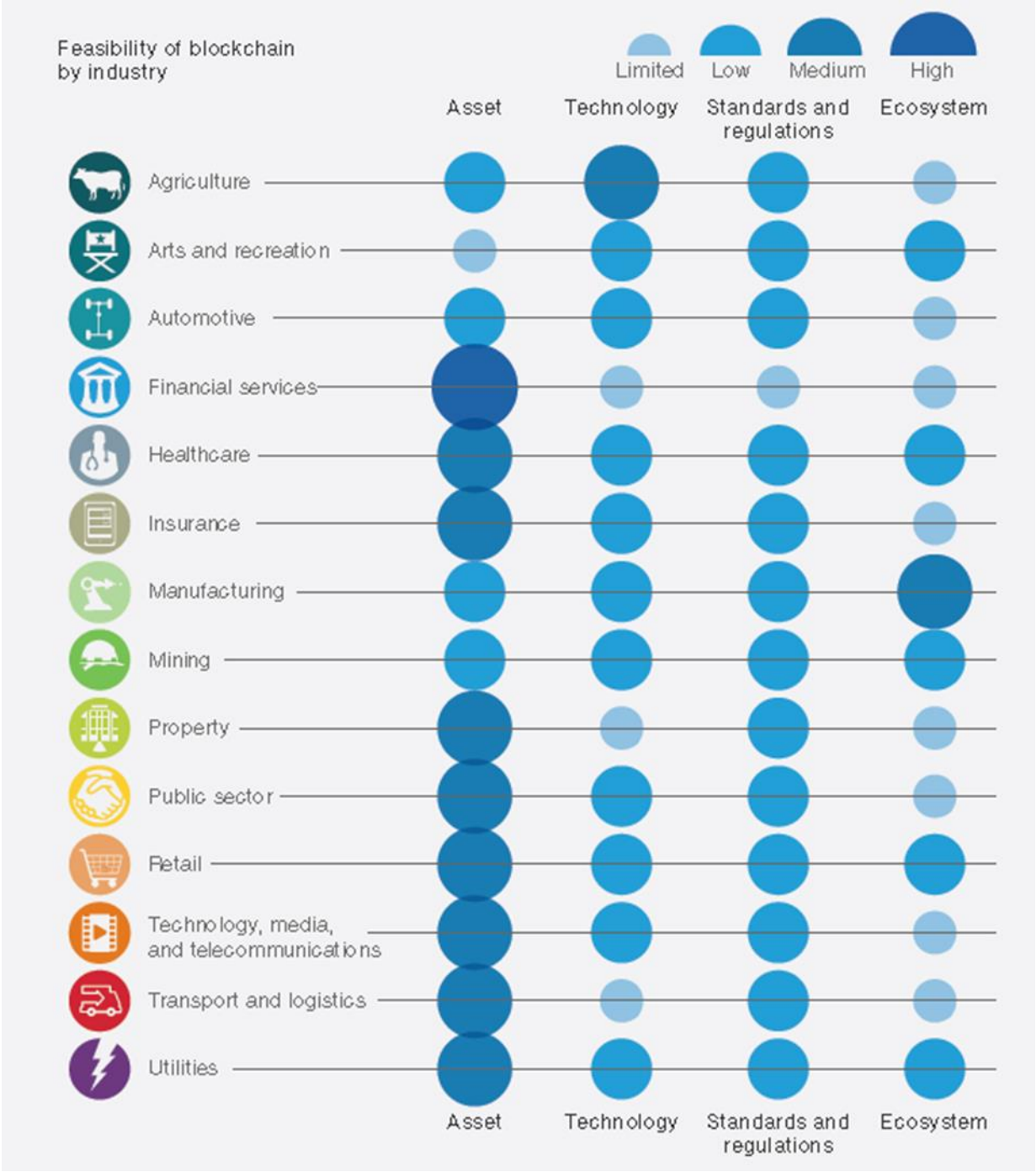


Figure 8.31 Blockchain Feasibility by Industry (Carson, et al. 2018)

Figure 8.32 shows blockchain use cases by industry.

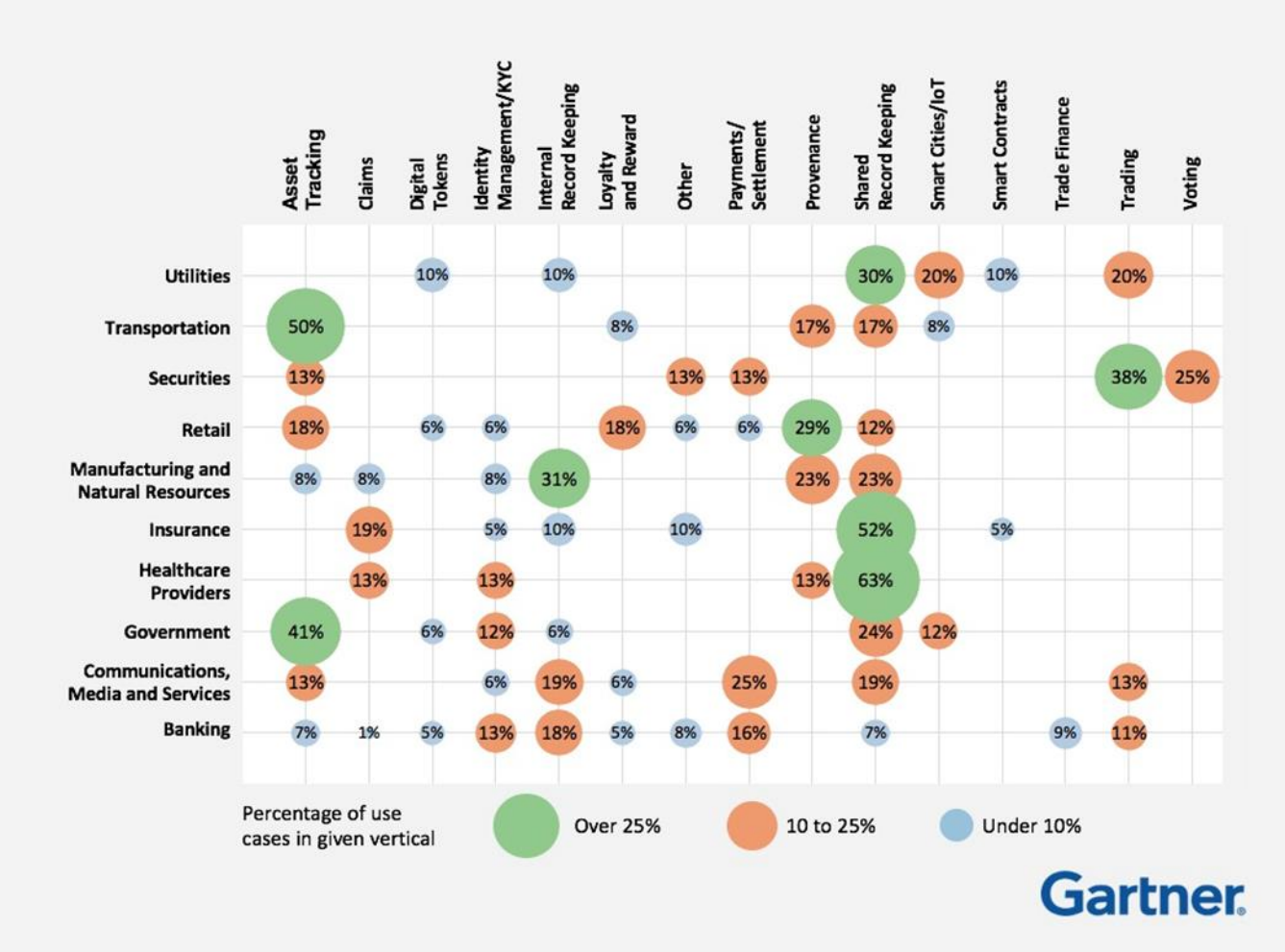


Figure 8.32 Blockchain Use Cases by Industry (Mearian 2019)

Uses of blockchain include:

- Bitcoin
- Initial coin offering (ICO)
- Supply chains
- Property registries
- Digital rights management
- Trade finance

Figure 8.33 shows a blockchain technology stack and layers.

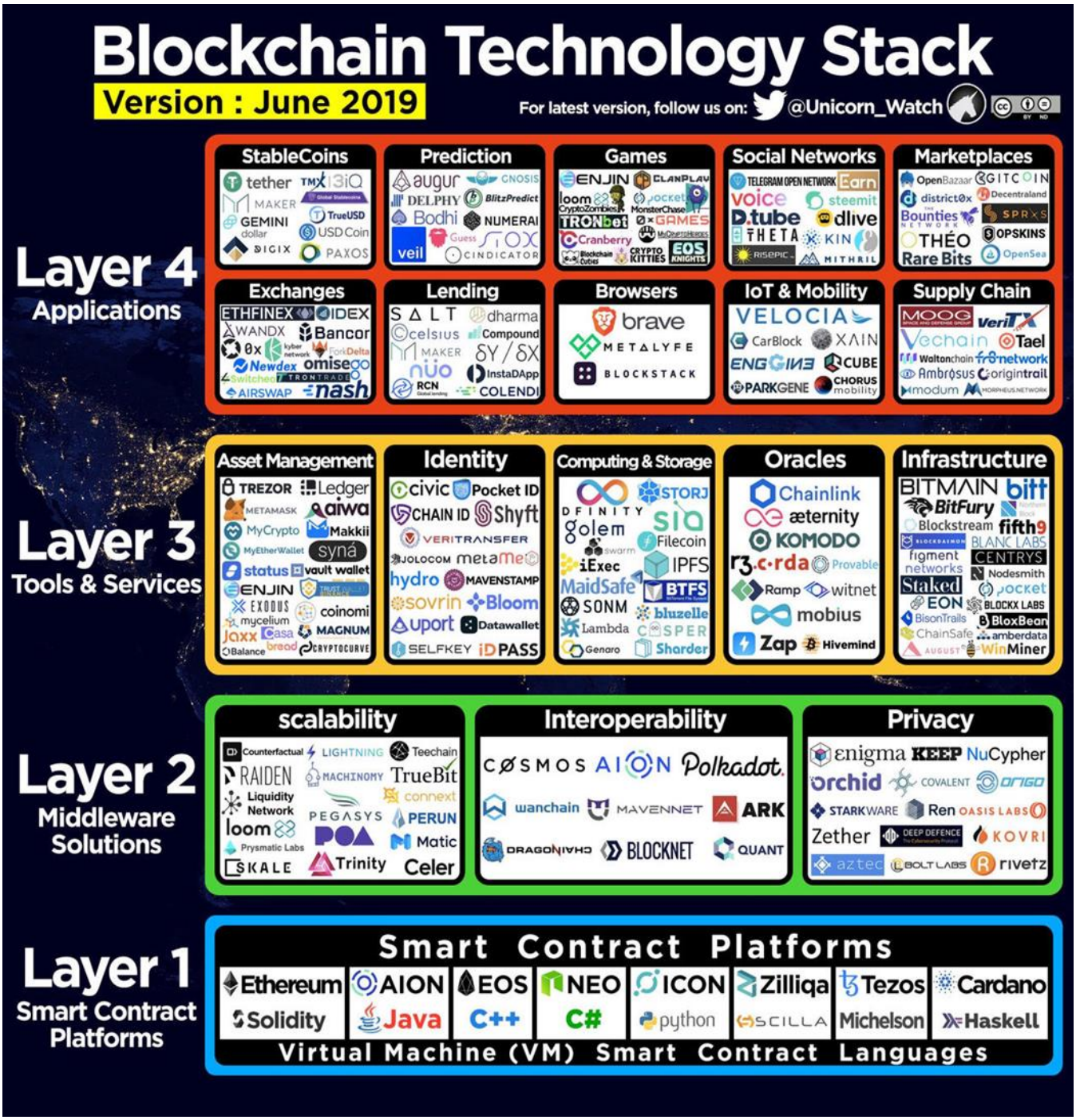


Figure 8.33 Blockchain Technology Stack (Unicorn Watch 2019)

Clearly, there are a lot of software players and one can assume that consolidation will bring the number of vendors down to a more manageable number for companies to select for investment.

What should be clear at this point is that blockchain is a foundation-level technology. While it can be used across industries for different situations, it is not a complete application. For example, it must also include features such as user interface, business logic, data persistence, and interoperability

mechanisms. What distinguishes blockchain from databases is that currently, blockchain does not implement the *create, read, update, delete* model used in conventional databases. Also, blockchain platforms are not currently interoperable with other blockchain platforms, which may change as the technology and use cases mature.

What makes blockchain disruptive in a global world, according to George Gilder, can be summarized in two points: a new security architecture and re-empowerment of money.

New Security Architecture. Hackers love centralized security architecture because it tells them 1) what's important and 2) where it can be found. In contrast, blockchain provides an immutable record of all transactions and information transmissions that have occurred — and distributes a compressed version of all the data to everyone in the network. By using a distributed instead of a centralized model, all of the information is not in one place — where it's an easy target for hackers.

Giving Power Back to Money. Governments have forgotten what money is for and how it works. As a result, they're issuing more and more of it, on the assumption that somehow money constitutes wealth, instead of realizing that money measures wealth. Going back to a gold standard is what sets currencies at a fixed rate, rather than a floating rate tied to nothing (paper). Blockchain — along with cryptocurrencies — offer a solution. It's not just about creating a new form of money that the government can't touch. With the help of blockchain, some cryptocurrencies will eventually replace real money and displace wildly floating currencies.

There are even efforts to tie cryptocurrencies to gold. That will create a stable coin standard for transacting business (Guilder 2018)**.**

Lastly, blockchain must be considered in the context of business

> *"Governance in public blockchains such as Ethereum and Bitcoin is mostly aimed at technical issues. Human behaviors or motivation are rarely addressed," Leow said in the release. "CIOs must be aware of the risk that blockchain governance issues might pose for the success of their project. Especially larger organizations should think about joining or forming consortia to help define governance models for the public blockchain" (Panetta 2019).*

Much of blockchain and its corresponding technologies are still somewhat young and lack a degree of maturity to scale for global commerce. In addition, many leaders still don't fully understand blockchain and its related technologies. Even if the technology was mature and leaders understood it well enough to deploy it, there's still an issue of governance, not in a central authority, but in the technology, system design, and the network rules, especially on how to come to an agreement should something go wrong. Another point on governance is that by default, blockchain shares information that you may not want to be shared — primarily in public blockchain networks. While most of these issues will be resolved over time, blockchain still has a lot more development before it is ready for widespread enterprise use.

One of blockchain's best fits in financial services is as a communication layer for Business Process Management (BPM). By leveraging smart contracts and the auditability of distributed ledger technologies, blockchain can facilitate processes involving multiple parties following specific regulatory

guidelines. In these scenarios, the technology is being used primarily to share documentation, communicate information, and track different states of transactions. Integration of these systems with existing workflows and back offices provides better visibility among all participants. It is not about pushing everyone to adopt a whole new platform. Instead, it is about enabling simple integration of legacy infrastructure into new networks, which can provide improved functionality.

Blockchain technology is different than BPM solutions in that traditional BPM services tend to handle internal workflows within a single organization only. They do not manage the workflow process and information across organizations. If they do, they fall into the same trap that blockchain is helping to move away from, which is having a centralized repository of information controlled by a third party (in this case, the business process or workflow provider). If a third party holds data and is responsible for passing it from one organization to another, there is a risk of resiliency problems that come with that central or single point of failure.

Blockchain technology allows for the creation of a peer-to-peer BPM system that eliminates the central repository of information and allows multiple corporations to exchange information directly with counterparties while guaranteeing the integrity of the process. The system allows for organizations to verify and enforce that specific steps are being taken and performed correctly by any party on the network. This verification is essential when dealing with regulated transactions that require specific guideline compliance. With blockchain systems, one can code guidelines into smart contracts, and the verification of a party conforming with those guidelines can then be performed by a counterparty as well. As a result, everyone can enforce the rules on everyone else and ensure that the correct steps are being taken throughout these workflows. Blockchain enables real-time auditing that provides assurances to counterparties that corners are not being cut.

Allowing the participants and counterparties to maintain control of their own data is another important benefit of using a blockchain for BPM. Even though participating organizations have enforced rules upon them by the network, they still maintain control of their data rather than a third party.

Along these lines, another BPM-related problem that blockchain technology can solve is internal fraud. From a risk perspective, a blockchain network enforces transaction rules on a party's own employees so that they cannot misbehave and circumvent rules and regulations.

8.6.2.1 *Blockchain in the Supply Chain*

Blockchain has already taken hold in the realm of supply chain. According to Spend Matters, experts suggest blockchain could become a universal "supply chain operating system" before long, where the technology could improve the following tasks:

- **Recording** the quantity and transfer of assets — like pallets, trailers, containers, and so on — as they move between supply chain nodes (Gonzalez 2015).
- **Tracking** purchase orders, change orders, receipts, shipment notifications, or other trade-related documents.
- **Assigning** or verifying certifications or certain properties of physical products; for example, determining if a food product is organic or fair trade (Herzberg 2015)

- **Linking** physical goods to serial numbers, bar codes, digital tags like RFID, and so on.
- **Sharing** information about manufacturing process, assembly, delivery, and maintenance of products with suppliers and vendors.

Regardless of the application, the benefits of shippers using blockchain include:

- **Enhanced transparency.** Documenting a product's journey across the supply chain reveals its true origin and touchpoints, which increases trust and helps eliminate the bias found in today's opaque supply chains. Manufacturers can also reduce recalls by sharing logs with OEMs and regulators (Gonzalez 2015).
- **Greater scalability.** Virtually any number of participants, accessing from any number of touchpoints, is possible (Forbes).
- **Better security.** A shared, indelible ledger with codified rules could potentially eliminate the audits required by internal systems and processes (Spend Matters 2015).
- **Increased innovation.** Opportunities abound to create new, specialized uses for the technology as a result of the decentralized architecture.

8.6.3 Artificial Intelligence (AI) and Machine Learning

This section covers artificial intelligence (AI), machine learning, and deep learning. Deep learning is worth exploring for its role in neural networks and for advanced applications like image recognition. Following are definitions for these terms.

Artificial intelligence (AI) means getting a computer to mimic human behavior in some way. AI is a sub-field of computer science. According to the Oxford English Dictionary, AI is "the theory and development of computer systems able to perform tasks normally requiring human intelligence," such as visual perception, speech recognition, decision-making, and translation between languages. Webster's defines AI as "the capability of a machine to imitate intelligent human behavior."

Machine learning (ML), is a subset of AI. Machine learning uses a range of techniques that allow computers to learn to perform tasks without being explicitly programmed. At their core, machine learning algorithms work to identify patterns in data and create models that predict or classify specific outcomes. In ML, the essential task is to create a predictor of future outputs from some set of inputs. This task is accomplished by training the predictor statistically from historical data. If the value predicted is a real number, then you are solving a regression problem. If you are predicting a yes or no response, then you are solving a binary or two-class classification problem. If you are predicting more than two classes, then you are solving a multiclass classification problem. The important point is that the corpus of data is the same, but the algorithms might be different. Interestingly, neural networks are an option for any of the three kinds of prediction problems. Also note that neural networks are known both for accuracy and long training times and are one of the more time-consuming but accurate approaches to machine learning.

Deep learning is a subset of machine learning that allows computers to solve very complex problems. It uses deep learning algorithms and deep neural networks (DNNs). DNNs are neural networks constructed from many layers (hence the term "deep") of alternating linear and nonlinear processing units, and are trained using large-scale algorithms and massive amounts of training data. A deep neural network might

have ten to twenty hidden layers, whereas a typical neural network may have only a few. The more layers in the network, the more characteristics it can recognize. Unfortunately, the more layers in the network, the longer it will take to calculate, and the more difficult it will be to train. One kind of deep learning algorithm is *random decision forests* (RDFs). Again, they are constructed from many layers, but instead of neurons, the RDF is constructed from decision trees and outputs a statistical average (mode or mean) of the predictions of the individual trees. The randomized aspects of RDFs are the use of bootstrap aggregation (bagging) for individual trees and taking random subsets of the features.

According to a report from Forrester's Rob Koplowitz, BPM will evolve based on the following:

- **Machine learning will optimize processes.** Analytics have taken over everything, including process management. In the past, operators had access to data, but were not provided actionable guidance. The emergence of AI takes those analytics a step further by providing actionable insights.
- **Unstructured data becomes organized.** BPM traditionally excels at moving structured processes towards an automated manner. Unstructured processes, on the other hand, are a different story since patterns aren't so readily available. AI technologies including natural language processing (NLP) close the gap by providing sentiment analysis and the possibility to convert unstructured data to something more organized.
- **New interfaces, new opportunities.** The arrival of new technologies presents new interfaces and user experiences including voice commands and chat (2017).

It is not the intention of this BPM body of knowledge to go into a college or graduate-level course on AI, machine learning, deep learning, or neural networks. For those interested in further study, you can learn a lot about deep learning simply by installing one of the deep learning packages, trying out its samples, and reading its tutorials. For more depth, consider one or more of the following resources:

- *Neural Networks and Deep Learning*, by Michael Nielsen
- *A Brief Introduction to Neural Networks*, by David Kriesel
- *Deep Learning*, by Yoshua Bengio, Ian Goodfellow, and Aaron Courville
- *A Course in Machine Learning*, by Hal Daumé III
- The *TensorFlow Playground*, by Daniel Smilkov and Shan Carter
- Stanford CS class CS231n *Convolutional Neural Networks for Visual Recognition*

Companies invest in AI development to achieve one of these three objectives:

(1) Build systems that think exactly like humans (*strong* AI)
(2) Just get systems to work without figuring out how human reasoning works (*weak* AI)
(3) Use human reasoning as a model but not necessarily the end goal

The majority of AI development happening today by industry leaders falls under the third objective and uses human reasoning as a guide to provide better services or create better products rather than trying to achieve a perfect replica of the human mind (Marr 2018).

Amazon builds much of its business on machine-learning systems (as a subset of AI) and defines AI as, "the field of computer science dedicated to solving cognitive problems commonly associated with human intelligence, such as learning, problem solving, and pattern recognition." Machine learning is so

important to Amazon, they stated, “Without ML, Amazon.com couldn’t grow its business, improve its customer experience and selection, and optimize its logistic speed and quality.”

Given that big data is a major challenge for companies that want to develop insights into their customers, some of the major applications of AI, machine learning, and deep learning, can do the following:

- Model the organization based on observations.
- Generate insights by simultaneously reviewing lots of factors and variables (far more than a person can achieve in a reasonable time and with cost constraints).
- Learn continuously as new observations are provided.
- Quantify the likelihood of outcomes (that is, predict what is likely to happen).
- Prescribe specific actions to optimize business goals and metrics.
- Adjust rapidly to new business rules through faster retraining versus traditional, slower reprogramming.

What makes AI, machine learning, and deep learning possible now is the proliferation of data volume and data types coupled with the lower costs of computing and storage hardware and tools. AI, machine learning, and deep learning are a natural progression of business intelligence.

In May 2011, the gap for managers and analysts who knew how to use the results of analytics stood at 1.5 million, an order of magnitude more than for those who produce the analytics (such as data analysts and data scientists). Put another way, the chokepoint in the data value chain is not the data or the analytics; it’s the ability to consume the data and analytics in context and in an intelligent way. In other words, the challenge is gaining contextual insights (patterns) from the data (Manyika et al. 2011).

In the following extract from Infoworld, author Jerry Hartanto analyzes the business application of AI, machine learning, and deep learning.

AI, machine learning, and deep learning can turn that pile of data into an asset by systematically determining its importance, predicting outcomes, prescribing specific actions, and automating decision making. In short, AI, machine learning, and deep learning enable organizations and businesses to take on the factors driving business complexity, among them:

Value chains and supply chains that are more global, intertwined, and focused on microsegments.

Business rules that rapidly change to keep pace with competitors and customer needs and preferences.

Correct forecasting and deployment of scarce resources to optimize competing projects/investments and business metrics.

Need to simultaneously drive towards both increased quality and customer experience while reducing costs.

In many ways, AI, machine learning, and deep learning are superior to explicit programming and traditional statistical analysis:

The business rules don’t really need to be known to achieve the targeted outcome — the machine just needs to be trained on example inputs and outputs.

If the business rules change such that the same inputs no longer result in the same outputs, the machine just needs to be retrained — not reprogrammed — accelerating response times and alleviating people of the need to learn new business rules.

Compared to traditional statistical analysis, AI, machine learning, and deep learning models are relatively quick to build, so it's possible to rapidly iterate through several models in a try-learn-retry approach (2019).

8.6.4 Business Intelligence versus Artificial Intelligence

Where business intelligence describes and diagnoses past events, AI, machine learning, and deep learning try to predict the likelihood of future events and prescribe how to increase the likelihood of those events actually occurring. Figure 8.34 shows the increasing maturity of analytics toward this prescriptive result that uses AI, machine learning, and deep learning.

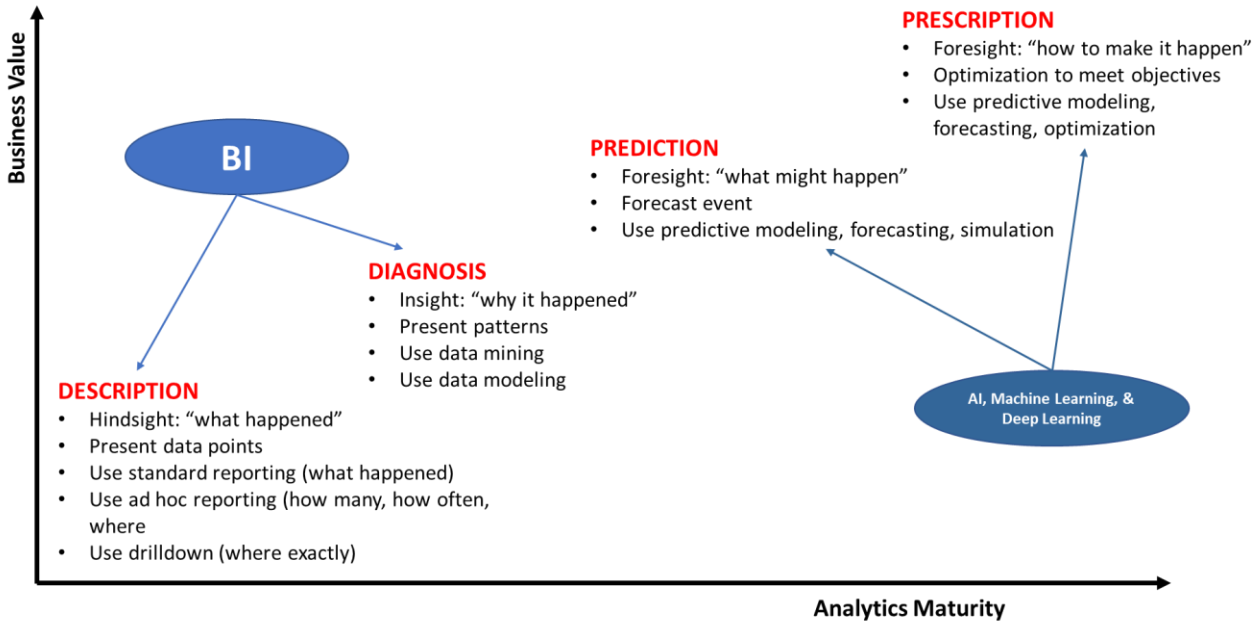


Figure 8.34 Business Value and Analytics Maturity, adapted (Hartanto 2019)

The challenge with AI, machine learning, and deep learning is that all of it currently is based on statistics, which has an element of error in predicting outcomes, as depicted by Figure 8.35.

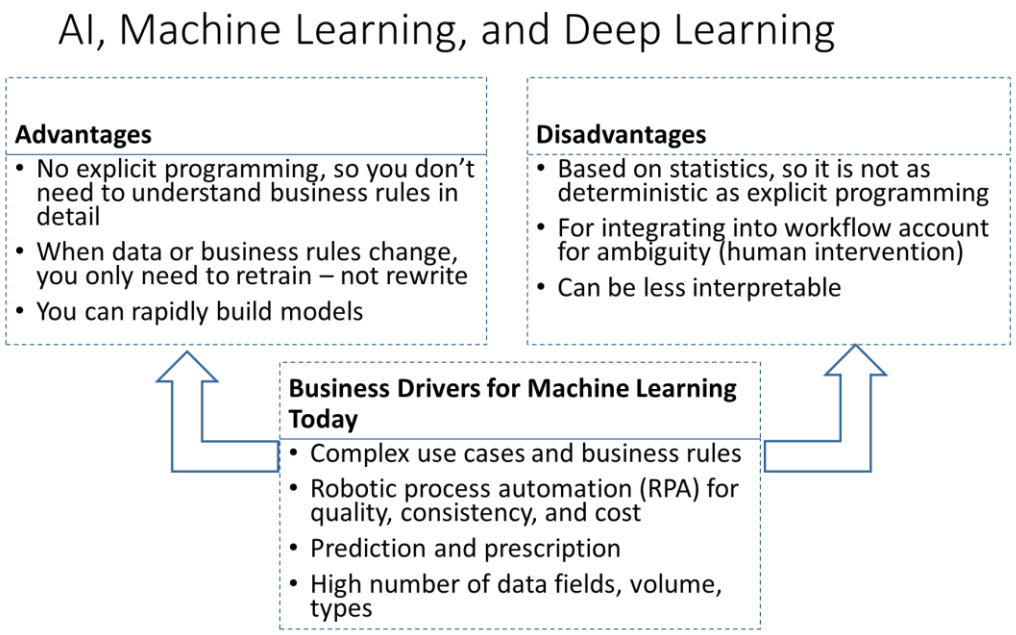


Figure 8.35 AI, ML, and Deep Learning Advantages, Disadvantages, and Drivers, adapted (Hartanto 2019)

Following is one way to define the differences among BI, statistics, and AI:

- **BI (business intelligence)** is traditionally query-oriented and relies on analysts to identify the patterns (such as who are the most profitable customers, why are they the most profitable, and what attributes set them apart, such as age or job type).
- **Statistics** also rely on analysts to understand the properties (or structure) of the data to find information about the population in the data, but it adds mathematical rigor in extrapolating to generalizations (such as if there is a difference between these customer segments in real life versus what is found in the sample data).
- **AI, machine learning, and deep learning** rely on algorithms (not analysts) to autonomously find patterns in the data and thereby enable prediction and prescription.

While statistical modeling and machine learning are both used to build models of business situations, there are some key differences between the two, as Figure 8.36 shows.

	Statistical Modeling	Machine Learning
Basis for Prediction	• Formalization of relationships between variables in the form of mathematical equations • Dependent variable (Y) = f (independent variable) + error	• Tries to find out patterns hidden in data using algorithms, and treats the data mechanism as unknown • Output (Y) → Input (X)
Model-building requirements	• Must understand relationships among variables beforehand • Dependent on several assumptions about the data • Explicit programming	• Does not require understanding relationships among variables beforehand • Independent of all assumptions, so its predictive power is generally very strong • Learns from data without explicit programming

Figure 8.36 Statistical Modeling versus Machine Learning, adapted (Hartanto 2019)

Some additional points of contrasts include:

- Statistical modeling requires a formal mathematical equation between the inputs and outputs. In contrast, machine learning and deep learning don't try to find that mathematical equation; instead, they simply try to re-create the output given the inputs.
- Statistical modeling requires an understanding between the variables and makes assumptions about statistical properties of the data population. Machine learning and deep learning do not.

8.6.5 AI, Machine Learning, and Deep Learning

Figure 8.37 shows how each is a subset of the other: deep learning is a subset of machine learning, which is a subset of AI.

There are two types of AI:

- *Artificial general intelligence (AGI) refers to machine thinking like people and doing human-like things. This is what you often see in movies like I, Robot.*
- *Artificial narrow intelligence (ANI) refers to using machines for very specific tasks, such as automating a specific process or activities in that process.*

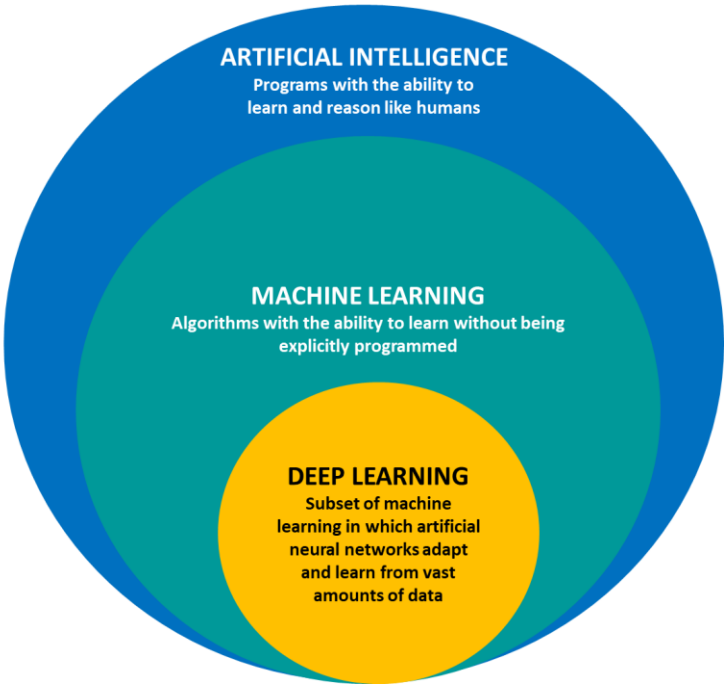


Figure 8.37 AI, Machine Learning, and Deep Learning Relationship, adapted (Hartanto 2019).

Figure 8.38 shows the relationship between AI, machine learning, and deep learning. Machine learning uses algorithms and deep learning takes those algorithms and adds hyper-parameters to build a final learning model.

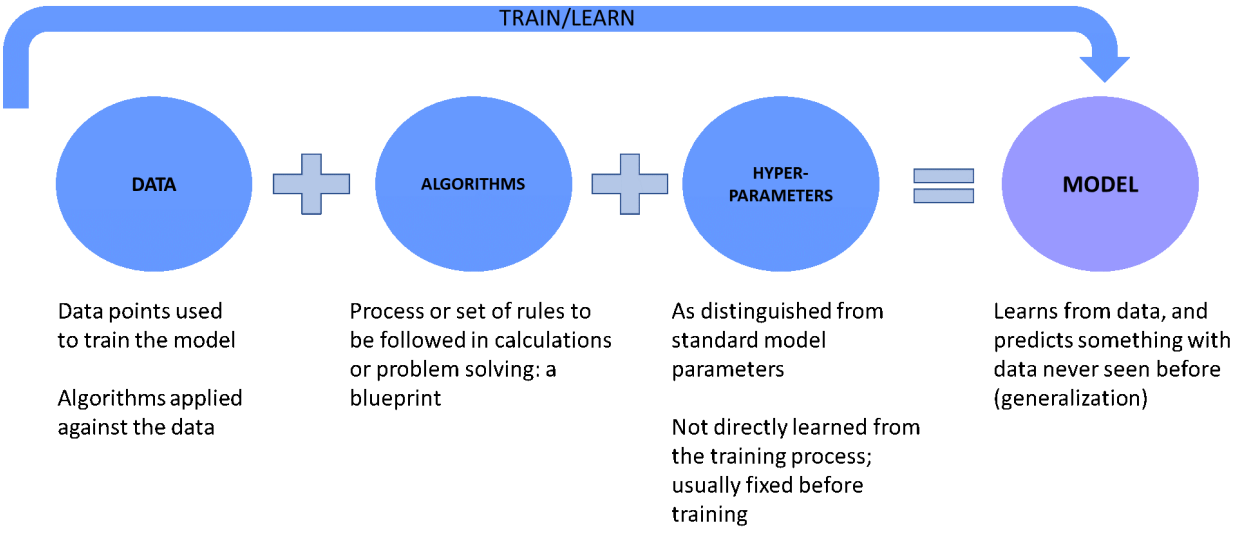


Figure 8.38 Relationship between Models and Algorithms, adapted (Hartanto 2019)

8.6.5.1 *Types of Machine Learning*

Machines, just like people, can learn in different ways, including supervised, unsupervised, semi-supervised, reinforcement, and transfer learning.

Supervised

In human supervised learning, an instructor shows or tells you both the right way and the wrong way to play a piano. In an ideal situation, you are given equal numbers of examples of how to play the right and wrong ways. In machines, the training data consists of a target or outcome variable (or dependent variable) that is to be predicted from a set of predictors (independent variables). Using these sets of variables, you generate a function that maps inputs to desired outputs. The training process continues until the model achieves a desired level of performance on the training data. A business example of supervised training is showing the system examples of loan applications (consisting of predictors like credit history, work history, asset ownership, income, and education) that were approved or rejected (the target outcomes and decisions).

Unsupervised

In unsupervised learning, you're on your own — nobody tells how you to play the piano, so you make up your own ideas of right and wrong, with the goal of optimizing a parameter that's important to you, such as speed of finishing the piece, the ratio of loud notes to soft notes, or number of unique keys you touch. In unsupervised machine learning, data points have no *right* or *wrong* labels associated. Instead, the goal is to organize the data in some way or to describe its structure. This organization can mean grouping it into clusters or finding different ways of looking at complex data so that it appears simpler or more organized. Unsupervised learning is usually less effective at training the model than supervised learning, but it may be necessary when no labels exist (in other words, the *right* answers are not known). A common business example is market segmentation. It's frequently unclear what the right market segments are, but every marketer is looking for segments of natural affinities so they can approach those segments with just the right message, promotions, and products.

Semi-supervised

Semi-supervised learning combines supervised and unsupervised learning. Semi-supervised learning is used where there is not enough supervised data. In the piano example, you would receive some instruction but not a lot (maybe because lessons are expensive or there aren't enough teachers).

Reinforcement

In reinforcement learning, the instructor does not tell you the right and wrong way to play the piano. You don't know what parameter you're trying to optimize, but you are told when you do something right or wrong. The instructor hits your knuckles with a ruler when you play the wrong note or play with the wrong tempo. When you play well, she gives you a pat on the back. In machine learning, reinforcement learning can address situations where supervised data is sparse, but the *right* answer is known. For example, in the game of chess, there are too many permutations of moves to document (label). But reinforcement learning still tells the machine when it makes right and wrong decisions that advance it towards winning, such as capturing pieces and strengthening positions in chess.

Transfer Learning

In transfer learning, you use your knowledge of playing another instrument, like the trumpet, to teach yourself to play the piano. You learn based on transferable skills you already have, like reading music

and nimbleness in your hands. In machine learning, transfer learning is used because it reduces learning time, which can be significant (hours or even days) for models that use deep learning architectures.

8.6.5.2 *Common Machine Learning Algorithms*

Algorithms are the engines of machine learning; they turn a data set into a model. The algorithm type that works best (supervised, regression, and so on) depends on the kind of problem, computing resources available, and the nature of your data. Common algorithm types are shown in the following table.

Algorithm Type	Description
Regression	Simply drawing a curve or line through data points.
Classification	Determining to what group something belongs. Binary classification (two groups) is determining if something belongs to a class or not, such as whether the animal in the picture is a dog or not. Multiclass classification (more than two groups) is determining whether the animal is a dog, cat, bird, and so on.
Clustering	Similar to classification, but you don't know the classifications ahead of time. You determine there are three types of animals, but you don't know what those animals are, so you just divide them into groups. Generally speaking, clustering is used when there is insufficient supervised data or when you want to find natural groupings in the data without being constrained to specific groups, such as dogs, cats, or birds.
Time series	Assumes that the sequence of data is important (that the data points taken over time have an internal structure that should be accounted for). For example, sales data could be considered time-series because you may want to trend revenue over time to detect seasonality and correlate it with promotional events. On the other hand, the order of your animal pictures doesn't matter for classification purposes.
Optimization	A method of achieving the best value for multiple variables when they do not move in the same direction.
NLP (natural language processing)	General category of algorithms that try to mimic human use and understanding of languages, such as chatbots, scrubbing unstructured writing (like doctor's notes) for key data fields, and autonomous writing of news articles.
Anomaly detection	Used to find outliers in the data. It is similar to control charts, but uses lots more variables as inputs. Anomaly detection is especially useful when *normal* operating parameters are difficult to define and change over time, and you want your detection of abnormalities to adjust automatically.

The following table contains a summary of the types of algorithms associated with model learning types.

Algorithm	Description	Learning Type	Example
Regression (2,3,4,5)	Fit a curve or line to the data points, so the differences between the distances of data points from the curve or line are minimized	Supervised	House price, such as based on location, square footage, or number of bedrooms Meetup attendance, such as based on topic, date and time, or prizes
Classification (0/1/2/.../N)	Identify to which of a set of categories (subpopulations) a new observation belongs; training with data whose category membership is known	Supervised	Customer churn or not Transaction is fraud or not Patient has disease or not; which disease
Clustering (grouping)	Use the inherent structures in the data to best organize the data into groups of maximum commonality; no error or reward signal available	Unsupervised	Market segmentation, such as target marketing, churn reduction Identify outliers, such as higher-risk patients, suspect transactions
Time series (2019, 2020)	Data points taken over time may have an internal structure (such as autocorrelation, trend, or seasonal variation)	Supervised or unsupervised	Daily closing price of stock EEG trace analysis to indicate seizure Hourly utilization demand on server
Optimization	Maximize or minimize an amount given constraints	Supervised or reinforcement	Maximize machine use Minimizing transport time Delivery of things with highest value
NLP	Automatic computational processing of human languages; with text as input and output	Supervised or unsupervised	Notes transcription Autocomplete, next-word suggestion Grammar checkers
Anomaly detection	Outlier detection; identify unusual patterns that do not conform to expected behavior	Unsupervised	Machine about to fail People and machines attempting breach True versus false alarms

(Hartano 2019)

Figure 8.39 illustrates the concept of deep learning models based on neural networks.

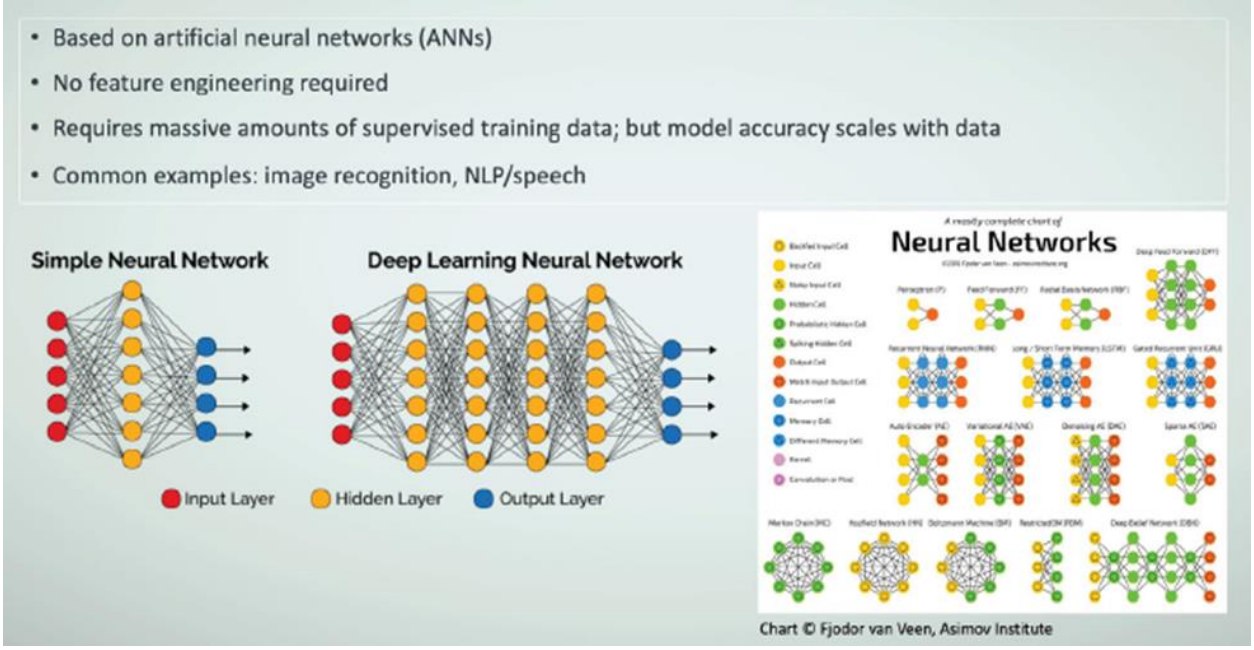


Figure 8.39 Modeling: Deep Learning (Hartanto 2019) and (Van Veen and Leijnen 2019)

8.6.5.3 *Deep Learning Models*

Deep learning is based on the concept of artificial neural networks (ANNs). Neural networks function like human brains where synapses become stronger or weaker based on feedback of some sort, and neurons fire based on specified conditions. Difficult problems are being solved through deep learning models, including self-driving cars, image detection, video analysis, and language processing.

Caveats to the benefits of using deep learning models include:

- **Large amounts of data.** Deep learning models require much more data than machine learning models. Without large amounts of data, deep learning usually does not perform as well.
- **Training and computing power.** Because deep learning models require large amounts of data, the training process takes a long time and requires a lot of computational processing power. Ever more powerful and faster CPUs, memory, and newer GPUs and FPGAs (field-programmable logic arrays) are addressing this challenge.
- **Interpretability.** Deep learning models are usually less interpretable than machine learning models. Interpretability is a major area of deep learning research, so perhaps this will improve.
- **Measurement.** How do we measure machine learning model performance? Models, just like people, have their performance assessed. There are a few ways to measure the performance of a relatively simple regression model (MAE, RMSE, and R2 performance metrics are straightforward).

Most AI projects fail; failure happens for a variety of reasons. Figure 8.40 shows categories of AI project failure.

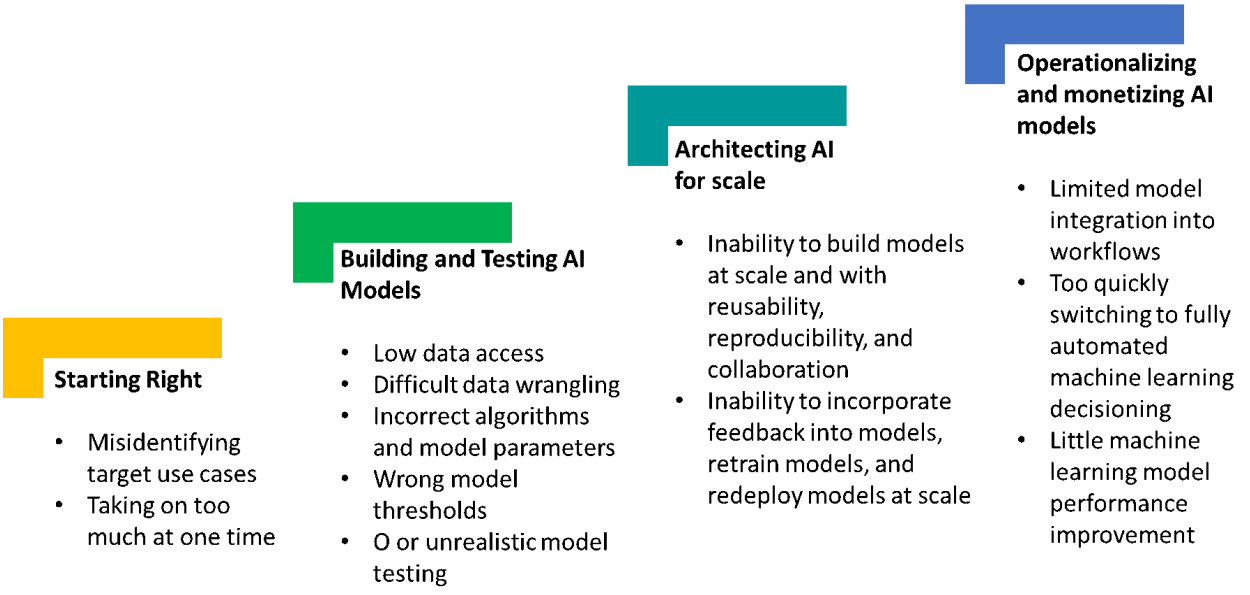


Figure 8.40 Why AI Projects Fail (Hartanto 2019)

Use Cases

The first driver of failure is either selecting the wrong use case or taking on too many uses cases without sufficient capabilities and infrastructure. You can use the criteria described earlier to identify problems that better lend themselves to AI solutions. In addition, it is smart to set up a series of use cases that let capabilities and knowledge be built incrementally and with increasing technical sophistication. Selecting the right use cases is best done collaboratively with the following:

- **Line-of-business staff** who know the business problems, contexts, and constraints, and the hypotheses they want tested.
- **Business analysts** who can ask questions that clarify business intent and requirements and who can identify data sources and transformations.
- **Data scientists** who can formulate the machine learning and deep learning problem so that models can provide answers to the organization's hypotheses.
- **Data engineers and IT resources** who can provide access to data. Organizing and orchestrating AI projects correctly upfront requires experienced cross-functional leaders who understand and can balance business impacts, operational drivers, workflow barriers and opportunities, data needs and constraints, and technology enablers.

Build and Test Models

The second point of failure is incorrectly building the AI models themselves based on lack of two elements:

- **Discipline.** Even though data science, like other sciences, is experimental in nature (you don't really know what the data will tell you until you work with it), the approach to data science should be well-defined, should be disciplined, and should speed time-to-value.
- **Good data scientists.** Good data scientists can quickly experiment and iterate, learn from their experiments, distinguish between promising and ineffective approaches, and research and

adapt cutting-edge methods if necessary. Good data scientists build MVPs (minimal viable products) in rapid, parallel fashion.

Scale

The third driver of failure is lack of scale to quickly build and improve multiple AI models simultaneously. Frequently, this issue comes down to data scientists being able to work collaboratively, to reuse data pipelines, workflows, models and algorithms, and to reproduce model results. Additionally, they need to be able to capture and quickly incorporate operational feedback (in the test, staging, or production environments) to further build scale. Accomplishing AI scale requires both the correct infrastructure environment and a right-touch model governance approach.

Operationalize and Monetize Models

The fourth driver of failure is an inability to operationalize and monetize AI models. Generally speaking, AI models are developed for one of two purposes:

- To find previously unidentified insights
- To automate decision making (for both cost reduction and efficiency or productivity).

Clearly, models that never make it out of the laboratory can't accomplish these tasks. Furthermore, not only do the models need to be deployed (that is, made accessible to people or systems), but they must be incorporated into workflows in such a way that they are *used* in operations. Exceptions (such as when models cannot make decisions with high probability of correctness) must be managed gracefully (such as through human intervention, model retraining, and model rollback). AI operationalization and monetization requires gradual but full model workflow integration, monitoring of data inputs and model performance parameters, and management of frequent model deployments. Figure 8.41 shows an example AI solution framework that ties AI together with BPM.

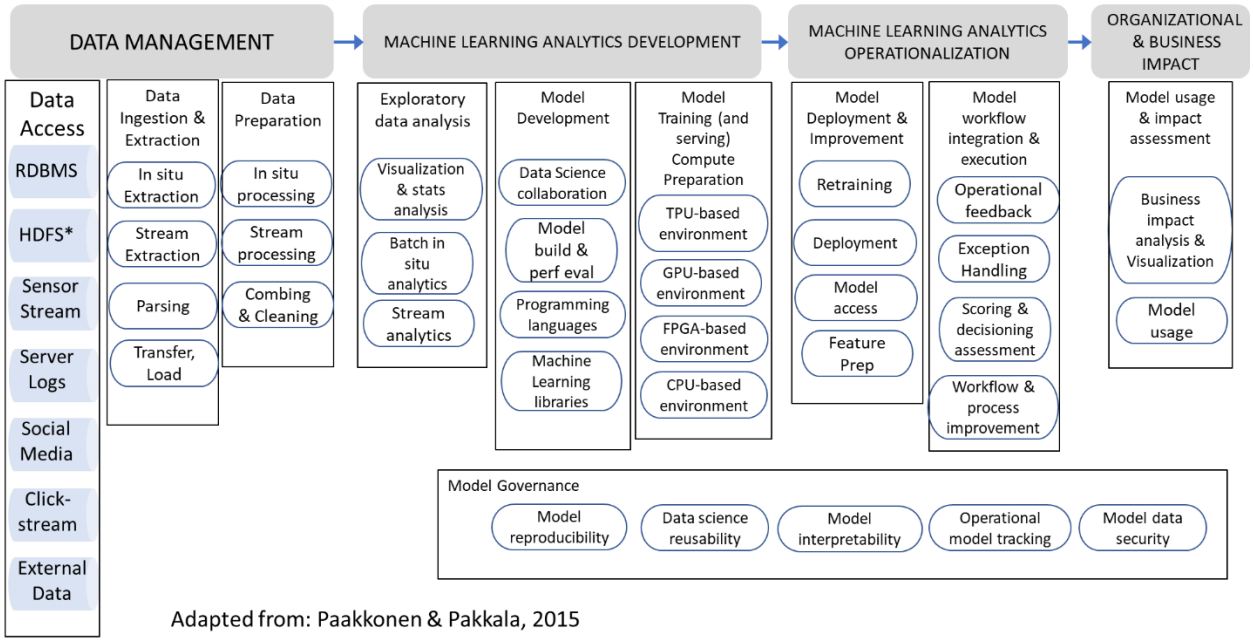


Figure 8.41 AI Solution Framework (Hartano 2019)

*Figure 8.41 mentions the Hadoop Distributed File System (HDFS**)**, a distributed file system designed to run on commodity hardware. For more information see hadoop.apache.org/hdfs.

There are four components to building an AI solution framework:

- Data management
- Model development
- Model operationalization
- Organizational and business impact

Data management is a normal part of current BI environments, so not covered here.

The second component, model development, consists of two broad areas:

- Defining and prioritizing use cases that are appropriate for machine learning models
- Building the machine learning models at scale

The third component, model operationalization, not only entails model deployment but also the process of continuous retraining and redeployment, model integration with operational workflows, and integration of operational feedback for model improvement. The purpose of model operationalization is to monetize capabilities of models.

Finally, the fourth component, organization and business impact, is simple but vital to the future maturation of an organization's AI capabilities. The function of this component is to ensure that the AI models are actually used by the lines of businesses (that is, they trust them and derive value from them) and that they affect business outcomes. Without line of business buy-in, AI projects rarely succeed.

These four components require collaboration groups of IT, data engineers, data scientists, and lines of business. AI is a team sport.

8.6.5.4 *Supply Chain Example with Eight Criteria for Achieving Success with AI*

According to One Network Enterprises, there are eight criteria for a successful AI implementation in supply chain management.

- Access to real-time data
- Access to community data
- Support for network-wide objective functions
- Incremental decision process; cost of change considered
- Decision process continuous, self-learning, and self-monitoring
- AI engines must be autonomous decision-making engines
- AI engines must be highly scalable
- System must allow user engagement

All of these criteria are fundamental.

Access to Real-Time Data

To improve on traditional enterprise systems with older batch-planning systems, new AI systems must eliminate the stale data problem. Most supply chains today attempt to execute plans using data that is

days old, but this results in poor decision-making that sub-optimizes the supply chain or requires manual user intervention to address. Without real-time information, an AI tool is just making bad decisions faster.

Access to Community (Multi-Party) Data

The ability to access data outside of the enterprise or, more importantly, receive permission to see the data that is relevant to your trading community, must be made available to any type of AI, deep learning or machine learning algorithms.

Unless the AI tool can see the forward-most demand and downstream supply, and all relevant constraints and capacities in the supply chain, the results will be no better than that of a traditional planning system. Unfortunately, this lack of visibility and access to real-time, community data is the norm in over 99% of all supply chains.

Support for Network-Wide Objective Functions

The objective function, or primary goal, of the AI engine must be consumer service level at the lowest possible cost. The end-consumer is the only consumer of true finished goods products. If we ignore this fact, trading partners will not get the full value that comes from optimizing service levels and cost to serve, which is obviously important as increased consumer sell-through drives value for everyone.

Further enrichment of the decision algorithm should support enterprise-level, cross-customer allocation to address product scarcity issues and individual enterprise business policies. Thus, AI solutions must support global consumer-driven objectives, even when faced with constraints within the supply chain.

Decision Process Must Be Incremental and Consider the Cost of Change

Re-planning and changing execution plans across a networked community in real-time can create nervousness in the community. Constant change without weighing the cost of the change creates more costs than savings and reduces the ability to effectively execute. An AI tool must consider trade-offs in terms of cost of change against incremental benefits when making decisions.

Decision Process Must Be Continuous, Self-Learning and Self-Monitoring

Data in a multi-party, real-time network is always changing. Variability and latency is a recurring problem, and execution efficiency varies constantly. The AI system must be looking at the problem continuously, not just periodically, and should learn as it goes on how to best set its own policies to fine-tune its abilities. Part of the learning process is to measure the effectiveness *analytics*, and then apply what it has learned.

AI Engines Must Be Autonomous Decision-Making Engines

Significant value can be achieved only if the algorithm cannot only make intelligent decisions, but can also execute them. Furthermore, they need to execute not just within the enterprise but where appropriate, across trading partners. This autonomy requires your AI system and the underlying execution system to support multi-party execution workflows.

AI Engines Must Be Highly Scalable

For the supply chain to be optimized across an entire networked community of consumers to suppliers, the system must be able to process huge volumes of data very quickly. Large community supply chains can have millions, if not hundreds of millions, of stocking locations. AI solutions must be able to make smart decisions, fast, and on a massive scale.

Must Have a Way for Users to Engage with the System

AI should not operate in a black box. The UI must give users visibility to decision criteria and propagation impact, and enable them to understand issues that the AI system cannot solve. The users, regardless of type, must to be able to monitor and provide additional input to override AI decisions when necessary. However, the AI system must drive the system itself and only engage the user on an exception basis or allow the user to add new information the AI may not know at the request of the user (One Network Enterprises Staff 2017).

Figure 8.42 shows a supply chain architecture for an AI platform.

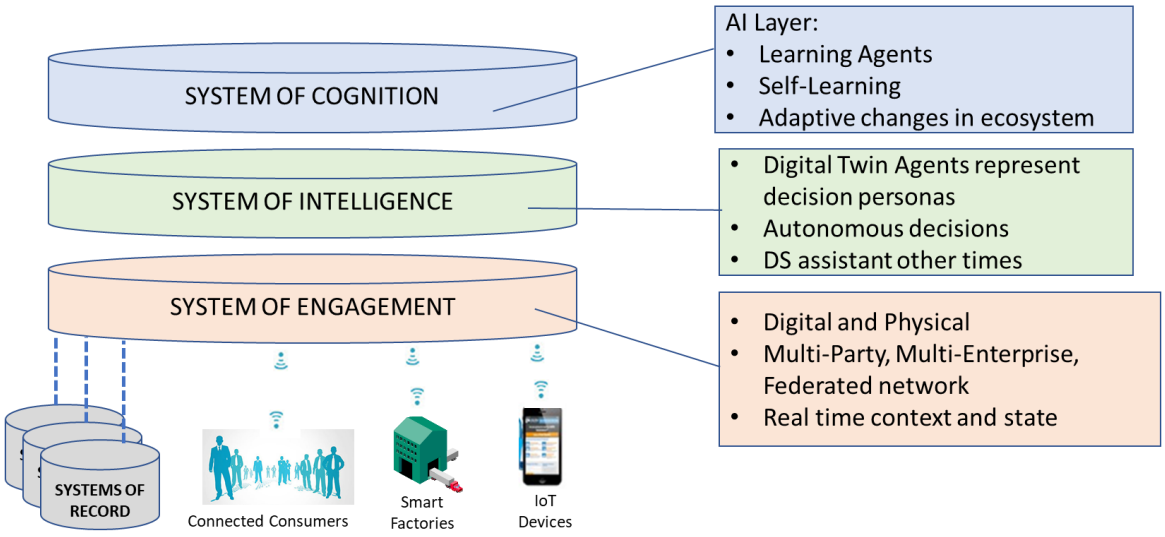


Figure 8.42 Supply Chain Architecture for an AI Platform, adapted (One Network Enterprises Staff 2017)

The important point of the supply chain architecture for using AI is that the *system of cognition* layer is the AI layer and the *system of intelligence* layer utilizes RPA. The AI layer is much more complex than Figure 8.42 shows; an organization needs an end-to-end AI solution framework that can be leveraged as a reference architecture.

8.6.6 Convergence of BPM and AI

BPM, at least with respect to process automation and process mining, is an indispensable part of AI. BPM is, to a considerable extent, a projection of AI into the business process world. The role of BPM for AI is equally important in that critical business transactions delegated to AI come completely outside of control of company management (in ecommerce). BPM is the only safety belt capable of protecting companies from their newborn artificial brains and retaining control in AI-driven digital platforms. Not

accidentally, all leading AI systems increasingly use BPM techniques and methodology as an essential part of their business applications. While low-code BPM was mentioned in the iBPMS section, low-code development works for less complicated processes and process-related transactions where the process can be *improved* rather quickly with little disruption to the organization. When building out AI platforms with machine and deep learning algorithms, the best approach to integrating AI with BPM will entail the use of microservices.

8.6.6.1 *Microservices*

Microservices are self-contained processes that provide unique business capabilities. These processes can be deployed independently in a standalone fashion. Microservices also control their own data stores. Communication between microservices is usually done through HTTP and messaging. Since microservices are stateless, organizations have the ability to scale effortlessly. Microservices break work into components and are easier to maintain due to the independent nature of each self-contained process.

Microservices' architectural opposite is an application built as a single, monolithic, autonomous unit. This traditional approach has processes that are inextricably linked and that end up tied to other services. As a result, a small modification to one process could affect the entire system. Therein lies the problem with low-code BPM platforms. Microservice architecture solves this problem. If a microservice needs to be modified, rebuilding it should be straightforward. For enterprises, this flexibility is incredibly important. With traditional software programming, changes that need to be made could affect the entire operating system. Microservices have the advantage in that they can be quickly and easily swapped out when designed correctly. In short, a microservice focuses on a single business capability. That’s not to say it does only one thing — it simply has a very specific purpose.

Due to the ever-increasing complexity of business systems, focused microservices have become more popular. Microservices divide up responsibilities and each tackles a singular task to ensure that all the facets of the organization receive adequate attention. Microservice technology is specifically designed to be embedded within existing applications, such as customer relationship management (CRM), supply chain management (SCM), or enterprise resource planning (ERP) software, to name a few. The resulting architecture allows for scalable software development. The use of microservices is really where AI and BPM will converge at scale.

Microservices Challenges

Using microservices is not without its challenges. The main considerations include:

- **Complexity.** Complexity can be problematic. As you add more microservices, it will potentially create duplication of services as the environment becomes more distributed.
- **Communication.** Communication isn’t easy due to the distributed deployment. Potential for large quantities of services requires developers to put additional effort into properly managing inter-service communication. It’s easy for microservice architecture to become very complex, fast. As a result, communication may slow down considerably.
- **Talent.** Due to the complexity of the microservice architecture, talented developers are required. You need a dedicated developer for maintenance, user queries, and new integrations.

While microservices need more work and more coding than their low-code counterpart, they ultimately give you more control and make it easier to swap pieces out as technology continues to improve.

- **Commitment.** Microservices are a long-term commitment. However, for those who need more control, the decision to transition from a low-code solution to microservices is easy. Commitment to learning and deeply understanding system architectures and how to manage and maintain microservices pays off in the long term.

Low-Code and Microservices

The best industry sectors for using microservices are software companies and high-tech organizations. A microservice-based approach to BPM is great for building enterprise cloud applications. It's particularly beneficial for independent software vendors (ISVs) creating enterprise software that needs a fully integrated workflow engine in their product stack. The nice thing about microservice architecture is that software companies can simply buy the BPM engine and build out everything they need around the powerful core. The following table compares low-code and microservices from several perspectives.

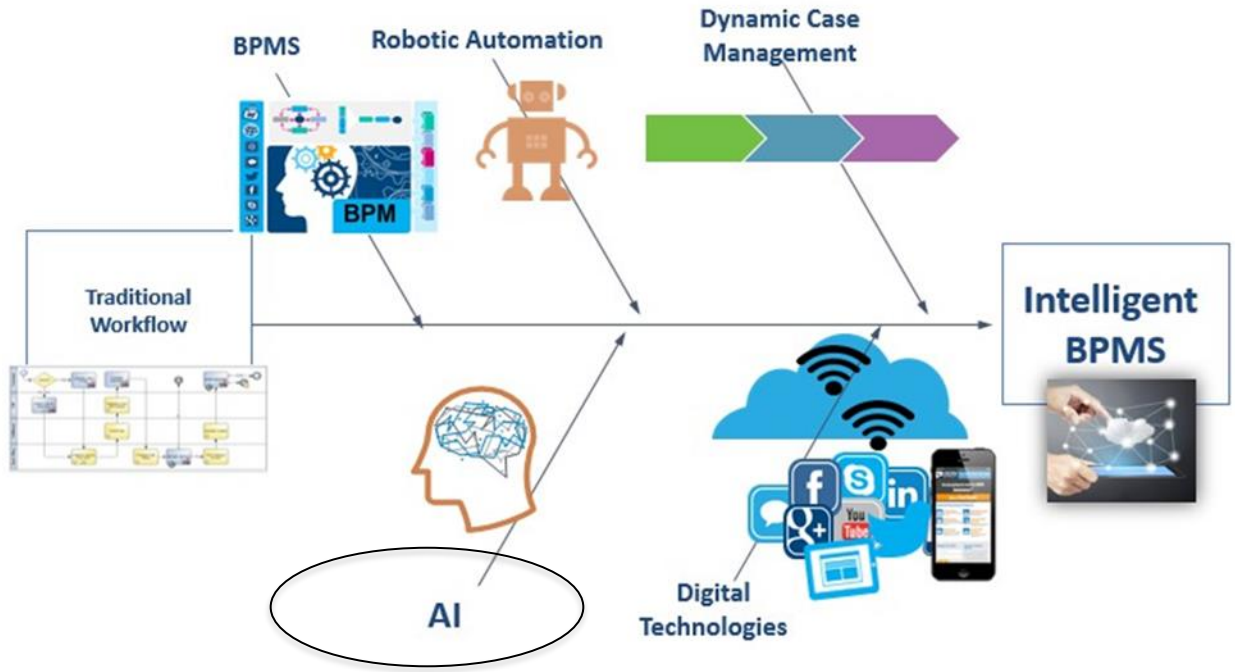
	Low-Code	Microservices
Setup	A few days to get up and running Months to create all the custom interfaces needed	Months to create all the setup custom interfaces needed
Pricing	Per user or per transaction model	Transaction-based pricing and/or developer licenses
Process Creation	Drag-and-drop interface Processes can be created, tested, and deployed within weeks or months	Processes created by developers using customized tooling of their choice
Flexibility	More limited ability to customize parts of the solution	Infinitely customizable Choose front-end technologies, DB layer, and so on
User Experience	Non-technical employees can create processes and use apps with minimal training	User experience is built from scratch by selecting best of breed components
Commitment	Medium	High

(ProcessMaker Staff 2018)

iBPMS has become more intelligent and advanced, Business Rules, Artificial Intelligence and Intelligent Analytics capabilities became unified within the BPMS, and now we see the evolution of intelligent BPM. Intelligent Business Process Management (iBPM) is a digital transformation discipline with the associated automation platform that aligns business objectives to execution. There are several trends that have influenced the evolution of iBPM – making it the core engine of transformation for digital enterprises. Two of these trends are the process participants and process intelligence.

Robotic Automation started to become incorporated in robust Digital Process Automation (another way to designate iBPM) platforms. Next-generation iBPMSs support the entire spectrum of work automation: structured, cognitive, and AI-assisted. Also significant is the emergence of Dynamic Case Management to handle ad-hoc work and provide a more powerful model (compared to flowcharts and swim lanes) to work orchestration.

The following graphic outlines the evolution of AI in iBPMS:



8.6.7 Internet of Things (IoT)

The Internet of (IoT) is the concept of connecting any device with an on and off switch to the Internet (and/or to each other). Devices include cellphones, coffee makers, washing machines, headphones, lamps, wearable devices, and almost anything else you can think of. Components of machines like a jet engine of an airplane or the drill of an oil rig are also potential things to connect.

Gartner predicts that by 2020, over 26 billion devices will be connected to the Internet (Hung 2017). In this sense, IoT is just a giant network of connected devices or *things*. One can assume that going forward, any device that *can* be connected *will* be connected. Devices don't have to be *smart* — meaning they store their own data — rather, all devices have to do is connect to storage.

8.6.7.1 *Three Categories of Things*

In IoT, all things connected to the Internet fall into three categories:

- Things that collect information and then send it
- Things that receive information and then act on it
- Things that do both

All three categories have enormous benefits that feed each other.

Collecting and Sending Information

This category really means sensors. Sensors could be temperature sensors, motion sensors, moisture sensors, air quality sensors, light sensors, you name it. These sensors, along with a connection, allow us

to automatically collect information from the environment which, in turn, allows us to make more intelligent decisions. In humans, our sight, hearing, smell, touch, and taste allow us to make sense of the world; sensors allow machines to make sense of the world. Temperature sensors are a great example of products being transported that require a constant temperature, like pharmaceuticals. Another example is on a farm, where sensors automatically collect information about soil moisture to tell farmers exactly when their crops need to be watered.

Receiving and Acting on Information

This category includes familiar machines that receive information and act on it. Your printer receives a document and it prints it. Your car receives a signal from your car keys and the doors open.

The real power of IoT arises when things can do both — collect information and send it and receive information and act on it.

Doing Both

In farming, sensors can collect information about soil moisture, but you don't really need the farmer to water crops. Instead, the irrigation system can automatically turn on as needed, based on how much moisture the sensors detect. The irrigation system can also fetch weather information from the Internet and not water crops on days when rain is predicted.

IoT extends the power of the Internet beyond the computer and devices. IoT matters because it provides people and businesses with better insight into and control over 99% of the objects and environments that remain beyond the reach of the Internet. Obviously, the amount of data generated by IoT will require more insight into that data for decisions, which crosses over into the domain of artificial intelligence.

8.6.7.2 *Six Categories of Connected Things*

The six categories of connected things include products, assets, fleets, infrastructures, markets, and people.

Connected Products

From connected consumer-level coffeemakers to connected industrial pumps, this category enables end-to-end visibility into product-centric operations. It also promises improvements or even transformation around issues like regulatory compliance and product serviceability.

Connected Assets

In contrast with connected products, this category involves high-value, long-lived equipment such as aircraft and industrial machinery. Connected assets link production systems with manufacturing and maintenance processes to increase asset uptime and reduce operational and repair costs.

Connected Fleets

This category is all about tracking, monitoring, analyzing, and maintaining any assets that move — from trucks to ships to construction equipment — wherever they appear in the network. Extracting data from mobile equipment has been difficult and expensive, so the promise in using IoT is immense.

Connected Infrastructures

From software networks, to power grids, to buildings, the majority of IoT sensors are likely to end up in connected infrastructures. This category has potential to deliver new forms of digital operational intelligence to transform physical systems. The goals are to drive economic growth, improve service, and allow for more effective and efficient operations and risk mitigation.

Connected Markets

Markets apply to any activity that involves physical space, from retail centers, to farms, to cities. IoT can help cities, rural areas, and other markets to optimize use of assets and natural resources; reduce energy usage, emissions, and congestion; and improve efficiency and quality of life.

Connected People

This category focuses on improving work, life, and health by linking people and communities, enabling organizations to evolve into new business models, and delivering better lifestyle experiences.

8.6.7.3 *Challenges of Connected Things*

Challenges facing adoption of IoT center around management, standards, and security. The current challenges of connected things include:

- **Device management**. How do we onboard and offboard devices? How do we manage data as devices volunteer data to cloud-based platforms?
- **Semantic standards**. How do connected things describe themselves to the IoT ecosystem, including details like device type, serial number, and environmental factors like location and temperature?
- **Security**. Has the device been tampered with? Has the transmission of data been listened to? Has the message been delivered?

8.6.7.4 *IoT Architecture*

There are many ways to begin an enterprise or industrial Internet of things (IoT) journey. What's important is not to let the perceived complexity of the IoT obscure the possibilities for implementing what should be very rewarding projects. Figure 8.43 shows a simple IoT reference architecture.

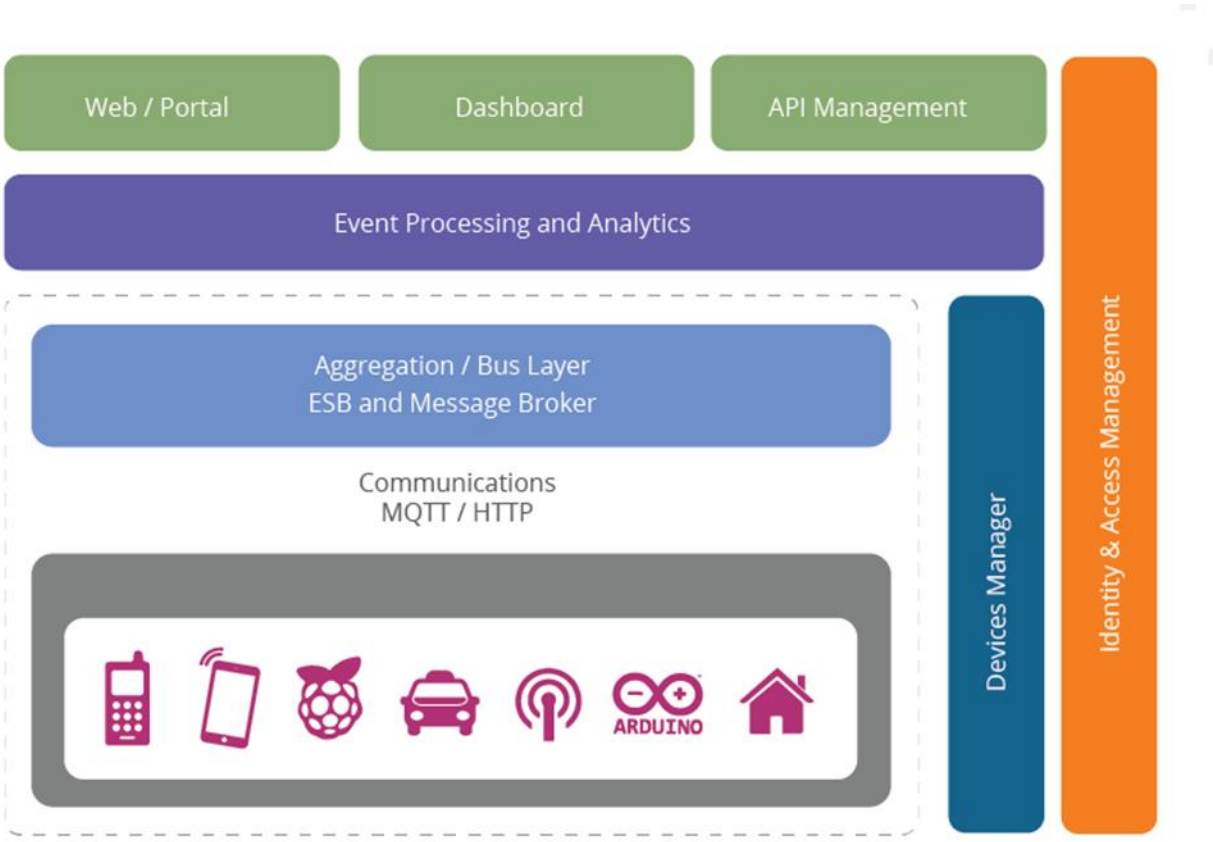


Figure 8.43 IoT Reference Architecture (Munasinghe 2017)

You can get started by laying a solid framework for your IoT system.

The IoT is more than Internet-connected consumer devices. Sooner or later, your IT organization will need you to create an infrastructure to support it. That brings us to the process of getting to an IoT architecture.

IoT layers:

- Customer and external communications (web or portal, dashboards, APIs)
- Event processing and analytics (including data storage)
- Aggregation/bus layer (ESB and message broker)
- Relevant transports (MQTT, HTTP, XMPP, CoAP, AMQP, and so on)
- Devices

Cross-cutting layers:

- Device manager
- Identity and access management

Companies will need to invest in the kind of four-part architecture that supports many IoT systems today. Picture these four parts as stages in a process, as shown in Figure 8.44. All four are integrated, mutually reinforcing structures that carry value-laden data from the various networked things to production and traditional IT systems to deliver actionable business insights.

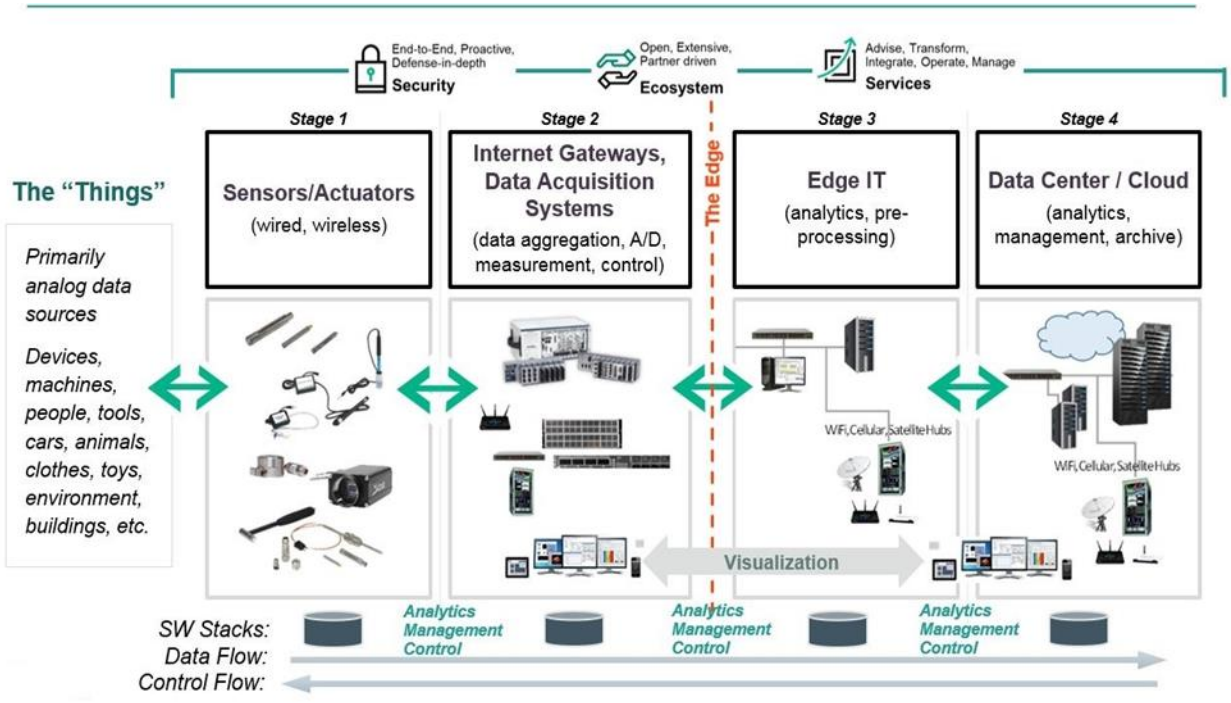


Figure 8.44 Four Stage IoT Solutions Architecture (Fuller 2016)

The four stages of IoT Architecture are:

- **Stage 1**. Networked things, typically wireless sensors and actuators.
- **Stage 2**. Sensor data aggregation systems and analog-to-digital data conversion.
- **Stage 3**. Edge IT systems perform preprocessing of the data before it moves on to the data center or cloud.
- **Stage 4**. Data that is analyzed, managed, and stored on traditional back-end data center systems.

Clearly, the sensor and actuator stage is the province of operations technology (OT) professionals. So is Stage 2. Stages 3 and 4 are typically controlled by IT, although the location of edge IT processing may be at a remote site or nearer to the data center. The dashed vertical line labeled "the edge" is the traditional demarcation between OT and IT responsibilities, although this line is blurring.

The IoT continues to reshape commercial, industrial, scientific, and engineering endeavors in profound and unpredictable ways. The IoT is the instrument that will enable organizations to connect intelligent technologies to the data-emitting universe of objects. The implications for IT infrastructure will be just as far-reaching.

8.6.7.5 *IoT and The Supply Chain*

Many forward-looking organizations are beginning to experiment with IoT devices to transform complex supply chains into fully connected and homogenous networks. Sensor data and radio frequency identification (RFID) information from devices, for example, can enable near real-time asset tracking, monitoring, and alerts that help streamline tasks and minimize disruption. More broadly, the data generated by these devices can help produce actionable insights that inform business intelligence and can help businesses improve operations. There are four main areas where IoT will improve the supply chains: visibility, collaboration, assets, and customer service.

Increased Visibility

IoT allows supply chain managers to connect their vehicles, equipment, and devices to gain near real-time status updates on jobs. This instant visibility can offer a full picture across the supply chain, from the warehouse to different stakeholders and customers. For example, rather than seeing a job status listed as *with courier* or *in transit*, managers can see the exact location of the vehicle. With this information, they can make intelligent and timely decisions that will keep goods moving efficiently. It also helps deliver other benefits across the organization, such as reducing costs and aiding with compliance.

Encouraging Collaboration

IoT helps organizations to take a much more holistic view of how their supply chain impacts business. It is particularly important for more complex supply chains, where different parts or components are sourced across disparate suppliers and locations. IoT gives decision makers the ability to access near real-time details on job statuses across the entire chain and helps break down silos. Increased collaboration across business areas can also help to identify potential issues or bottlenecks earlier, make smarter strategic decisions, and boost productivity.

Maximizing Assets

Improved connectivity allows supply chain managers or logistics teams to optimize fleets. They can provide smarter route planning and identify assets that are delayed in traffic or held up at a previous job. They can also track utilization rates to monitor the efficiency of assets, enabling managers to schedule the optimal number of jobs for each asset. With a deeper understanding about how assets are utilized and performing, business operations can be fine-tuned. This insight helps increase productivity and allows supply chain managers to schedule more deliveries or dispatches per day. When multiplied across a fleet and the entire supply chain, IoT could potentially bring a huge boost to an organization's bottom line. For example, studies have shown more effective routing and utilization can reduce driver hours by almost 25%. UPS does this today with GPS tracking of delivery trucks and route optimization software.

Bolstering Customer Service

A more connected supply chain not only helps boost efficiency, it also helps deliver better customer service. Managers can access information in the office or on mobile apps to track where an item is in near real-time, so that forecasting delivery times becomes a more exact science. Managers can then identify any potential issues sooner, contact the customer to manage their expectations, or make

alternate arrangements to ensure SLAs are met. The connected fleet also allows for automation of status updates for customers, helping them stay informed and reducing inbound inquiries to customer contact centers.

BPM is a vital component of any device that has IoT connectivity. The role of BPM, in terms of IoT, is to act as the process conduit for all of the data collected from and to the processes that are being executed. The process outputs or outcomes either generate the desired result or the data is sent to other processes or other devices in the overall value chain.

When implementing any new technology, such as IoT, organizations must consider enterprise security. Figure 8.45 compares aspects of enterprise security to IoT security.

Enterprise Security	VS	IoT Security
1x	**Scale**	100x
3-5 years	**Lifespan**	8-20 years
Standards based	**Hardware**	Purpose-built/Imagination driven
Standards based	**OS**	Purpose-built/Imagination driven
Unlimited	**Software**	Unlimited
High-powered	**Performance**	Limited/Resource challenged
Unlimited Electrical Supply	**Power**	Limited Electrical or Lifetime battery
Autonomous – Benefits from Network	**Operating Mode**	Codependent
Concentric Operator Owned Networks	**Networks**	Distributed, Mobile, 3rd Party networks
Indoor	**Environmental**	Mix – Indoor, Outdoor, Harsh, Hazardous
Easily Accessible	**Physical Access**	Mostly Set & Forget
Easily & Often Updated & Upgraded	**Maintenance**	Challenging, Expensive & Risky Updates & Upgrades
Repaired or Replaced	**Break Fix**	Disposed or Abandoned
Low to Moderate	**Ownership Cost**	Low to Extremely High

Figure 8.45 Enterprise versus IoT Security (Acreto Staff 2019)

8.6.8 Technology and Transformation Key Concepts

The following table shows key concepts for technology and transformation.

Technology and Transformation Key Concepts
Business and Digital Transformation
Enterprise Technologies
iBPMS

Newer Technologies

Phase 3: Develop Initiatives

In phase 3, technology implementation plans proceed through the software development life cycle (SDLC) towards a *go-live* date. All non-technical implementation plans developed for distinct dimensions of change also proceed forward.

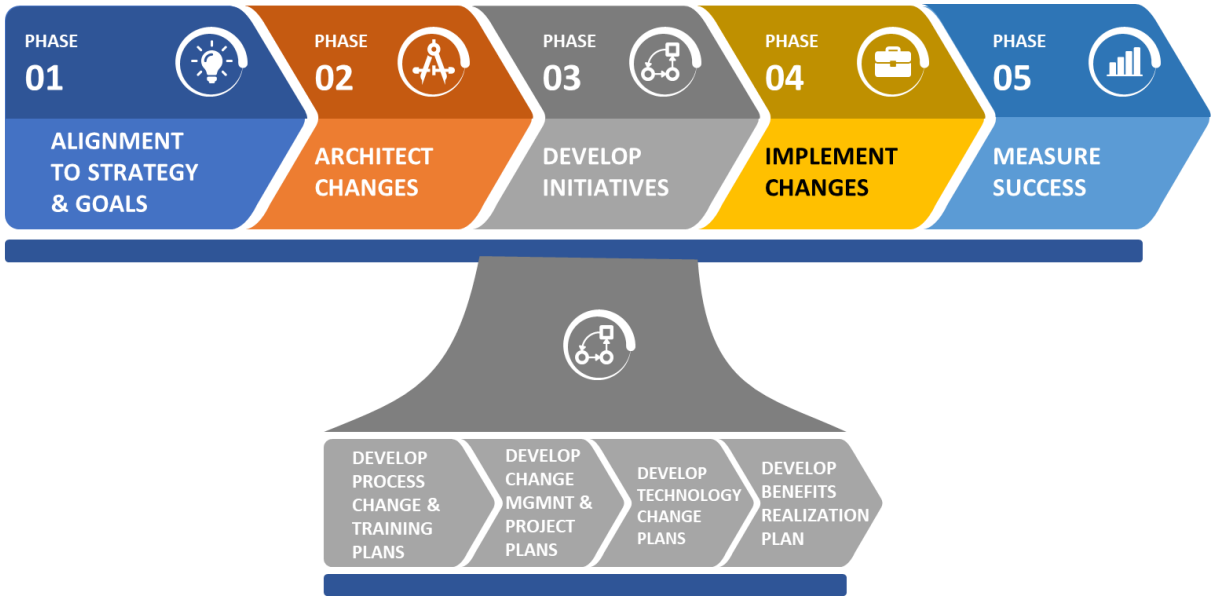


Figure 9.1 Phase 3 of the BPM Life Cycle

Since the *BPM CBOK Guide* is not prescriptive, it does not cover how-to topics in BPM such as project management plans with scheduling and sequencing. However, the guide does follow the BPM life cycle phases to show BPM best practices for each phase. For the Develop Initiatives phase, the following is an example of topics an enterprise-level plan would cover.

Enterprise-level plans cover (example only):

- **Organizational design**. New organizational structures to support the scope and depth of organizational changes and schedule.
- **People plan**. Organizational job roles and responsibilities, training plans, scope, and schedule.
- **Change management** plan. Scope, depth, and schedule for how the people will transition from current to future organizations, communication plan for organizations, job roles and responsibilities.
- **Business process implementation plan.** The number of new processes prioritized, scope and depth, performance of processes, risks and mitigation, cost/benefit tradeoffs, number of job roles affected, degree of automation from technology, and benefits realization plans.
- **Data**. Data models (conceptual, logical, and physical) and architecture implementation, data quality, business rules, CRUD (create, read, update, delete), risk mitigation plans.
- **Technology (application and infrastructure)**. Includes SDLC for the applications in scope, Agile methodology (if applicable), security and privacy, hardware and network configurations, staffing plans (inhouse and augmented), SLAs, and risk mitigation plans.

9 Building a Process-Oriented Organization and Culture

The ultimate goal of a BPM initiative is to build a process-oriented culture in which the organization embraces technology and other changes needed to make work more efficient and to consistently focus on creating value for customers. Using Agile with BPM technology requires the appropriate corporate culture and governance to support it. BPM governance ensures sure that process, data, and technology are consistent with the people requirements and that both are aligned to produce the best value for the organization. Governance is the integrated part of a BPM technology approach and strategy.

Former GE CEO Jack Welch once famously said, "The soft stuff is the hard stuff." Given the scope and magnitude of change involved in enterprise-level initiatives, it should be obvious that a tremendous amount of HR-related development is required throughout the BPM life cycle or for any transformation. Employee leadership development, re-skilling, training, and on-the-job learning require significant budget planning that should start early on, *at the beginning of the BPM life cycle* — a point that cannot be over-emphasized. Figure 9.2 illustrates the scope of organizational design required for enterprise-level change within the BPM life cycle.

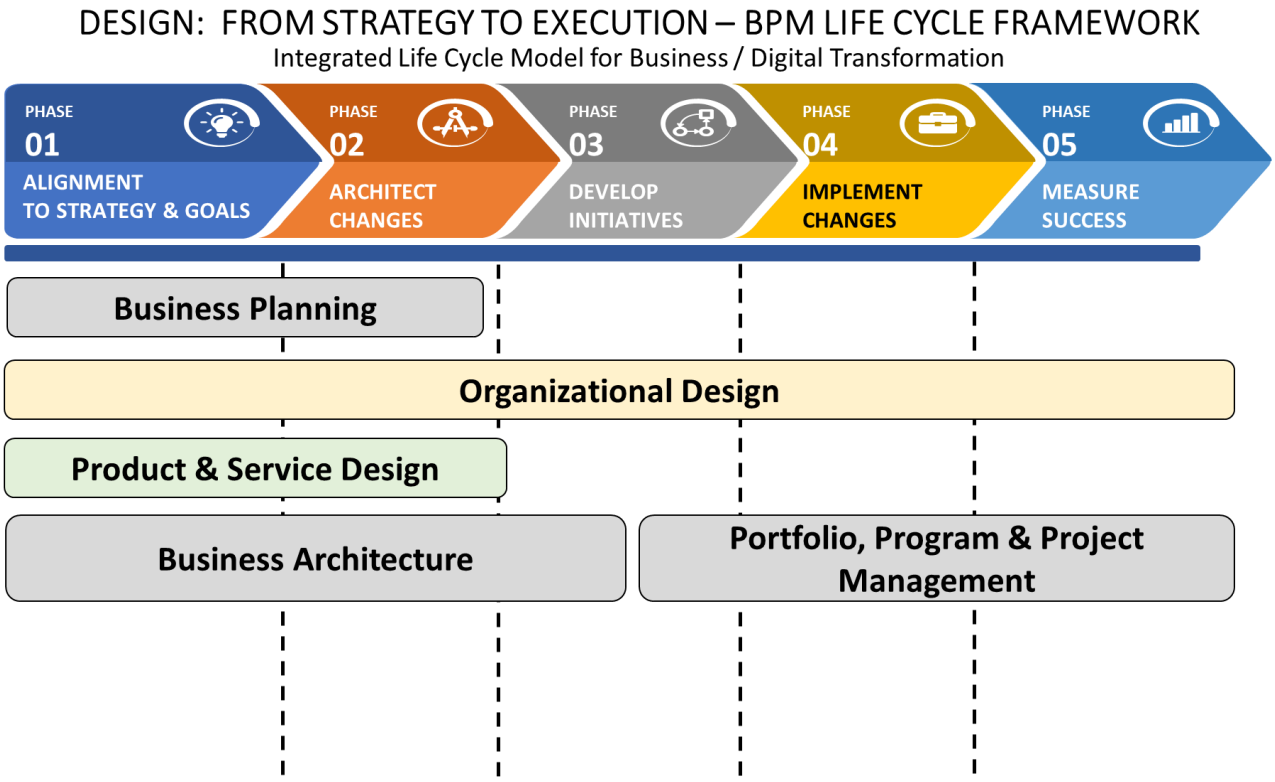


Figure 9.2 Organizational Design Aligned with Business Planning and Business Architecture

Major business transformation change initiatives require focus on both of the following:

- Leadership development
- Cultural change

9.1 Leadership Development

Leadership development is the most critical activity and is essential for changing cultures. According to Deloitte's research, 84% of global organizations invest in formal learning programs for leadership development (Derler, et al. 2017). There are competency structures, behavioral formulas, neuropsychological models, leadership frameworks, and so on, that shift with the times and trends. One thing is certain — there is no consensus on any of them. Most thinking out there hasn't produced much in terms of consistent results.

"There is such a large compendium of knowledge out there, yet there are questions that still haven't been answered," according to Noah G. Rabinowitz, Chief Learning Officer and Vice President Global Leadership Development at Intel Corporation. There are hard questions to ask such as:

- Why is the gap growing between the rise of exponential technologies and actual leadership capability?
- Why is artificial intelligence (AI) exponentially outpacing human capability?
- Why are *change management* and *digital transformation*— or any transformation for that matter — still even topics of discussion?

Harvard's 2018 Leadership Development survey found that 75% of L&D executives surveyed felt that leadership program effectiveness was clearly not improving. At best, the results of all this spending are unknown. According to Harvard Professor Barbara Kellerman, "… notwithstanding the enormous sums of money and time that have been poured into trying to teach people how to lead, over its roughly 40-year history the leadership industry has not in any major, meaningful, measurable way improved the human condition (2012)."

There's a tremendous need to focus on sustained value creation by pivoting away from content and newness toward contextual relevance and business impact. According to Noah Rabinowitz, "we need to move away from the 'hard coded' orthodoxies that prevent us from moving away from task-based development paradigms toward solving the organization's biggest and most challenging problems (2019)."

Rabinowitz points out the ten orthodoxies that distract us from real leadership development with a return. An extract from his article follows.

Orthodoxy 1: The "historical" leadership database and normative dataset provide answers for the future.

Orthodoxy 2: Leadership development is hierarchical and should help people prepare for promotion and moving up the ladder. For decades now, the leadership pipeline construct has guided our leadership development strategies.

Orthodoxy 3: Learning and work are separate activities. Time in a learning environment is time off the job.

Orthodoxy 4: Better tools or intellectual property makes for better leadership development.

Orthodoxy 5: Zen garden (off-site) retreats lead to better leadership discussions.

Orthodoxy 6: Benchmarking against what others are doing helps us determine what we should do.

Orthodoxy 7: Mapping what we have today to what we want in the future helps us keep the equity built into the current system.

Orthodoxy 8: Gaining stakeholder alignment on the design of a leadership program is worth the extra time it takes to accomplish that alignment.

Orthodoxy 9: Organizations are obligated to help develop managers' skills to gain competitive advantage.

Orthodoxy 10: Human ego and the desire for power.

NOTE: To read the entire blog, here is link: https://capitalhblog.deloitte.com/2019/04/24/ten-orthodoxies-that-distract-us-from-real-leadership-development/#more-8341

Rabinowitz believes that the big shift in leadership development will be to flip the 10 orthodoxies through a combination of innovative, real-world and agile-development strategies — all of them centrally focused on solving actual and relevant business problems. The mission of leadership development must become the same mission as the rest of the organization: to solve problems, create value, change culture, drive results, and build purpose – with all investments in the next generation and not the current generation (Rabinowitz 2019).

9.2 Culture Change

The second critical area is culture change. According to the Norm Sabapathy, EVP HR at Cadillac Fairview Corp, "The No. 1 reason why any organization should care is that it has been proven that culture, if you have a strong one, is positively correlated with business results."
Following is an extract from an article about Sabapathy's 10 tips for driving cultural change that will stick.

1. ***Define a set of desired values and behaviors****. Have your leaders clearly describe the values and behaviors they're seeking. Make sure people can really understand and relate [your culture] to day-to-day behavior." That means coming up with behavioral descriptors for each value you define and articulating how those would translate into actionable behaviors at all levels.*

2. ***Align culture with strategy and processes.*** *Look at your mission, vision and values and consider how they line up with your HR processes, including hiring, performance management, compensation, benefits and the promotion of talent. It's important that your recruiting and talent management build your culture, especially into your future, including succession plans.*

3. ***Connect culture and accountability.*** *This is self-explanatory, although many companies fail when it comes to being accountable.*

4. ***Have visible proponents.*** *For culture change to stick, it must be a priority of the CEO and board of directors. For a public or private company, it's important to show the board a framework for understanding organizational culture and its impact on performance, and also work with the board to create a standing performance objective for the CEO that evaluates culture.*

5. ***Define the non-negotiables****. When contemplating a culture change, look at your current culture and call out which aspects you want to retain. Determining what's not up for debate is*

particularly important during mergers and acquisitions, when leaders of two or more organizations must figure out how to blend identities.

6. ***Align your culture with your brand****. Culture must resonate with both employees and the marketplace. To accomplish this, leaders need to figure out how to activate the brand across multiple stakeholder groups, especially in the current online world, where today's bad customer experience can become tomorrow's viral sensation.*

7. ***Measure it.*** *What gets measured gets managed. Useful tools to demonstrate the effectiveness of your efforts by implementing employee surveys, talent analyses that identify gaps between desired and actual behavior, and assessments of ethics hotline usage.*

8. ***Don't rush it.*** *Changing a culture can take anywhere from months to several years. Start by making sure there's a clear rationale for why the organization should change.*

9. ***Invest now.*** *Don't wait for staff and resources that may never come**.** It is a journey and not a destination (like BPM).*

10. ***Be bold and lead.*** *You don't have to be in a position of influence to have influence. When we step up, it encourages others to step up as well (Folz 2016).*

It is generally accepted that leadership drives culture and culture is what sustains business results. Business and digital transformation must start with strategy and processes. The important point here is that leadership development and culture change all have HR processes as the cornerstone for building the culture required to address any business change. Organizations would truly benefit from Chief People and Learning Officers who completely understand and know how to achieve leadership development and culture change as described. Unfortunately, many organizations lack the right people for this important role that is foundational for organizational change.

9.3 Three Levels of Organizational Change and Engagement

Once the strategy is approved by executive management and/or the board of directors, the transformation moves from concept to cultural reality. Communication is the number one activity that drives changing organizational culture. Change, whether cultural or process change, has three levels of engagement:

- **Organizational level.** Addressed through values and behaviors. Also called enterprise level.
- **Process level.** Includes business processes for operations and HR. Includes the project level.
- **Job level.** Values and behaviors, job description, job training, measurements, and incentives. Includes the job and the job performer. Also called individual level.

The second most important activity is leadership commitment. Leaders have to *walk the talk.* Meaning leaders should demonstrate their commitment to build credibility among all employees.

9.4 The Process-Driven Organization

The process-driven organization is an enterprise that is structured, organized, managed, and measured around its primary business processes.

Accountability is the principal concept that organizations need to introduce and sustain when changing organizational culture. From a process perspective, workers must embrace accountability for workflow that crosses traditional organizational boundaries to create value for customers and the organization. Approaches include changes in work processes, organizational structure, roles and responsibilities, performance measures, values, and culture. The changes in organizational structure do not replace traditional structures based on functional, geographic, or product disciplines. Instead, a process organization represents an overlay on a traditional organization design intended to create greater emphasis on customer focus and process orientation.

Changes in organization structure through the introduction of roles such as a Process Owner and a BPM Center of Excellence need to be supported by the right models, measures, improvement methods, and aligned recognition systems. Simple, visually compelling and relevant process models, customer-focused measures, integrated improvement methods, and aligned recognition systems all serve to shift company culture from a hierarchical view to a customer-focused, process-based view.

The role of measurement is crucial in this regard. Process-oriented companies measure what matters to customers. The most common of the customer-focused measures include *perfect order delivery* (as defined by The Supply Chain Council), *perfect new product introduction*, and *first-time-right* responses to customer inquiries and complaints.

Establishing accountability for process performance is another cornerstone of a customer-focused, process-centric enterprise. In spite of the existing literature and no small amount of fanfare around the importance of process ownership, organizations often stumble with success in process ownership in some or all of the following ways:

- Process Owners are appointed at middle management levels with responsibility for processes of small scope and are not supported by executive process-owner appointments for the improvement and management of the organization's end-to-end processes.
- Lack of adequate and continuing training for, and education on, the role of Process Owner.
- The role of Process Owner is divorced from the fundamental management framework of the organization, and Process Owners lack a clear voice in making decisions around resources and priorities.

An integrated approach to improving performance through a customer-focused, process-based view of the enterprise is another key element in becoming a process-centric enterprise. This requires integration in the various improvement methods used by an organization, including approaches such as Lean, Six Sigma, Continuous Process Improvement, Reengineering, and technology-enabled BPM initiatives. While

such integration involves a greater investment in training and generally requires more effort, the resulting benefits can be significant.

The journey to enterprise-wide process management involves the definition of an organization's end-to-end processes (typically 5 to 10), measuring performance from both the customer's and the organization's points of view, designating Process Owners with responsibility and accountability for process performance, selecting two or three processes for improvement action, capturing early wins in each selected process, and sustaining gains through ongoing management of the organization's end-to-end processes. This cycle is then repeated until the entire operations of the organization have been optimized.

9.4.1 Enterprise Performance Matrix

Geary Rummler viewed organizations as human performance systems with cross-functional processes as the connective tissue holding performance together. He recommended using a performance matrix to illustrate and integrate the multiple levels of an organization and its scope of involvement. The following is an overview represented in a matrix that covers the three levels of an organization and the scope of involvement at each level.

Level of Organization	Scope at Level
Organizational	The organization as a whole
Process	The specific processes the organization uses to accomplish work
Job	Concrete activities that people and systems perform

At each level, the assumption is that organizations:

- Define goals and measures
- Create designs for achieving their goals and measures
- Establish management practices that assure that the designs achieve the desired goals and measures

The following table illustrates the concept of an integrated approach to performance improvement. The matrix stresses dynamic interaction among all levels and all nine variables in the matrix.

Level	Goals and Measures	Design and Implementation	Management
Organizational Level	• Organizational goals • Measures of organizational success	• Organizational design • Organizational implementation	Organizational management
Process Level	• Process goals • Measures of process success	• Process design • Process implementation	Process management
Job	• Job goals • Job measures of success	• Job design	• Job management

	• Job performer goals • Job performer measures of success	• Job implementation	• Job performer management

Organizations that use an organizational performance matrix are successful in how they communicate performance expectations from the organizational level to the job level through the processes in focus.

9.5 Organizational Change

This section focuses on changes at the organizational level, involving senior executives of the functional areas impacted by the business change. Human Resources (HR) is almost always involved, especially when new roles need job descriptions, compensation levels, and so on. However, the more difficult exercise is the organizational change — the design of the new organization, reporting structures, and so on.

Identifying the right change management activities in support of your transformation or project improvement initiative involves consideration of options in a variety of separate but related business areas, as depicted in Figure 9.3. The core shows the involvement of people and sponsors.

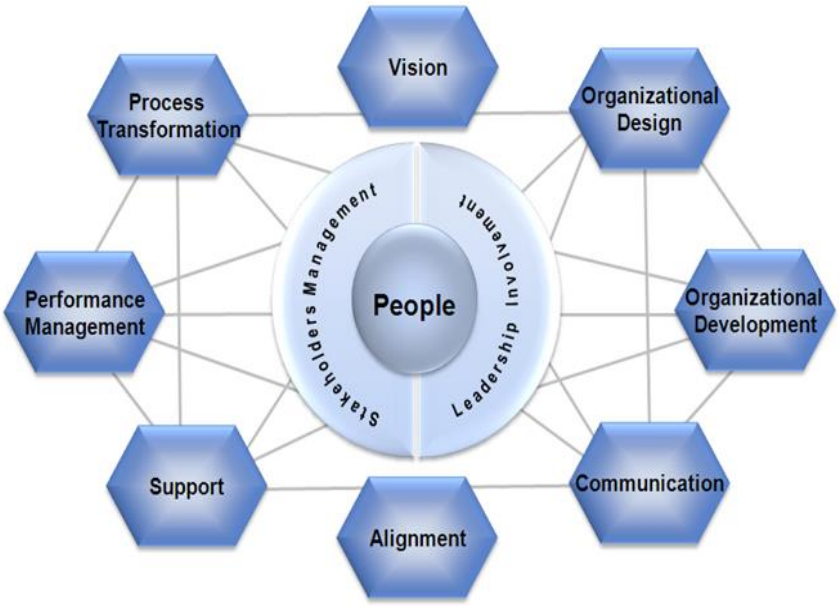


Figure 9.3 Planning Change Management Activities

The component modules in the outer circle are the areas that should always be considered in a change management program. Transformation-level change starts with the definition of clear vision for the change aligned with the corporate vision and strategy. Moving to the right in Figure 9.3, from Vision to Organizational Design, Organization Development, Communication, Alignment, Support, and Performance Management, you finally reach Process Transformation.

Organizational design is a step-by-step methodology that identifies dysfunctional aspects of workflow, procedures, structures, and systems. The design realigns them to fit current business realities and goals,

and then develops plans to implement the new changes. The process focuses on improving both the technical and people side of the organization.

For most companies, the design process leads to a more effective organization design, significantly improved results (profitability, customer service, internal operations), and employees who are empowered and committed to the organization. The hallmark of the design process is a comprehensive and holistic approach to organizational improvement that touches all aspects of organizational life, so the organization can achieve:

- Excellent customer service
- Increased profitability
- Reduced operating costs
- Improved efficiency and cycle time
- A culture of committed and engaged employees
- A clear strategy for managing and growing the organization

By design, BPM focuses on the integration of people with core business processes, technology, and systems. A well-designed organization ensures that the form of the organization matches its purpose or strategy, meets the challenges posed by business realities, and significantly increases the likelihood that the collective efforts of people will be successful.
As companies grow and the challenges in the external environment become more complex, businesses processes, structures and systems that once worked, become barriers to efficiency, customer service, employee morale, and financial profitability. Organizations that don't periodically renew themselves suffer from such symptoms as:

- Inefficient workflow with breakdowns and non-value-added steps
- Redundancies in effort
- Fragmented work with little regard for good of the whole (Production ships bad parts to meet their quotas)
- Lack of knowledge and focus on the customer
- Silo mentality and turf battles
- Lack of ownership ("It's not my job")
- Coverup and blame rather than identifying and solving problems
- Delays in decision-making
- People don't have information or authority to solve problems when and where they occur
- Management, rather than the front line, is responsible for solving problems when things go wrong
- It takes a long time to get something done
- Systems are ill-defined or reinforce wrong behaviors
- Mistrust between workers and management

9.5.1 Organizational Design

The Center for Organizational Design (www.centerod.com) has a recommended framework to help leaders understand their organizations and guide a successful redesign. The model reduces the complexity of an organization to eight key variables that must be understood and aligned for an organization to be successful as shown in Figure 9.4.

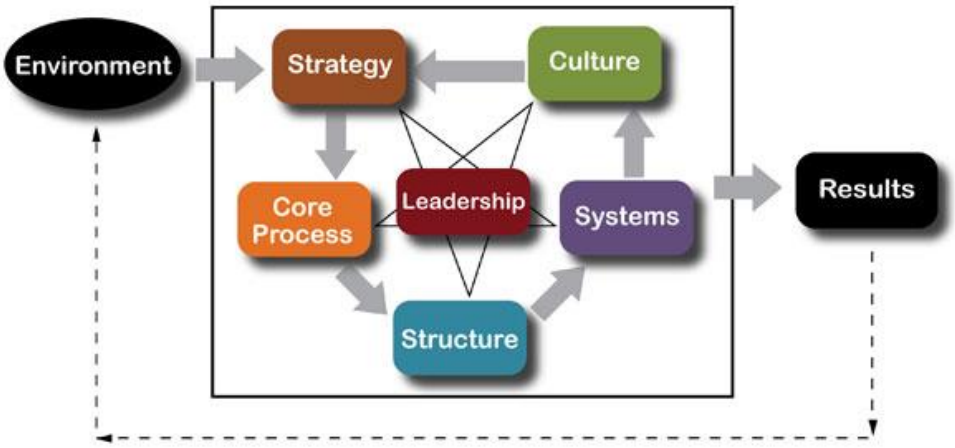


Figure 9.4 Organizational Design Framework – Transformation Model (The Center for Organizational Design, n.d.)

Alignment implies a holistic or systems point of view that finds the best *fit* between all organizational elements. Paying attention to and understanding these variables will result in major improvements in customer service, quality, efficiency, cycle time, profitability, and satisfaction of employees.
Eight variables form the *big picture* or context of an organization and ultimately determine its success: environment, strategy, core processes, structure, systems, culture, results, and leadership.
Organizational design is really about the relationship and balance between each of these variables. The role of leaders could be defined as understanding and managing these variables.

Environment. Organizations, like all living systems, can survive only to the extent that they maintain harmony with their external environment. This includes being sensitive to the evolving needs and perceptions of customers, understanding changes occurring in technologies, knowing your competition and understanding the legal, social, and political climates. Most organizations eventually deteriorate because they fail to maintain a responsive posture towards their environment.

Strategy. There are two parts to strategy. Business strategy is a set of conscious decisions about how the organization will add value to customers and distinguish itself from its competitors. It also includes performance targets and strategy for growth. A well-developed business strategy tells the organization where it is going and guides it like a ship's rudder in a stormy sea. An organizational strategy is the *being* or character of the organization. It has to do with *who we are* and not just *what we do*. Strategy includes the mission, vision of the future, values, and guiding principles.

Core process. The major cross-functional flow of work in the organization. A core process is the sequence of events or steps necessary to get a product out the door or deliver a service. The concept of core process includes the technology and resources (equipment, software, space, and materials) required to produce a deliverable. Core business processes are, or should be, the focal point around which all other business unit activity is organized. Understanding, streamlining, and properly supporting core business processes is the central job of any organization.

Structure. How people are organized around business processes. Structure moves beyond box charts to understanding the boundaries, roles, responsibilities, and reporting relationships among people. It is a sort of template that determines not only relationships, but coordination of tasks and allocation of resources around business processes. The proper question about structure is not whether it is the right one, but whether it fits with the rest of the organization (core process, strategy) and helps rather than hinders performance.

Systems. Systems are the inter-related sets of tasks or activities that help organize and coordinate work. Examples include recruiting and selection, training and development, how people are promoted, communication and information sharing, decision making, how people are rewarded, planning and goal setting, personnel policies and procedures, performance feedback, and so on. Systems are usually standardized and applicable across the whole organization. They are often *owned* by management or special support functions. The most effective systems are often the simplest.

Culture. Culture is how the organization really operates. It consists of the leadership style, worker attitudes and habits, and management practices that make up the distinctive *personality* of the organization. Culture is like the air that permeates everything and is both cause and effect of organizational behavior. Culture mirrors the true philosophy and values that the organization actually practices. As such, culture is a measure of how well an organization has translated its philosophy (organizational strategy) into practice.

Results. What is the organization's current performance? Results define the success or health of an organization and are therefore the starting point for understanding how well the organization is functioning. Results indicate where the organization is strong, as well as where it is weak and what it needs to change. Everything is tied to results.

Leadership. Leaders drive success. They set goals and monitor results, scan the external environment, define vision and strategy, design (consciously or by default) the infrastructure of the organization, develop people, and build culture. However, traditional assumptions, roles and practices of leadership are no longer adequate to manage in today's complex world. Successful leaders are changing their assumptions about work, organizations, and people to build collaborative, more responsive organizations.

9.5.1.1 *Designing the New Organization*

The senior team (and/or others who have been invited to participate in the process), look to the future and develop a complete set of design recommendations for the *ideal future*. At a high level, the stages in this process include the following:

- **Defining your basic organizing principle.** Will you organize primarily around processes, customer-types, geographies, and so on?
- **Streamlining core business processes.** Streamline the value-adding processes that result in revenue and/or deliverables to customers.
- **Documenting and standardizing procedures.** Written procedures help workers avoid mistakes and ensure consistency.
- **Organizing people around core processes.** Identify headcount necessary to do core work.

- **Defining tasks, functions, and skills.** What are the performance metrics for each function and team? How are they evaluated and held accountable?
- **Determining facility, layout, and equipment needs.** Plan and budget for the facilities and equipment teams and departments throughout the organization need to succeed.
- **Identifying support resources.** Identify functions outside the core process, like finance, sales, and HR. Where should these be located?
- **Defining the management structure.** Plan the team that provides strategic, coordinating, and operational support.
- **Improving coordinating and development systems.** Include hiring, training, compensation, information-sharing, goal setting, and so on.

At some point, the design process morphs into transition planning as critical implementation dates are set and specific, concrete action plans are created to implement the new design. A key part of transition planning includes communicating progress to other members of the organization. A communications plan is developed that educates people on what is happening. Education brings awareness, and everyone's inclusion brings the beginning of commitment.

9.5.1.2 *Implementing the Design*

To implement the new organizational design, people should be organized into natural workgroups that receive training in the new design, team skills, and start-up team building. During implementation, new work roles are learned and new relationships within and outside the business unit are established. Equipment and facilities are rearranged. Reward systems, performance systems, information sharing, decision-making, and management systems are changed and adjusted. Some of the implementation tasks can be accomplished quickly, while others may stretch over a longer period.

9.5.2 Project Management

It is not the intention of the *BPM CBOK Guide* to include the body of knowledge for project management, but it will be covered in brief as it applies to BPM.

> *Project management is the application of knowledge, skills, tools, and techniques to project activities to meet project requirements. Project management is accomplished through the application and integration of the project management processes of initiating, planning, executing, monitoring and controlling, and closing (Project Management Institute 2004).*

Essential skills of project management include:

- Communication
- Leadership
- Team management
- Negotiation
- Planning
- Time management
- Risk management

Many experienced project managers also have some subject matter expertise on the project at hand. For example, if the project is an ERP implementation, the project manager usually has enough subject matter expertise to be dangerous, so to speak, in that they will know what questions to ask and when to call someone out. Like BPM, project management has its own life cycle as shown in Figure 9.5.



Figure 9.5 Project Management Structure and Phases (Mind Tools Team 2019)

The project phases (verticals in the diagram) are:

- Project strategy and business case
- Preparation
- Design
- Development and testing
- Training and business readiness
- Support and benefits realization
- Project close

Each phase represents a decision gate to move to the next gate in the project. Then there are the project processes (horizontal in the diagram):

- Phase management
- Planning
- Control
- Team management
- Communication
- Procurement
- Integration

Project management and experience with the project management life cycle phases and processes are valuable skills. BPM Professionals may want to take further training to develop a core project management skill set.

9.5.3 Change Management

Change management is another valuable skill for BPM Professionals. Change management is usually done concurrently within a project management life cycle.

Change management is the process, tools, and techniques used to manage the people side of change to achieve the required business outcome. Change management focuses on the people impacted by the change. Any change to processes, systems, organizational structures, and/or job roles will have a technical side and a people side.

Business and digital transformation ultimately impacts one or more of the following parts of an organization:

- Processes
- Systems
- Organizational structure
- Job roles

All of the approaches and tools of change management prescribe adjustments to one or more of the four parts of the organization. Business and digital transformation affect all four.
Creating change within an organization takes hard work and an understanding of what must actually take place to make the change happen. Change management and project management are two of the most common, key disciplines required to bring a change to life.

Change management incorporates the organizational tools that can be used to help individuals make successful personal transitions, resulting in the adoption and realization of change.

Both project management and change management support moving an organization from a current state (how things are done today), through a transitional state, to a desired future state (the new processes, systems, organizational structures, or job roles defined by the change). Project management focuses on the tasks to achieve project requirements, while change management focuses on people. Project management and change management have evolved as disciplines to provide both the structure and the tools needed to manage and realize change successfully on the technical and people sides. Figure 9.6 shows the processes and tools used in the project management and change management disciplines.

Discipline	Process	Tools
Project Management	• Initiating • Planning • Executing • Monitoring & Control • Close • (PM BOK 3rd Edition)	• Statement of Work • Project Charter • Business Cast • Work breakdown structure • Budget Estimations • Resource allocation • Schedules • Tracking • Risk identification and mitigation • Reports on performance & compliance
Change Management	• Planning for Change • Managing Change • Reinforcing Change (Prosci methodology)	• Individual Change model • Communication • Sponsorship • Coaching • Training • Resistance management

Figure 9.6 Project Management and Change Management Processes and Tools (PROSCI Team, n.d.)

Both business and digital transformations require that the project team outlines the specific activities for defining and prescribing how to move from point A to point B (by changing processes, systems, organization structures, or job roles). The change team outlines the steps needed to help the individuals affected by the change do their jobs in the new way (for example, people transitioning from fulfilling Function A to Function B as shown in Figure 9.7).

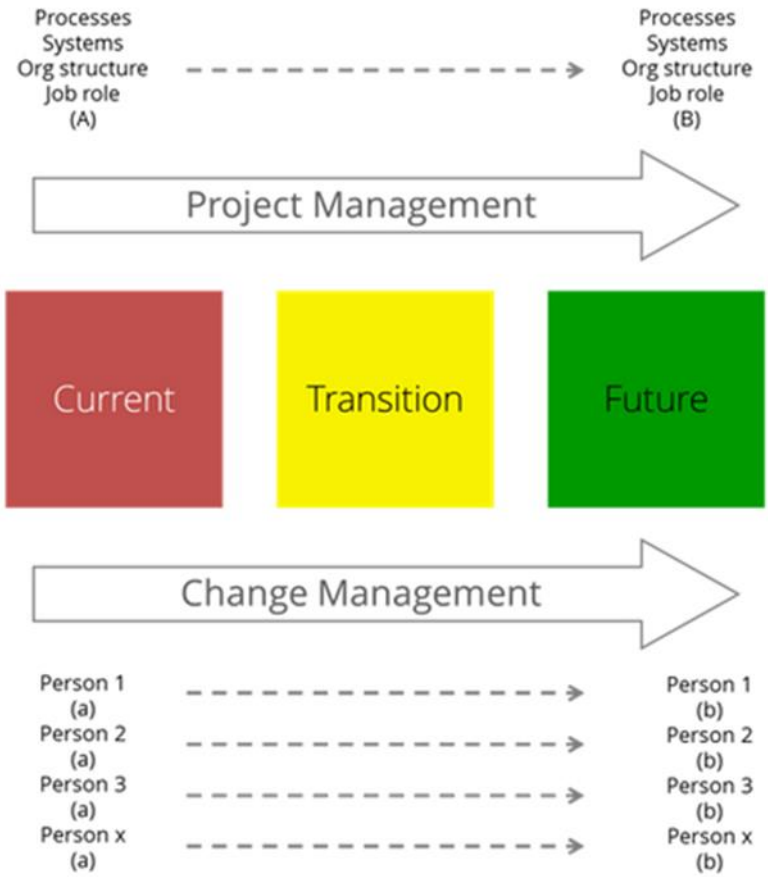


Figure 9.7 Change Management for New Job Roles (PROSCI Team, n.d.)

The goal of project management is to effectively deploy resources in a structured manner to develop and implement the solution in terms of what needs to be done to processes, systems, organizational structure and job roles. The goal of change management is to help each individual impacted by the change to make a successful transition, given what is required by the solution. PROSCI Team, n.d.)

Change management and project management are tools that need to be applied independent of the actual change being undertaken. Anytime alterations are made to processes, systems, organization structures or job roles, you need a structured approach to manage both the technical side and the people side of the pending change. The approach will vary for every transformation initiative. Project managers and change managers work together toward the same goal, but with different roles and associated tasks.

Project managers:

- Identify milestones and activities that must be completed
- Outline resources needed and how they will work together
- Define scope (what will be part of the project and what will not be)

Change managers:

- Craft key messages that must be communicated
- Work with project sponsors to build strong and active coalitions of senior leaders

- Make the case of why the change is needed to employees throughout the organization, even before the specific details of the solution are complete

The most effective transformation projects integrate these activities into a single project plan. Change management is a term widely used and at times confusing. Figure 9.8 shows the three most widely accepted levels of change management.

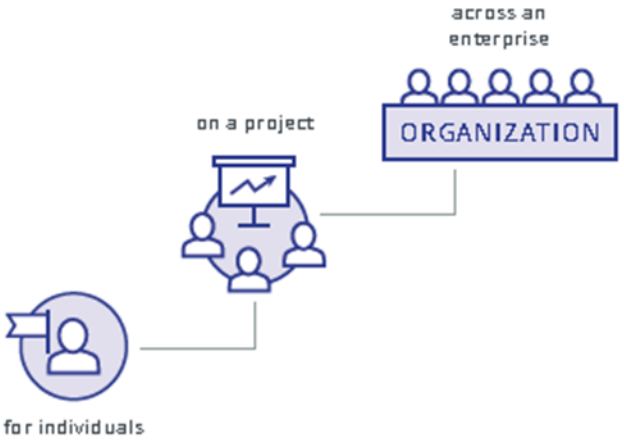


Figure 9.8 Three Levels of Change Management (PROSCI Team, n.d.)

Goals for the three levels of change management include:

- **For individuals.** To enable success by supporting people through their personal change journeys.
- **On a project**. To increase outcomes and return on investment by driving adoption and usage.
- **Across an enterprise.** To deliver strategic intent, mitigate saturation, and improve agility by embedding change management.

Change management at any level ultimately focuses on how to help employees embrace, adopt, and utilize a change in their day-to-day work.

For business and digital transformation, PWC proposes ten principles of leading for change:

(1) Lead with culture (typically the CEO)
(2) Start at the top (executive level)
(3) Involve every layer (includes mid-level and frontline staff)
(4) Make the rational and emotional case together
(5) Act your way into the new thinking (make decisions visible, spend time with frontline, make sure mid-level and frontline have direct contact with customers)
(6) Engage, engage, engage (more than just one message at beginning of initiative)
(7) Lead outside the lines (includes everyone with authority and influence)
    - Pride builders (rewards)
    - Trusted nodes (go-to people)
    - Change and culture ambassadors (engage informal leaders)
(8) Leverage formal solutions (structure, reward systems, training, development, and so on)
(9) Leverage informal solutions (setting up a quality standard to adhere to)

(10) Assess and adapt (Aguirre and Alpern 2014)

Four critical skills for a change management practitioner include:

(1) Advance communication
(2) Expert coach
(3) Strategic thinker
(4) Project management

PROSCI suggests the following seven change management best practices:

(1) Mobilize an active and visible executive sponsor
(2) Dedicate change management resources
(3) Apply a structured change management approach
(4) Engage with employees and encourage their participation
(5) Communicate frequently and openly
(6) Integrate and engage with project management
(7) Engage with middle managers (PROSCI Team, n.d.)

The essential skills of project management and change management done concurrently within the context of their respective life cycle phases and processes coupled with the BPM life cycle are extremely valuable to the BPM Professional and are recommended as part of a core skill set.

9.5.4 Financial Management

Financial management within the scope of project management is a competency BPM Professionals need. Effective and efficient financial management includes the following key components: budgeting, internal controls, GAAP cost principles, accounting and record keeping, procurement, reporting and audits. Project financial management is the process that brings together planning, budgeting, accounting, financial reporting, internal control, auditing, procurement, disbursement, and the physical performance of the project with the aim of managing project resources properly and achieving the project's objectives. Leading any initiative requires proficiency in financial management of budgets, people, resources (like computers), and most of all time and schedule.

BPM Professionals must be skilled in the foundational concepts of financial management in order to be successful and, if one aspires, to progress to more senior executive levels within an organization.

9.5.5 Risk Management

Risk management is the process used by project managers to minimize any potential problems that may negatively impact a project's timetable. Risk is any unexpected event that might affect the people, processes, technology, and resources involved in a project. Unlike issues, which are certain to happen, risks are events that could occur, and you may not be able to tell when. Because of this uncertainty, project risk requires serious preparation in order to manage them efficiently. The risk management process used to prepare for project risks is called a *risk assessment*. A risk assessment is made up of five basic steps.

Risk assessment steps:

- Step 1: Identify the risk
- Step 2: Analyze the risk
- Step 3: Evaluate or rank the risk
- Step 4: Treat the risk
- Step 5: Monitor and review the risk

Project management risks are composed of the following five elements:

- **Risk event.** What might happen to affect your project?
- **Risk timeframe.** When is it likely to happen?
- **Probability.** What are the chances of it happening?
- **Impact.** What is the expected outcome?
- **Factors.** What events might forewarn or trigger the risk event?

Project managers develop a risk matrix like the one shown in Figure 9.9 to visualize risks.



Figure 9.9 Risk Assessment Matrix

BPM Professionals must be skilled in risk assessment in the context of a BPM initiative. The risk assessment should be done prior to any process implementation, especially when implementing technology solutions.

9.5.6 Process Culture

A *process culture* exists when the organization's processes are known, agreed on, communicated, and visible to all employees. Characteristics of a process culture specifically include:

- General agreement on what the business processes are
- Understanding of how business processes interact and affect each other
- Clear definition of the value each process produces
- Documentation of how each process produces its results
- Understanding of what skills are required for each process
- Understanding of how well each process performs
- Ongoing measurement of process performance
- Management decisions based on process performance knowledge

- Owners of each process having accountability for process performance

9.5.7 Moving from Hierarchical Structures to the Process-Driven Organization

The legacy of managerial structures in functionally-oriented companies is typically a departmental hierarchy, where managers are responsible for workers performing tasks related to a particular resource or business function. Groups of workers are combined into divisions or departments, each adding layers of management and control. In large enterprises, these departments are often grouped by product, market, or geography. These *silos* of resources are represented on a common and familiar organizational chart, as shown in Figure 9.10.

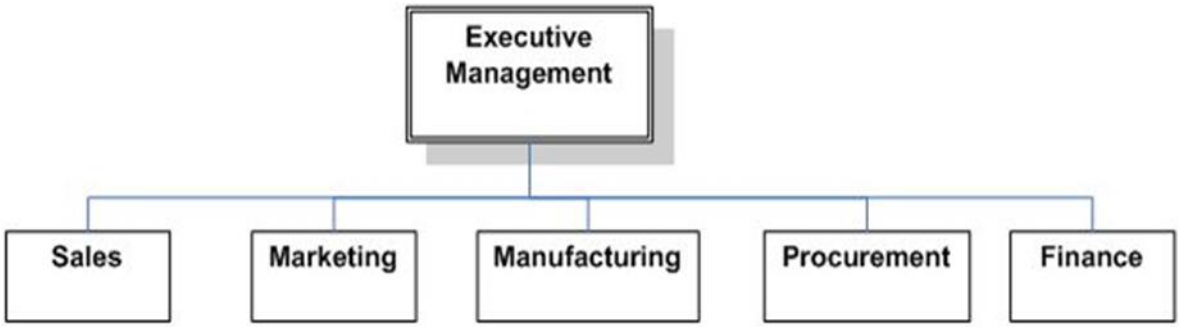


Figure 9.10 Example Organizational Chart

9.5.8 How ERP and ERP Systems Facilitated Change in Organizational Structures

As company growth strategies changed, so did labor strategies. The de-verticalization of many industries led to different organizational structures and business models. What hadn't changed for every company was the functional orientation and approach to work in organizations. It wasn't until the advent of *enterprise resource planning* (ERP) systems in the mid-1990s that organizations were forced to consider their orientation to process. ERP systems offered a standard, integrated alternative to the existing functional processes by transacting horizontal processes that were enabled through the ERP technology.

There are many stories and examples of companies that invested a lot of money on ERP implementations with correspondingly high failure rates, but the fact remains that the transformation imposed by ERP systems was one of process and not one of technology. Companies that were hugely successful were the ones who took a process-oriented approach to the transformation. ERP, like it or not, was a technology disruption point that forced companies to be more process oriented.
Since ERP processes are pre-designed, it wasn't long before management of core business processes transitioned to a new, horizontal focus in the organizational structure. These cross-functional processes required a new organizational orientation in which accountability and ownership of process performance needed to be explicit (see Figure 9.11). The addition of new responsibilities to existing roles within functional organizations created a process dimension governed by the role of a Process Owner.
In terms of Rummler's performance matrix, this new role requires integration of the job or job performer into the horizontal process. For example, order-to-cash necessitates a team orientation to the

process where multiple jobs and job performers are up and downstream to each other before the final output is delivered to the customer.

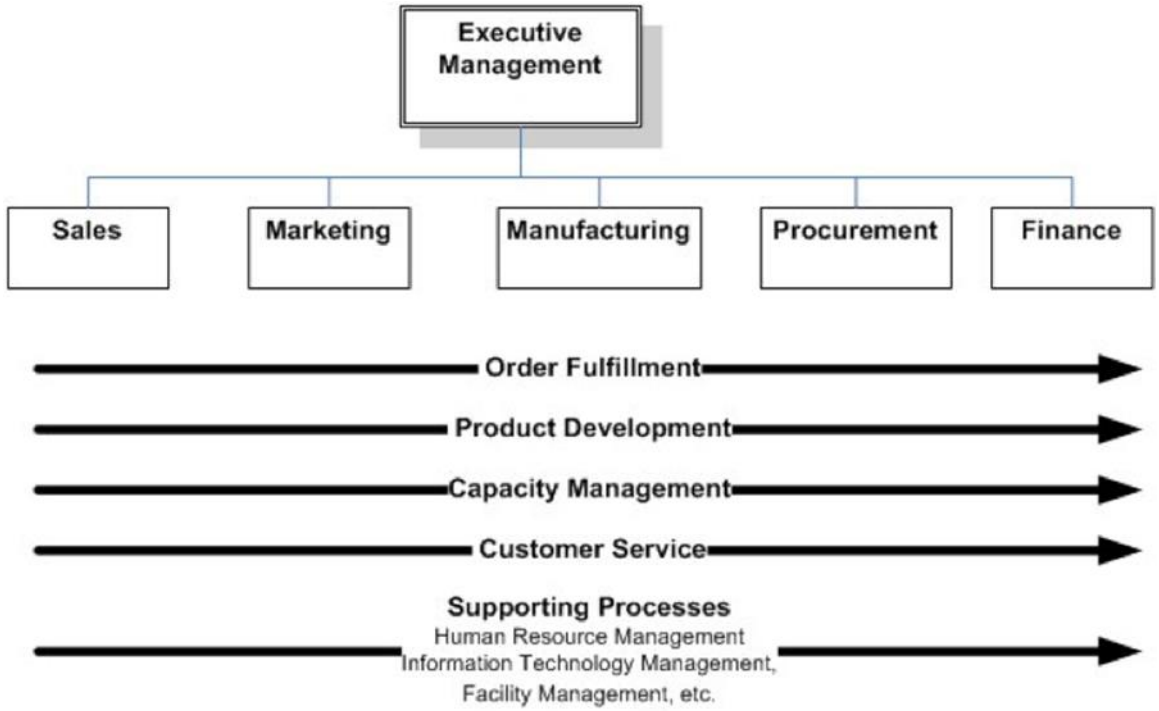


Figure 9.11 Cross-Functional Orientation to End-to-End Process in ERP

9.5.9 Process Management Roles

Process-driven organizations in all stages of development include individuals whose new roles will support the management and performance of those cross-functional processes. Roles related to process management include:

- Process Owners
- Process managers
- Process analysts
- Process designers
- Process architects
- Business analysts
- Subject matter experts
- Executive sponsors
- IT professionals
- Change management professionals

9.5.9.1 *Process Owner*

Following is a definition for the role of Process Owner.

A Process Owner has the ongoing responsibility and accountability for the successful design, development, execution, and performance of a complete end-to-end business process. Process ownership can be a full-time responsibility or an added responsibility, such as a line or staff function.

Characteristics and Responsibilities of Process Owners

Some companies may label the Process Owner role differently. For example, titles such as process leader, process manager, and process steward are often used. In addition to the title, the substance of this role may also vary. Process Owners are likely to be individuals at an executive level, typically VP or higher, who have common responsibilities across vertical silos. They may have direct or indirect authority over strategy, budgets, and resources. Their scope of responsibility may vary.

Process Owners usually are those concerned with end-to-end business processes that directly deliver value to the customers of the organization and have enterprise-level responsibility for the performance of the process as it relates to and impacts the balance sheet and income statement. Depending on the type of process — for example, recruitment to retirement — they may be *support* Process Owners who are concerned with the processes that support the organization's primary business processes, such as human resources, financial, or information technology processes. They may be subprocess owners concerned with sub-components of an overall end-to-end business process.

The Process Owner role usually involves other duties, such as chairing transformation efforts, integrating process results with those of other Process Owners, advocating for process priorities, benchmarking process performance, or coaching process performers. Process Owners may also have other roles in the organization, such as functional or departmental management. Whatever the title, authority, or scope, all Process Owners share a unique accountability for a business process.
Some common characteristics of process ownership include:

- **Accountability and responsibility for process design.** Process Owners may share decision rights related to the process design with other managers or participants. However, they are accountable for the overall integrity and integration of the process design. Process design may be iterative, with a goal of continuous improvement, involving incremental improvements to tasks and activities, or it may require redesign of the entire end-to-end business process.
- **Accountability for process performance.** Process Owners may manage the process, that is, how work gets done, but not necessarily the people who perform the work. Managing process performance involves developing a strategy for the process with performance goals and objectives. It includes ensuring that resources and skills are in place, measuring and communicating actual performance against targets, and using this feedback to continuously reset goals and objectives. Process Owners initiate process transformation efforts and define incentives, which ensure that the process continues to deliver value to its customers.
- **Advocacy and support.** In order to ensure that proper resources, training, incentives, and executive attention are allotted, Process Owners may need to manage communications and advocate for the processes under their care with executive management, customers, suppliers, participants, and other internal and external stakeholders. They may find that they must

operate through influence rather than authority. Inevitably, even the most professional and successful teams encounter problems with each other like unanticipated demands, exceptional circumstances, design problems, or changing customer requirements. As Process Owners continuously monitor results, they must also investigate and resolve problems.

9.5.9.2 *Process Manager*

Following is a definition for the role of process manager.

> *A process manager actually performs and coordinates the work on a process or processes. Process managers are involved in measuring and monitoring process metrics and driving continuous process improvement.*

Process Manager Responsibilities

The process manager bears accountability and responsibility for process:

- Performance, efficiency, and quality
- Supply of the necessary resources
- Control by prioritizing, controlling, and escalating process needs
- Co-ordination of the individual tasks and the allocation of resources
- Results measurement and analysis
- Implementation of required changes for improvement

9.5.9.3 *Process Analyst*

Process analysts manage process transformation projects, lead process discovery and design workshops, coach Process Owners, and measure and report on process performance. Process analysts typically have a great deal of skill in documenting and understanding process design and performance patterns. They provide analysis and assessment of current processes, evaluate alternate process design options, and make recommendations for change based on various frameworks. Their findings provide insight for process integration, design, and structure. This role is often combined with the role of the process designer.

9.5.9.4 *Process Designer*

Process designers have significant process knowledge. They design new business processes, transform existing business processes, and implement plans. Designers typically possess analytical and creative skills as well. They use visual and mathematical models to describe each step in a process and the organization of work. A process designer ensures that the process design aligns and complies with the overall business goals and policies.

9.5.9.5 *Process Architects*

Process architects may function in a business or technology role. Depending on the orientation, they may be focused on managing business performance or on mapping technology to business operations. Process architects are responsible for:

- Developing an enterprise Business Architecture blueprint, along with corresponding value-stream process metrics
- Ensuring alignment among business needs, Business Architecture, and information technology architecture
- Developing and maintaining a repository of reference models and standards with regard to a company's products and services, business processes, performance measures, and organization

Process architects are engaged in business process analysis and transformation initiatives. Their involvement may be from a standards and compliance perspective, or they may serve as subject-matter experts (SMEs) to advise the team on the organization's process methodology. Through the analysis of business process architecture, companies identify opportunities for market advantage, business integration, and internal process initiatives.

9.5.9.6 *Other Key Roles*

The following roles support BPM initiatives.

Business Analyst

A common role in process change initiatives is that of business analyst (BA). BAs are responsible for analyzing the information and technology needs of their business customers to help propose information and technology solutions. BAs may facilitate meetings to assist the project team in analyzing current technology mappings or they may be involved with business operations and designing new information and technology functions. Within the systems development life cycle, the BA typically performs a liaison function between the business side of an enterprise and the information technology department or external service providers. Common alternative titles are business systems analyst, systems analyst, and functional analyst.

Subject Matter Experts

Many process improvement projects or process management teams include subject matter experts (SMEs). These are people who have a deep understanding of certain business functions or operations, often possessing years of experience as a participant in business operations. SMEs provide input on the current process and assist in designing new processes. They may have institutional knowledge about the rules governing the organization's processes, customer requirements, or the organization's culture. SMEs often validate models and assumptions and are members of implementation teams as trusted stakeholders providing change leadership.

Executive Sponsors: Management and Leadership

The role of executive leadership is critical to Business Process Management. The executive leader(s) set the vision, tone, and pace of business process improvement. Leaders determine the direction and strategy of BPM, focusing the enterprise on its larger objectives. They allocate resources and reward success. Leaders unify missions and groups throughout the enterprise and appoint and empower Process Owners or other individuals who play key roles in the management of business processes.

Executive leaders may even be Process Owners themselves, owning and institutionalizing the process of process management. They act as champions inspiring the enterprise to change, sometimes by creating a sense of urgency to overcome skepticism and resistance. To do this leaders must communicate the

case for process management and remove obstacles that may impede progress toward the goal. Leaders are responsible for creating the environment for success, sometimes through influence and persuasion, other times by resolving conflict and removing roadblocks.

IT Organization Roles

There are a number of roles within Information Technology groups that may play an important part in BPM, including solution architects, system analysts, BPMS configuration specialists, developers, database administrators, and others. These experts help define supporting technology solutions and may help define new capabilities for business processes based on enabling technology. IT personnel assist in process transformation initiatives through the implementation of new technology, while ensuring that the organization's technical standards are enforced.

Other Roles

The ABPMP recommends including the following roles as part of the overall BPM team:

- Project manager
- Change management manager
- Data analyst
- Data quality analyst

Data analysts document the data requirements for inputs, outputs, alignment of business rules with algorithm development, and business intelligence reporting requirements among others. Data analysts should perform their work concurrently with the process architect throughout the BPM life cycle.

9.5.10 Governing Bodies

As organizations mature in the management of their business processes, issues arise regarding process integration. Processes must join as a collective whole to ensure a single, coherent organization that consistently delivers value across all of the organization's processes. The organization thus needs to identify new mechanisms for planning, budgeting, and allocating resources to ensure that its processes are properly resourced, integrated, and aligned with strategic objectives.

Organizations must have a clear governance structure to provide leadership and clarify *decision rights* to enable cross-functional and departmental process improvement or management programs to succeed. Often, the root of resistance to BPM initiatives, sometimes causing them to fail, is change in the organizational governance structure. Individuals with power and control over resources (based upon organizational functions, product lines, or geographic boundaries) may find that their performance measures, authority, and span of control must change in order to successfully implement BPM.

The reason for change is simple. BPM provides an end-to-end perspective on how work is done. This end-to-end perspective crosses traditional organizational boundaries and requires that the mechanisms by which decisions are made and resources allocated must also be aligned with the end-to-end business process. Sound governance provides a structure of authority and a framework for collaboration. The structure and framework enable proper allocation of resources and efficient coordination of activity control throughout the organization. Traditional managers who are unable to adapt their thinking

beyond their organizational silo to end-to-end BPM are likely to resist initiatives that potentially change their influence in the organization.

9.5.11 Process Governance

There is no single, standard, process governance structure widely in use. Organizational focus on process is still emerging and a variety of governance structures are in use and evolving. Issues such as organizational strategy, culture, process maturity, business process outsourcing, and even the nature of individual leaders can cause a significant deviation from any given governance framework.
According to Forrester Research:

> *Business professionals hold the key to 21st century business transformation as process skills migrate out of IT departments and into business operation groups. Supply Chain is a perfect example where, depending on the industry, there are critical processes like Order to Cash, Manufacturing to Distribution and Request to Service [that] have explicit ownership along with the appropriate roles and skills to manage and improve process performance, which directly impacts the top and bottom lines of companies. (Moore, et al. 2010)*

Information technology is an enabler in the supply chain example, as it is in many other process examples. The partnership between the organization and IT is critical to the success of business transformation efforts. There have been many studies in the ERP arena that have looked at the importance of first designing business processes and implementing them prior to IT implementations.

Panorama Consulting has published an ERP report every year for the last three years and has observed the same results across multiple industries. The 2019 ERP report mentions that of ERP implementations, 64% realized improvement in all business processes and 30% improved most of their business processes with only 6% claiming that they didn't realize any business process improvement. Over 50% of company respondents who realized benefits said they used change management best practices. *Timeline overruns were primary due to data-related migration issues, which emphasizes the importance of having the appropriate data analysts on the team*.
According to the study, the best-in-class companies who realize the business benefits of ERP tend to have the following best practices:

- Exquisite focus on the business processes, that is, identifying the primary, management, and support business processes, and then defining and designing them for optimal performance. Choosing the software to fit the process is the goal, yet most companies get too tied up in the technical capability of supporting software and forget about the business process.
- Focus on achieving a healthy ROI based on business performance and having a business case that addresses post-implementation performance measurement.
- Strong commitment from senior business executives with CIO or IT alignment to a common set of goals.
- Adequate change management and training for the new processes and systems (Panorama Group Staff 2019).

9.5.12 BPM Center of Excellence

Organizations undertaking the process journey should consider instituting a Business Process Management Center of Excellence (BPM CoE) to address Enterprise Process Management and performance issues. This concept is also executed as a *Process Council*, but in this guide is a BPM CoE. Research from both Forrester and Gartner stresses that successful companies have instituted BPM CoEs to address enterprise-level process performance issues.

A BPM CoE may be made up of a combination of executive leaders, functional or departmental heads, and the Process Owners of the core cross-functional enterprise processes, as shown in Figure 9.2. Its mission may include the identification and resolution of any cross-process integration issues, conflicts between process and functional (or departmental) ownership, resource allocation, and the development and alignment of the organization's business objectives, goals, and strategy.

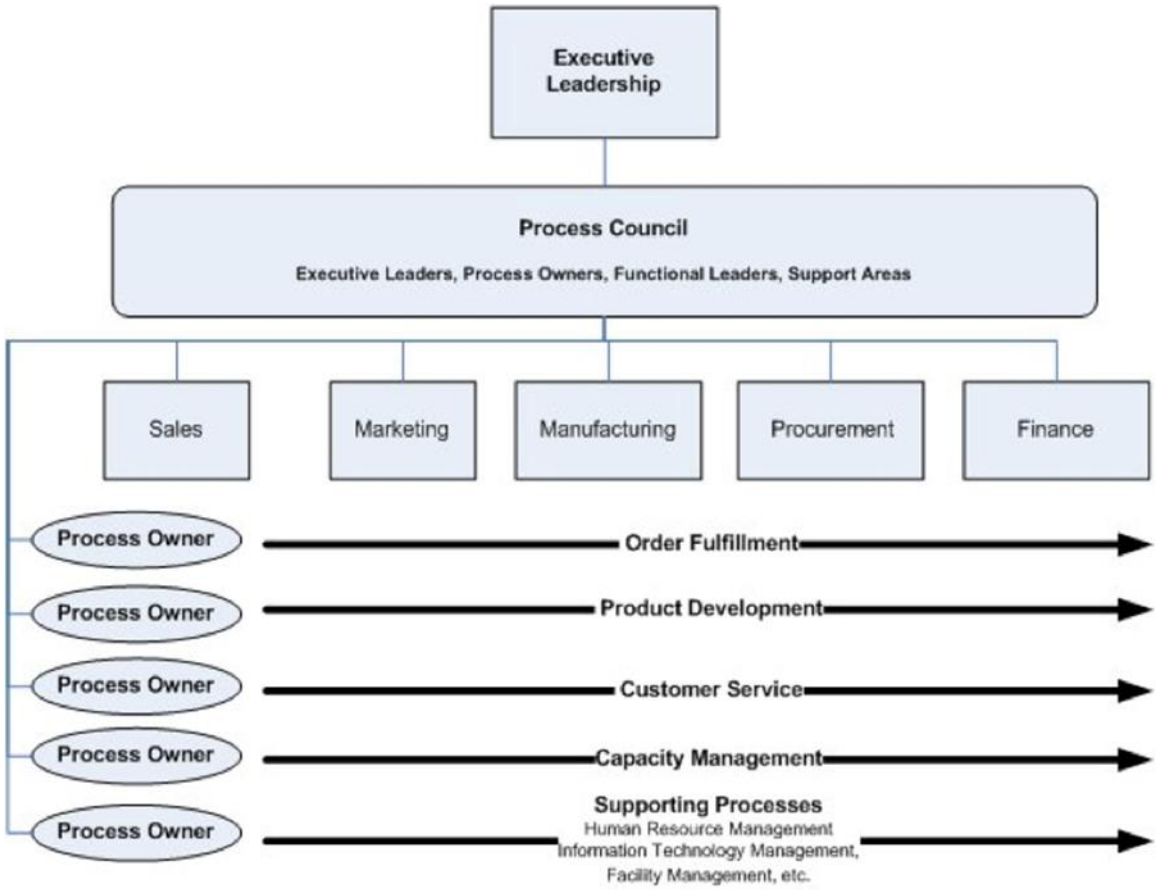


Figure 9.12 BPM CoE and Process Leadership

What is important is that the BPM CoE structure must be set up for efficiency and effectiveness in execution, so the group does not entangle itself in any other corporate council bureaucracy.

9.5.12.1 *BPM CoE Activities*

A BPM CoE is a cross-functional team with a formal organizational structure, defined tasks, roles, responsibilities, and processes for supporting and promoting methodical BPM adoption and effective use of BPM and continuous improvement across the organization. The team develops and maintains a library of reusable standards, methodologies, and techniques to ensure continues success with BPM projects and to minimize the time and effort needed to achieve those successes. The CoE team focuses on following critical activities:

- Creating and maintaining BPM vision and plans
- Creating and maintaining BPM life cycle methodology
- Strategic alignment to business
- Provide consistency of business process modeling standards
- Establishing and maintaining an enterprise business process architecture
- Process repository change management
- Continuously improving existing processes
- Creating new capabilities
- Metric measurement and benchmarking
- General administration of BPM roles and responsibilities
- BPM education
    - Establish a core set of skills and competencies
    - Develop training for BPM skills and competencies
- BPM software selection and usage
- Process portfolio management
- Process automation and compliance

CoEs also help address issues such as:

- How to create awareness and gain buy-in and acceptance
- What processes to consider and which one to automate next
- How to demonstrate the potential ROI of BPM initiatives
- How to develop competencies for successful BPM deployments
- How to engage and involve people from different organizational units
- What are the data collection needs across processes?
- How to define key performance indicators (KPIs)
- How to identify key improvement areas
- How to successfully deploy projects and measure results
- How to develop and manage user training programs

The CoE acts as the primary interface to the IT department for all things process. More than half of companies have moved to a CoE model to concentrate BPM expertise. The question remains whether to locate the CoE in IT, in Operations, or both — a best practice on location is not yet established. However, with the advent of low-code or no-code BPM software platforms, there is less reliance on IT from Operations.

9.5.12.2 *Centralized or Decentralized BPM CoE?*

Concentrating BPM expertise in a CoE is paramount to evolving to a process managed organization. A CoE allows an organization to realize a range of benefits that differ depending on the CoE model instituted. The two types of CoE for process governance are *centralized* and *decentralized*.

Centralized

A centralized model is where the CoE team serves as *consultants* to all business units, owning all aspects of implementation. Benefits of a centralized BPM CoE may include:

- Consistent implementations across business units
- Easy to leverage lessons learned
- Develops deep skills quickly
- IT has a single point of contact for requirements

Decentralized

A decentralized model is where each business unit develops deep skills in BPM and owns all aspects of implementation. Benefits of a decentralized BPM CoE may include:

- Focus on business unit priorities
- Flexibility on approach, timelines, resources

9.5.12.3 *Establishing a CoE*

Establishing a CoE is best accomplished in the nine stages shown in the table that follows.

Stage	Description	Components
1	Attain executive sponsorship	Senior business leader
2	Define goals and success criteria	• Process analysis and discovery • Process modeling • Process automation or implementation • Process performance assessment • Process improvement • Process governance • Process change management • Process library management • BPM education and training
3	Define governance structure	• Executive sponsor • Program manager • BPM visionary • Enterprise architect • BPM tool expert • Chief business architect • Process librarian • A representative from each line of business
4	Establish a BPM Architecture*	• Organizational objectives • Business operations • Established IT architectures, standards, and policies • Other processes • Established process standards
5	Set up BPM library and repository	• Repository software solution • Business and technical rules and their definitions

6	Establish change management practice	• Scope, depth, and schedule for people part of transition • Communication plan for organization, job roles and responsibilities
7	Develop business process architecture inventory	• Primary processes • Secondary processes • Support processes
8	Prioritize process selection based on strategic objectives (Figure 9.13)	• Avoid high effort, low-value processes • Focus efforts on value-creating processes
9	Start executing BPM projects	BPM life cycle model

* BPM Architecture is the operational link between the organizational strategic objectives and the tactical project details.

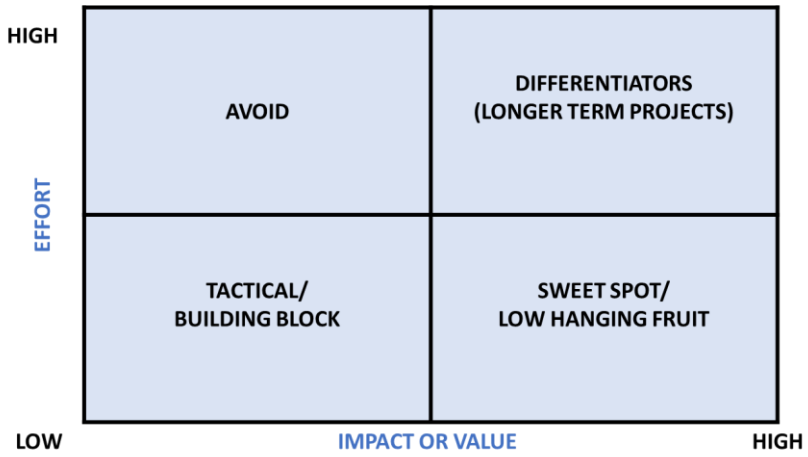


Figure 9.13 BPM Prioritization Matrix

9.5.12.4 *Benefits of a BPM CoE*

The benefits of implementing a BPM CoE are many. A CoE can help the organization realize:

- Cultural transformation
- Shareholder value creation
- Year-on-year growth
- Sustainable cost reduction
- Improved quality
- Certainty of outcome
- Increased returns on invested capital
- Enterprise speed and agility

As businesses mature in implementing process management, the nature of how work is performed and improves is often revealed. This discovery happens while assigning accountability for the management of core business processes and developing mechanisms to integrate and align these processes. Rather than controlling performance of individual tasks, Process Owners find they need support from cross-functional teams who are also focused on process performance (see Figure 9.14). Instead of command

and control oversight, these teams may work relatively independently, with guidance and support from management.

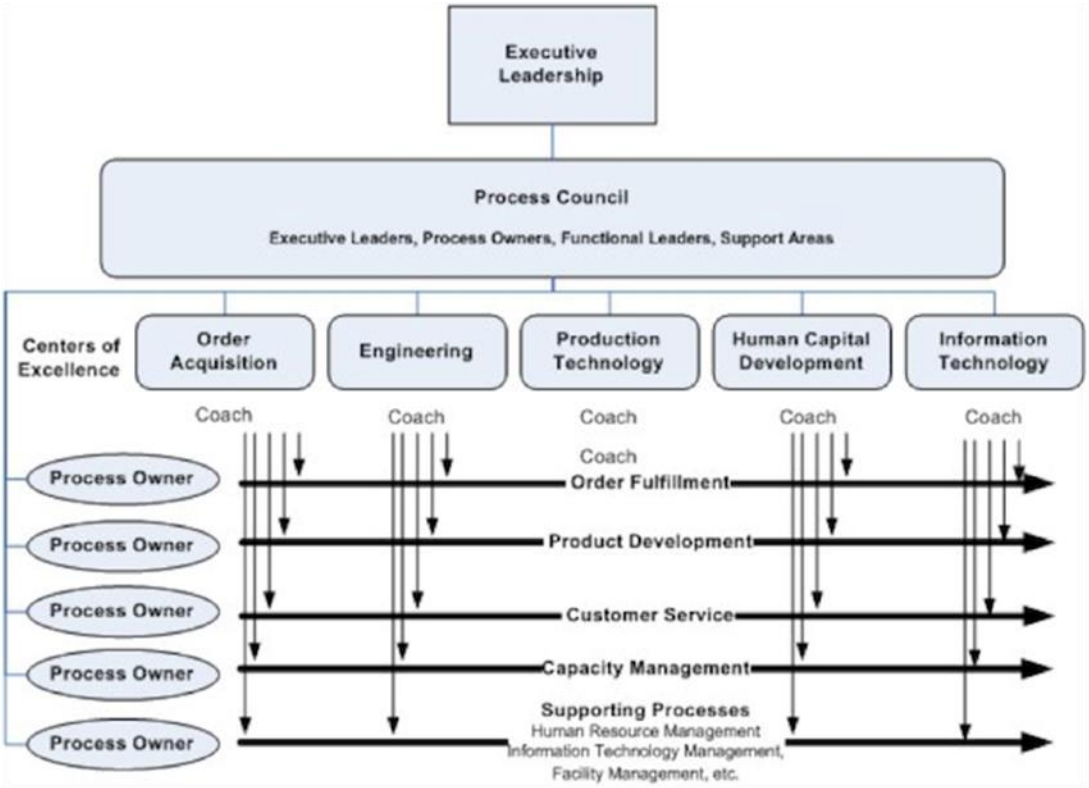


Figure 9.14 Cross-Functional Process Collaboration

Companies encounter a need for change in the required skills and culture of their organization as they gain experience in process management. They need to maintain and integrate new skills and professional expertise across all business processes. Specialized skills may have previously resided in a functional group of the enterprise. CoEs provide knowledge, standards, best practices, training, and education. They are responsible for ensuring the proper resources with proper skills are placed and allocated properly throughout the organization's business processes (see Figure 9.14).

When a CoE is a virtual organization, it may be called a *community of interest* (COIN). The CoE may consist of a simple email distribution list to connect all engineers, or maybe a robust, institutionalized group with large training facilities. Many CoEs are organized around a particular skill or profession, such as sales, marketing, finance, and information technology. Coaches may be assigned to business processes from the CoEs, with responsibility for supporting and developing members to ensure that the caliber of localized skills is maintained and enhanced. CoEs offer training and education programs as well as professional networking for sharing experiences. Some organizations use CoEs as an entrée for people into the organization; that is, they are hired by the center and deployed from the centers to process teams.

9.5.13 Building a Process-Oriented Organization and Culture Key Concepts

The following table shows key concepts for building a process-oriented organization and culture.

Building a Process-Oriented Organization and Culture Key Concepts	
Fostering a process culture	An enterprise fosters a process culture when business processes are known, agreed upon, communicated, and visible to all employees.
Characteristics of the process-maturing enterprise	As an enterprise matures in managing its business processes, its organizational structure will naturally tend toward change, which comprehends a process dimension. Management of work from a downward managerial command-and-control approach adapts to include a horizontal dimension reflective of end-to-end processes, driving accountability to the customer for delivery of value across functions.
Process Owner	An individual or group is assigned the role of Process Owner for a complete end-to-end business process. The Process Owner has an ongoing responsibility and accountability for the successful design, development, execution, and ongoing performance of this process.
Process supporting roles	Successful process management requires numerous roles in addition to Process Owner. Some individuals are responsible for more than one role. Common roles include: • Process manager • Process analyst • Process designer • Process architect • Business analyst • Subject matter expert • Executive management and leadership
Process governing body	For cross-functional and departmental process improvement or management programs to succeed, create a distinct process governing body like a BPM CoE to provide leadership and clarify decision rights.
Governance structure standards	While there are many governance structures (governing bodies) proposed and implemented, there is no single standard for creating an organizational focus on process.
Business Process Management Center of Excellence (BPM CoE)	A BPM CoE is a governing body made up of executive leaders, functional or department heads, and Process Owners. A CoE is one common approach to process governance. The BMP CoE: • Ensures alignment of business processes with enterprise strategies, goals, and objectives • May have responsibility to identify and resolve cross-process integration issues, conflicts between process and functional ownership • May have responsibility for allocation of BPM resources • Other names for governance bodies: ○ Process council ○ Business process management office (BPMO) ○ Community of interest (COIN) — virtual
Setting up a BPM CoE	• Attain executive sponsorship • Define goals and success criteria • Define governance structure • Establish a BPM Architecture • Set up BPM library and repository • Establish change management practice • Take process inventory

	• Prioritize process selection based on strategic objectives • Start executing BPM projects
BPM Professional	BPM Professionals must understand all potential organizational changes that result from increasing process maturity to effectively guide the organization through the transition.

Phase 4: Implement Changes

Since the *BPM CBOK Guide* is not prescriptive, it does not cover how to develop initiatives (phase 3) or how to implement changes (phase 4). However, the guide does follow the BPM life cycle phases to show BPM best practices for each phase. For the Implement Changes phase, following are the sub-phases an enterprise-level plan would follow, as shown in Figure 10.1.

- Implement organizational design and job role changes
- Implement process change and job training
- Implement technology go-live
- Stabilize technology and monitor process performance

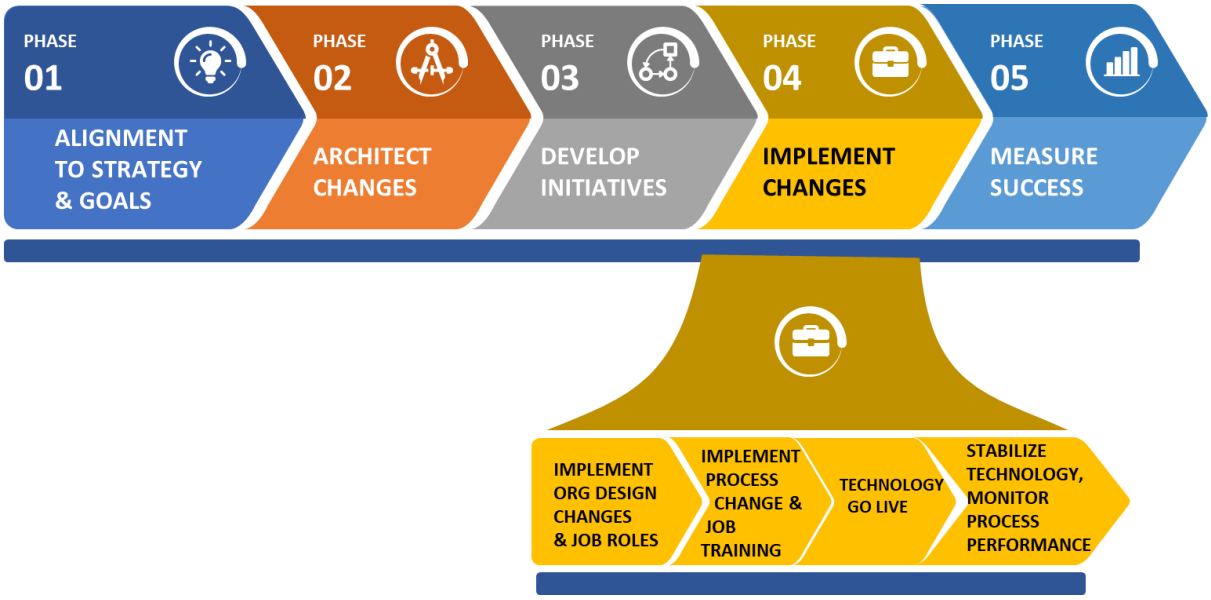


Figure 10.1 Phase 4 of the BPM Life Cycle

These sub-phases should be part of a larger project plan that includes all the major milestones, with detailed technology deliverables. A detailed implementation schedule is not included here simply because it would be highly dependent on the industry, company, scope of process changes, technologies chosen, and specific use cases.

This section simply serves to illustrate the sequencing of the phases in the BPM life cycle and provides a transition to phase 5.

Phase 5: Measure Success

Phase 5 occurs after initiatives are developed and process changes are implemented. During phase 5, organizations measure the success of BPM initiatives.

10 Enterprise Process Management

Enterprise Process Management (EPM) is a high-level, strategic assessment of the organizational process view that includes a high-level process analysis and performance evaluation. In contrast, BPM is process analysis and modeling at the detailed, business-unit level.

During BPM initiatives, organizations frequently run into problems when trying to spread process awareness and process thinking from a small group of consultants, or a BPM CoE, to their employees. That's why it's important that in any business or digital transformation using the BPM life cycle, for people to collaborate to reach consensus on the business change.

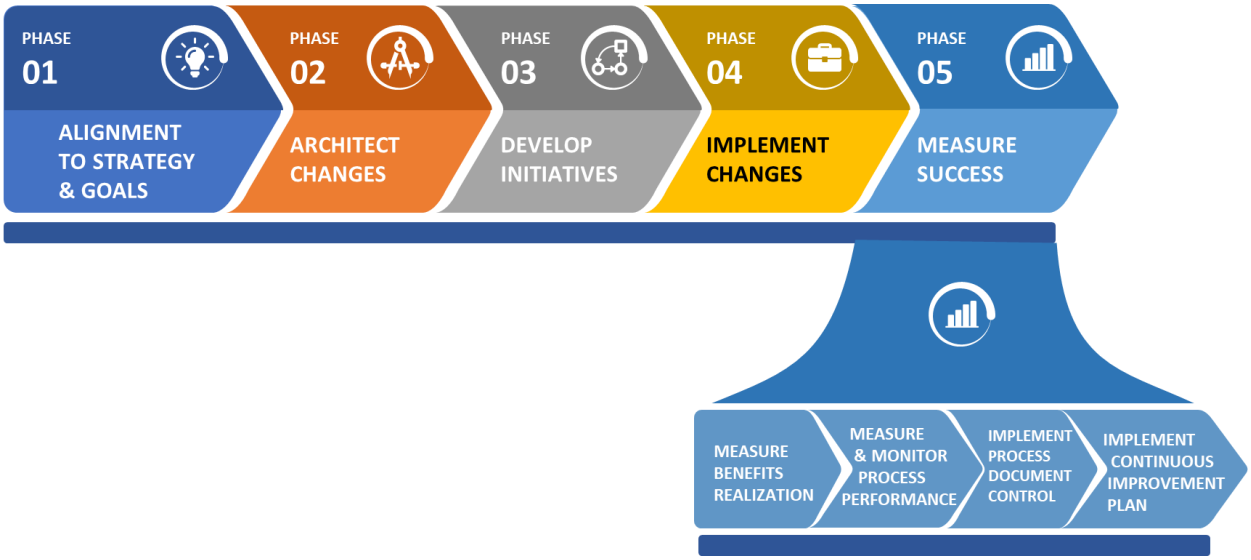


Figure 10.2 Phase 5 of the BPM Life Cycle

Helen Keller once said, "Alone we can do so little; together we can do so much." She was the first blind and deaf person to acquire a college degree. Her teacher, Ann Sullivan, helped her to communicate and Keller collaborated with her for forty-nine years until Sullivan's death. With the help of her companion, Martha Washington, Keller invented an early form of sign language, inventing more than sixty signs by age even. Keller wouldn't have accomplished any of this without Sullivan and Washington as collaborators.

Collaboration means to work with one another; to cooperate. Collaboration is the natural result of people interacting with one another, and the dynamic, often ad-hoc activities that ensue during business transformation. Innovation is often an output of effective collaboration, and when the events are repetitive, innovation can be turned into a process. Calculating ROI from collaboration is difficult because it is very dynamic and unpredictably inconsistent.

When a team of people is involved in changing or improving business processes, the team becomes centered around those processes. Collaboration creates an ecosystem, with the most vital part of that ecosystem being the effectiveness of the people collaborating.

Commercially available social platforms like Facebook, Instagram, and LinkedIn offer very simple social networking capabilities. There are online tools like Zoom and WebEx for sharing files in real time (via teleconference). Microsoft Project Server, Microsoft Teams, Smartsheet, and Slack are platforms for collaborating in *work* environments. Slack is free and has several add-ons that make it very competitive to Microsoft products. Slack add-ons include Asana, for team-based project management; Zapier for automation; and Todoist for to-do list actioning. The add-ons and no cost make Slack an attractive team collaboration platform. All of these tools are useful in enabling collaboration between people, companies, and geographies, so much so that meeting in person has become passé.

Fortunately, the majority of BPM vendor platforms now offer some form of collaboration (especially the cloud-based ones). These tools enable people from across the globe to model, analyze, design, and simulate business processes. Tools also allow teams to build a consensus of agreement on the goals and performance of the new business process before implementation.

As team collaboration has been proven to be effective within organizations, collaboration between organizations is now possible through many enterprise platforms like ERP, CRM, SCM, and BPMS. Moreover, organizations have widely begun to collaborate on shared processes. An example is supply chain management (SCM), which can be viewed as a set of collaborative, inter-enterprise processes involving organizations, people, systems and information. Analysis of supply chain processes affirms that employee, partner, and customer constituents are enmeshed, performing not just well-defined tasks. They are collaboratively solving complex problems like demand forecasting, inventory replenishment, and product development. There's a need to relate collaborative requirements to structured processes in these situations like outsourcing, managing inventories, improving auditability, and enhancing and speeding new product introduction within product life cycle management. Therefore, it's important to identify collaborative processes and understand that those business processes require multiple participants to engage, discuss, iterate, and decide before progressing to the next activity or phase of that business process. Customer and supplier collaboration is now possible within existing enterprise platforms like ERP, CRM, and SCM. Even though many of these platforms provide collaborative capabilities, there are still many processes that are not instantiated in those platforms. Those gaps allow for more innovative platforms, like iBPMS, to cover those additional business process to increase productivity, efficiency, and effectiveness — ultimately translating into more sales and reduced costs.

Collaboration is foundational for business (or digital) transformation to be successful, but there are other factors that must be addressed in aggregate.

BPM involves the transition from expressing strategy in general terms or in financial terms to expressing strategy in terms of observable cross-functional activity. This transition requires deliberation, planning, a shift in mindset, and a new set of leadership behaviors to support collaboration.

The shift in mindset involves a deep appreciation that the financial goals are simply the cumulative outcomes of the activities that the organization executes. For collaboration and Enterprise Process Management to be successful, encouraging the necessary exchange of ideas, didactic deliberation, and problem solving is required. Team interactions are needed during the BPM life cycle for business or digital transformation, especially when enterprise resources are limited.

The following factors underlie most successful major business transformations:

- A shared understanding of the definition of each enterprise-level business process, including details on where the process starts, where it ends, the key steps, and the departments involved
- Clarity and agreement on the critical few measures of performance for each process
- Acceptance of the estimates of current performance for each process
- Agreement on the size of the performance gap that needs to be bridged
- Agreement on the top priorities for improvement and allocation of resources
- Deep dedication and executive commitment to taking action
- A shared understanding of accountability assignments

Plans cannot be translated into action without a clear, shared understanding of the accountability for improving and managing the organization's major enterprise-level business process. It is worthwhile reiterating that in most organizations, no one person has authority or control over the entire set of activities in an end-to-end business process. Hence, the establishment of process governance is crucially important to drive customer centricity and collaboration at all management levels.

The final component in the planning stage is a solid communication plan that clearly communicates the enterprise process view, key accountability assignments, and the high-level goals to fully engage people in the organization.

Process management does not dominate or replace a business unit focus or the need for a functional focus. Instead, it represents an additional and valuable management practice that emphasizes the way in which an organization creates value for customers.

10.1.1 Definition of Enterprise Process Management (EPM)

Enterprise Process Management (EPM) assures alignment of the portfolio of end-to-end business processes and process architecture with the organization’s business strategy and resource allocation. It provides a governance model for the management and evaluation of initiatives.

It involves the deliberate, collaborative, and increasingly technology-aided definition, improvement, innovation, and management of end-to-end business processes that drives business agility.

10.1.2 Benefits of EPM

An organization creates value for its customers via the performance of its large, cross-functional business processes. These processes determine the way in which an organization design, makes, sells, delivers, services its products and performs its services. EPM is the means for the organization’s leaders to consciously and collaboratively improve and manage the flow of work in performing for customers.

Of course, there is much more to corporate success than just EPM. But EPM is an essential management practice for the leaders who want to satisfy customers and improve performance. EPM provides the means to better engage people, shift the culture towards a performance-based model, enable leadership, and facilitate growth. Nor does EPM dominate or replace a business-unit focus or the need for a functional focus. Instead, it represents an additional and valuable management practice that emphasizes the way in which an organization creates value for customers.

The essence of EPM is customer centricity and accountability for critical cross-functional processes and how they are performed. EPM calls for a different way of managing. A panel or council of executive-level Process Owners is required to deploy EPM operationally. The panel mindfully plans for improving and managing the large cross-functional processes.

Why should an organization engage in EPM? Aside from the obvious benefits of managing the organization's value chain, there are also fringe benefits in terms of engagement, leadership, and growth.

Process thinking can provide the needed context to engage the entire organization in executing on strategy. Leaders are beginning to recognize that worn-out phrases such as, "we are dedicated to growth," and "we put customers first" simply do not provide sufficient guidance to employees on what they can do to execute strategy.

The majority of employees are involved in activities such as developing products or services, selling, delivery, service, and so on. These activities are actually performed through collaborative cross-functional activities — or business processes — if you will.

By articulating strategic objectives in terms of the specific improvement needed for these cross-functional activities, organizations can better engage and even inspire employees to action.

Employees have difficulty identifying their roles in delivering on traditional financial measures of performance such as profit margin, cash flow, and asset intensity. Measuring what counts for customers is the essential ingredient of process management and provides a more relevant mechanism to engage employees and build a culture of discipline.

One of the more common criticisms of leaders by their employees is that they really don't know the business — at least not at the right level of detail. Again, the power of process thinking and the practice of process management at the enterprise level can enable leadership.

In the book, *Execution: The Discipline of Getting Things Done*, Bossidy, Charan, and Burck describe the following seven essential leadership behaviors.

- Know your people and your business
- Insist on realism
- Set clear goals and priorities
- Follow-through
- Reward the doers

- Expand people's capabilities
- Know yourself (2011)

To illustrate the potential that process thinking has for enabling leadership, just consider how process principles and practices can positively influence some of these behaviors.

Knowing the business involves understanding in detail the work and the roles of key departments and key people across the whole workflow as it crosses traditional organizational boundaries. Only then can leaders have sufficient knowledge to deliver best value to customers and shareholders. Many leaders do not appreciate the workflow at a sufficient level of detail, and that lack of understanding can detract from how value is created for customers. That is where business process definition and management come into play, for they require depth of involvement in the workflow.

By looking at the organization from a customer's point of view and measuring performance in terms of the timeliness, quality, and cost of products and services provided to customers, executives become better equipped to *insist on realism*. That is precisely what customers care about — a flawless product delivered on time, complete, and defect free. Customers have no personal interest in how a company is organized.

The business process view also assists executives in *setting clear and realistic goals and priorities*. People value plain speaking. They appreciate the clear goals and priorities that process thinking enables and the guidance it provides on their roles within the context of the organization.

Another of the potential benefits of seeing and understanding the organization in the context of its cross-functional business processes has to do with *rewarding the doers*. Expressing priorities in broad, cross-functional process terms can be instrumental in acknowledging the people from different departments who make significant contributions to the creation of value for customers in observable, measurable terms.

A less well-known fact is that process thinking is also essential to growth.

Michael Treacy emphasized in *Double-Digit Growth* that most management teams are adept at meeting cost targets or shaving 10% from the expense base or improving an individual process — but are far less able to plan and execute double-digit growth. Why is that? Treacy argues that organizations often lack the tools and management disciplines to tackle growth in a structured, systematic way. And that's part of the answer. But the other part is this: rapid, sustainable growth requires not just a systematic approach but also a systemic view and broad cross-functional collaboration (2003).

A focus on process and process metrics such as flawless delivery and *first-time-right* responsiveness are essential in providing existing products or services to either existing or new markets. Of course, that is not all there is to fueling growth. An organization can have outstanding performance in terms of delivery and responsiveness and yet fail to grow because the features of its product or service no longer meet customer needs or the offering is priced well above competitive offerings.

In order to achieve flawless delivery and service, organizations must measure and manage the performance of the large cross-functional processes that deliver value to customers. For most organizations, this involves the definition, improvement, and management of the product or service fulfillment process.

The other half of the growth equation involves the development and introduction of new products or services to either existing or new markets. Here the organization's aptitude in new product or service commercialization comes into play, in addition to flawless delivery and *first-time-right* responsiveness.

Successful, sustainable growth demands that an organization measure, improve, and manage its performance with respect to at least two key processes: order fulfillment and new product or service development.

10.1.3 Requirements of EPM

Michael Porter is credited with introducing the concept of interoperability across an organization's entire value chain in 1985. This concept is fundamental to EPM. While most organizations are structured according to traditional functional departments, EPM demands that the entire value chain involved in providing customers with products and services be defined, improved, and managed in an integrated way. This new paradigm requires a shift in the traditional functional mindset that dominates management thinking and the so-called *silo effect*, in which each functional unit is concerned with only its processes and coordination is lacking.

The role of measurement is indispensable to maintaining a customer-centric focus and assuring accountability for the performance of the organization's large cross-functional business processes.

In EPM, the focus is on measuring what counts to customers — from the customer's point of view. For most organizations, measuring includes metrics of quality, timeliness, completeness, accuracy, and responsiveness for the product and services provided.

For example, the Supply Chain Council has defined the concept of *perfect orders* as performance, "in delivering: the correct product, to the correct place, at the correct time, in the correct condition and packaging, in the correct quantity, with the correct documentation, to the correct customer" (APICS 2017).

The fundamental objectives of developing an enterprise view of process management are then to:

- Define the large cross-functional business processes that deliver customer value
- Articulate the organization's strategy in terms of its cross-functional business processes
- Assign accountability for the improvement and management of the organization's cross-functional processes
- Define the performance measures that matter to customers
- Define the organization's level of performance in terms of these customer-centric measures

In order to implement the above there are three essential deliverables; a customer-centric measurement framework, an enterprise-level process schematic, and an enterprise-level process improvement and management plan.

10.1.4 Customer-Centric Measurement Framework

A customer-centric measurement framework includes aspects that relate to new product introduction, product and service delivery, and service responsiveness. While the details vary based on the specifics of the organization, there are a number of commonalities. The table that follows shows typical components of an enterprise-level measurement framework.

Process	Output	Metrics	Indicator
Develop new product or service	Product or service introduction	• Time to market • Variance to promise date	TBD
Deliver product or service	Product or service to customer	The correct product or service, to the correct place, at the correct time, in the correct condition and packaging, in the correct quantity, with the correct documentation, to the correct customer	TBD
Respond to customer inquiry	Solution	• First-time-right responsiveness • Variance to promise date	TBD

10.1.5 Process Portfolio Management

Process portfolio management is an essential component of governance. A process portfolio is a consolidated view of the complete landscape of an organization's business processes. It allows for coherent treatment of the entire set of processes, so they can be improved in total, rather than streamlining one while unknowingly, sub-optimizing others (Rosemann 2006). Process portfolio management recognizes that improvement priorities need to be viewed on a portfolio basis. Accordingly, it ties the enterprise together from a funding priority and integration perspective. It provides a method to evaluate and manage all enterprise processes in a consolidated view. Process Performance Measurement provides a framework for process governance with respect to the management and evaluation of initiatives.

10.1.6 Enterprise Process Improvement and Management Planning

For some time now, there has been a debate on what's more important, strategy or execution? What matters today is that execution is tied to strategy and execution is more important. The Japanese have a saying, "Strategy without execution is a dream."

However, you can't execute flawlessly in the absence of a clear strategy. Nor can you do it in the absence of a process view of the organization on an end-to-end basis. That is why the creation of process governance at the enterprise-level view of business processes is vital.

In spite of a great deal of attention focused on the essence of strategy and execution, relatively little has been written on the benefits of defining and executing strategy in a process context. Yet, many would agree that it is the set of enterprise business processes that defines how work is done and creates value for customers and shareholders.

The combination of a customer-centric, enterprise-level measurement framework and an enterprise-level process schematic permits the leadership of organizations to define the size of the gap between current performance and desired performance for its large cross-functional processes. Then it is possible to answer the question, "Which of our core processes need to be improved and by how much in order to achieve strategic goals?" That's what enables execution. It is the answer to this question that pays significant dividends in terms of linking strategy to execution.

Of course, aligning processes with business strategies implies that adequate definitions of the organization's strategies have been developed. This can be problematic.

However, for an organization to take action on the improvement and management of its enterprise-level processes, it is essential to assign accountability for the performance of these processes. Accountability is a larger challenge than it would seem at first since most companies continue to be structured according to functional or departmental lines.

The two most common methods of establishing process governance via the assignment of accountability for process ownership involve either assigning accountability for the ownership of the process as an additional responsibility to a senior functional manager or creating a staff position as a Process Owner (also called process steward).

In both cases, the role of the Process Owner is to monitor the performance of the enterprise-level process and lead efforts in improving and managing the process to deliver value to customers. For many mid-sized and large organizations, the key cross-functional processes are so large that no one executive can have *control* over all the resources involved in delivering value to customers. That is why the establishment of a process governance structure made up of a panel of executives is an effective approach in many organizations. These executive Process Owners are tasked with the measurement, improvement, and management of the organization's processes.

The Process Owner needs to carry out an assessment of the process in question in much the same way as was done for the set of processes at the enterprise level. The assessment includes activities outlined in the following table.

Step	Activity Description
1	Define the critical few measures of performance from a customer's point of view.
2	Define the triggering events, inputs, key steps, results, and critical metrics for the process.
3	Assess the organization's current performance for the process that directly creates value for customers.
4	Determine the level of desired performance for the process by expressing strategic and operating goals in process terms.

5	Assess the size of the performance gap between the organization's current and desired performance for this large cross-functional business process.
6	Develop an improvement and management plan that clearly indicates the desired scope of process improvement, the relative priority, and accountability for action.
7	Communicate the plan, engage and inspire people to take action, and conduct training on a common approach.

Process Owners require some leverage in order to carry out their assignments. Some organizations assign the IT budget for the introduction of new technology to the Process Owner as one means of providing this leverage. In other instances, the discretionary component of executives' and managers' bonuses has been modified to allocate 20–30% of that bonus to measurable success in improving the organization's business processes.

One of the effects of globalization has been an increase in the incidence of outsourcing. In some instances, organizations may decide to outsource or offshore an entire business process, such as production. In other cases, a set of activities, or a group of people — such as the call center — might be outsourced or taken offshore.

10.1.7 Process Repository Management

While the concept of a process repository is covered in Chapter 4, it is treated here as a critical component of EPM. A common repository of business processes provides a central reference location to ensure consistent communication of what the process is, how it should be applied, who is responsible for its successful execution, a clear understanding of the inputs or triggers, and expected results upon process completion. A repository maintains information needed to adequately define, measure, analyze, improve, and control business processes. It helps to promote and support the understanding and acceptance of the cross-functional nature of many of the enterprise's business processes. A central process repository facilitates collaboration across functional business units by enabling and enforcing a methodology that focuses on the end-to-end process.

A central process repository contributes to the success of the enterprise's business process strategy by providing a blueprint to manage and control how process change is introduced and implemented in the enterprise. It also becomes the system of record for information on process ownership, technological enablers, and business rules and controls, both financial and operational. It may serve primarily as documentation about the enterprise's business processes. Or it may be used to simulate various scenarios to evaluate process improvements and to detect and analyze problems. The repository can also be used to identify and validate the appropriate solution. Sophisticated repositories can be interfaced with the enterprise's applications to enforce defined business rules.

10.1.8 BPM Process Maturity

Process maturity is how close a process is to being complete. In Chapter 5, the section called *Assess Business Process Maturity* covers assessment of process maturity. The section called *Organizational Process Management Maturity* talks about maturity levels from an organizational perspective.

The examination of maturity levels in process models includes the identification of a number of known success factors. Within each of these factors are suggested questions organizations should examine in order to assess their overall level of BPM maturity. These factors and corresponding questions are shown in the following table.

BPM Maturity Assessment Questionnaire
Organization
• Does your organization have a process-centric approach? • Is your organization customer focused? • What is the level of process awareness and emphasis?   ○ Among management?   ○ Among stakeholders?   ○ Among employees? • What is your level of process management success?
Process Definition (Organizational Scope)
• Are processes defined? • Are processes documented? • To what extent are processes documented? • Is process success dependent on individuals or teams? • Are defined processes standardized across the organization?
Process Responsibility (Accountability)
• Have process responsibilities been defined? • Who is accountable?
Process Sponsorship
Who are the primary sponsors of defined processes? • Top management? • Middle management? • Departmental? • IT?
Process Measures
• Have process measures been defined? • Have process measures been used? • Have process measures been planned?
Process Awareness (People Involvement)
• Do your employees and management think in processes? • What is the level of people involvement in process definition?   ○ Analysis?   ○ Process improvement? • What level of change management methods has been deployed? • Has continuous training been aligned with processes?
Process Alignment
• Are process goals aligned with defined business strategies? • Are processes aligned with organizational goals? • Are job descriptions aligned with process definitions?

- Are employee evaluations linked to processes?

Information Technology

- Does IT management use BPM for its processes?
- Are BPM support applications defined and employed in key processes?
- Does management use BPM applications to support performance monitoring?

Methodology

- Are BPM tools, process methodologies, or process frameworks used?
- Are they successful?

The list simply represents a sampling of questions organizations can use to begin assessing their BPM maturity. Answers to these and similar questions can provide some insight on an organization's BPM maturity level. A BPM maturity assessment helps reveal which factors may need improvement and which factors can be leveraged to advance to a higher BPM maturity level.

10.1.9 Revisiting the Balanced Scorecard

The balanced scorecard (BSC) is a strategic planning and management system that organizations use to do the following:

- Communicate what they are trying to accomplish
- Align the day-to-day work that everyone is doing with strategy
- Prioritize projects, products, and services
- Measure and monitor progress towards strategic targets (Balanced Scorecard Institute, n.d.)

See the *Balanced Scorecard* section of Chapter 7 on Process Performance Measurement for details about how a balanced scorecard approach can be used to measure process performance.

10.1.10 EPM Best Practices

When aligning business processes to strategy, first, look at the organization from the customer's point of view. This method will help change the typical inside-out view of the organization that the traditional, functional paradigm promotes. Seeing from a customer's point of view will help you identify the critical measures of performance that reflect a customer's particular requirements.

Then, try not to call the end-to-end processes by the same name used for business-unit processes. Use the list of value streams (or adaptations) to focus on a process-oriented view — new names help people see things in new ways.

Next, be clear on the definition of each end-to-end process. Clarify where the process starts, the key stages in the process, the departments involved, the output, and the major measures of process performance. Have internal experts prepare a draft schematic. The top-level team can then review and refine the plan. But make sure there is full commitment and ownership at the top level.

Finally, do it quickly. Don't take weeks or months, hoping to get it perfect. It will never be perfect. A few weeks of data gathering and a couple of days off-site is all that is needed to develop a workable set of level 1-3 business process models that will serve as a basis for next steps.

Once the top team has reached a shared understanding of the components of its own enterprise-level process model, the next step is to do the same for the organization's current level of performance on a few critical metrics. This information gathering typically involves getting real data on a set of measures around the timeliness, quality, and cost of product or service delivery, and other key aspects of the organization, such as developing new products or services.

One might think that getting data on the organization's current performance should be easy. In reality, it can be quite problematic. While most companies have a ton of data on revenues, margins, earnings, and cash flow, data on qualitative factors such as on-time delivery, accuracy, responsiveness, and completeness are sometimes difficult to assemble. To gauge current performance, become a customer and order a product or service (on a dummy account). Take lots of notes on the experience and track what you as a customer would complain about. The experience will provide a wealth of insight into the customer experience and pain points of the process. The guiding principle of "do it yourselves and do it quickly" applies here. Sampling is recommended whenever data is not readily available from existing information systems.

There is a twofold value in assembling and assessing this type of current performance data. First, it facilitates an objective and shared view of how the organization is performing when set against customer requirements. Second, it sets the baseline for the subsequent assessment of the size of the gap between the current level of performance and desired level of performance.

At the top team level, there are several major pitfalls to avoid in reaching a shared understanding of how the organization is performing against customer requirements.

- **Lack of candor.** Lack of honesty in measuring what customers really want is the first pitfall.
- **Data validity.** The second pitfall encountered is far subtler and, therefore, more problematic. It often starts when one or several members of the leadership team vehemently challenge the validity of the data on current performance. This lack of buy-in is difficult to assess and even more complex to address. To mitigate this, it is useful for the leader to ask each member of the top team to articulate his or her acceptance of the data on current performance.
- **Wrong level of detail.** This third pitfall can occur when leaders want to dive into a discussion of the *as-is* conditions versus *to-be* optimized and improved processes. Considering the wrong level of detail can deter and defer high-level strategic discussions, which are vital at this stage.

Once a shared understanding of the definition of the organization's enterprise-level business processes and its current performance has been achieved, the top team can then proceed to build a plan that will improve and manage the organization's large, cross-functional business processes.

Such a plan needs to answer two fundamental questions: Which of our business processes need to be improved, and by how much, in order to achieve our strategic objectives? Secondly, who will be held accountable for this planned improvement and management?

The role of Process Owners extends far beyond the simple monitoring of business process performance. To convert plans into action, Process Owners need to collaborate on critical process improvement projects. Close collaboration among members of the process panel is a critical factor in the success of large, cross-functional process improvement efforts. The following table outlines behaviors for success

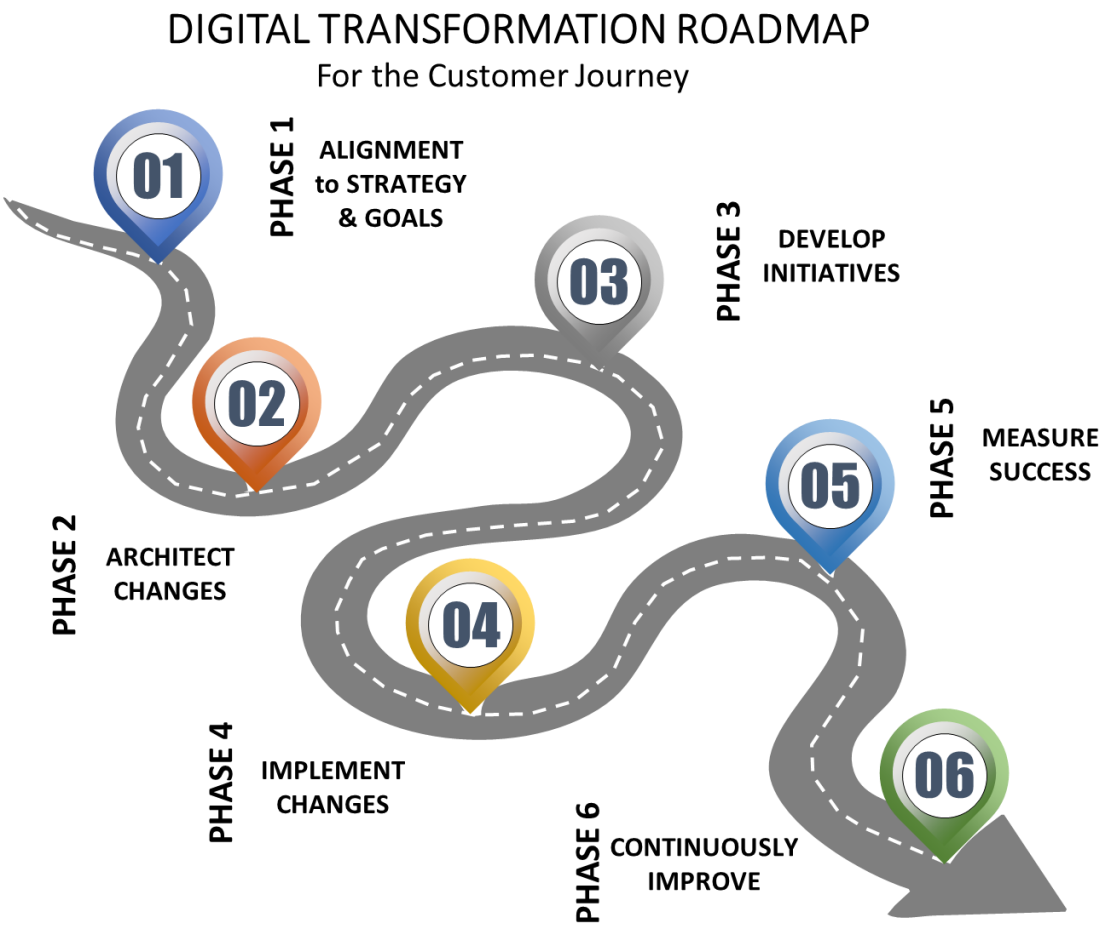
of large, cross-functional process improvement efforts organized by project phase. The table can be used as guidance for principled leadership behaviors of Process Owners.

Leadership Behaviors of Process Owners
Definition
• Agree on process boundaries • Set clear improvement goals • Appoint the best people • Identify realistic constraints • Set a clear schedule • Charter to implement, not just to design
Analysis
• Understand the flow of work in a cross-functional context • Agree on the size of the performance gap • Gain clarity on key issues, disconnects, opportunities • Insist on the prioritization of issues based on impact • Refine working team membership if needed
Design
• Probe to test the vision for the new design • Understand the cross-functional implications of how business should be conducted in the future • Gain clarity on the matrix of performance measures • Constructively challenge the recommendations for change
Implementation
• Process Owners chair meetings with process management teams throughout implementation • Conversation and awareness of cross-process dependencies increase • People begin to assign their loyalty as much to process as to function or business • People are aware of the progress in closing the gap between current and desired performance • There is a visible improvement in cross-department collaboration.

10.1.11 Transformation Is a Journey, Not a Destination

Overarching points in the *BPM CBOK Guide* to remember:

- Business and digital transformation must focus on the customer journey.
- It's all about the processes that create value for the customer.
- Strategy matters only when it can be executed to create value for the customer.
- People matter the most in a process-focused culture
- When you follow the BPM life cycle, it doesn't end at phase 5. It starts all over again in phase 6.
- Embrace change and have fun!


DIGITAL TRANSFORMATION ROADMAP
For the Customer Journey
01
PHASE 1
ALIGNMENT to STRATEGY & GOALS
02
PHASE 2
ARCHITECT CHANGES
03
PHASE 3
DEVELOP INITIATIVES
04
PHASE 4
IMPLEMENT CHANGES
05
PHASE 5
MEASURE SUCCESS
06
PHASE 6
CONTINUOUSLY IMPROVE

10.1.12 Enterprise Process Management Key Concepts

The following table shows key concepts for Enterprise Process Management.

Enterprise Process Management Key Concepts
• Enterprise Process Management (EPM) assures alignment of the portfolio of end-to-end business processes and process architecture with the organization's business strategy and resource allocation. It provides a governance model for the management and evaluation of initiatives. • EPM is an essential management practice that provides the means for an organization to create value for its customers. • The role of measurement is indispensable to maintaining a customer-centric focus and assuring accountability for the performance of the organization's large cross-functional business processes. • EPM has three essential requirements: ○ A customer-centric measurement framework   ○ An enterprise-level process schematic   ○ An enterprise-level process improvement and management plan • Business processes must be associated to a clear strategy. • Successful process governance requires clear ownership and accountability assigned for each process. • The role of the Process Owner is to monitor performance and lead the improvement and management of the processes. • Process Owners must be given the means necessary to successfully manage the process. • EPM can engage the entire organization in executing on strategy by clearly defining and communicating the means to accomplish it. • Process principles and practices positively influence leadership behaviors such as knowing the business, insisting on realism, setting clear and realistic goals and priorities, and rewarding the doers. • Process thinking is essential to business growth. • Each end to end process must be clearly and uniquely defined. • Avoid these three pitfalls: ○ A lack of candor in measuring what customers really want   ○ Members of the leadership team challenging the validity of the data on current performance.   ○ Working at the wrong level of detail • Enterprise Process Management involves the transition from expressing strategy in general terms or in financial terms to expressing strategy in terms of observable cross-functional activity and requires a shift in mindset and a new set of leadership behaviors.

11 Appendices

Appendices included in this guide include:

- Appendix A: **The BPM Competency Model**. Table that lists the core competencies required for progressive roles within the BPM discipline.
- Appendix B: **ABPMP BPM Core Curriculum**. Describes a model training curriculum for BPM Professionals.
- Appendix C: **ABPMP Code of Ethics**. For acceptance and signature by BPM Professionals.
- Appendix D: **ABPMP Standards of Conduct**. For acceptance and signature by BPM Professionals.
- Appendix E: **Chapter References**. List by chapter of works cited in the guide.
- Appendix F: **Glossary**. BPM terms and definitions.
- Appendix G: **Contributors**. Industry experts who have contributed to the *BPM CBOK Guide*.

11.1 Appendix A: ABPMP BPM Competency Model

www.abpmp.org

Equivalent Business Title	Process Analyst	Process Architect	Chief Process Architect
Primary Responsibilities	• Applies Business Process Principals in the analysis of As-Is business operations and the creation of To-Be business operating models • Creates Business Process Artifacts	• Leads Process Transformation and improvement Teams • Builds collaborative teams • Leverages BPM techniques, concepts and tools • Proactively assists business managers in identifying and evaluating opportunities for improvement. May lead some performance improvement initiatives absent a business owner • Performs administrative tasks – including staff evaluation, project estimation and planning, project budget expenditure	• Leads Process Architecture organization or department within enterprise • Advises Executive Management on strategy impact on processes, business and economic profit model • Structures, develops and manages the BPM governance and capability across the organization • Overseas the development and usage of the process knowledge repository • Ensures process stakeholders engagement and appropriate change management • Manages/advises multiple concurrent performance improvement projects • Monitors and evaluates the use of new business transformation tools and emerging techniques and methodologies • Responsible for project benefit delivery • Proven understanding of where and when traditional and BPMS IT application development/ generation applies to enterprise
Background			
Education/ Certification	• Undergraduate degree • *(or equivalent work experience)* • Certified Business Process Analyst (CBPA) from Association of Business	• Masters Degree *(or equivalent work experience)* • Certified Business Process Professional (CBPP) from Association of Business	• MBA Degree (optional, but preferred) • Certified Business Process Leader (CBPL) from Association of Business Process Professional (or equivalent work experience)

	Process Professional *(or equivalent work experience)* preferred • *Lean/Six Sigma green belt certification (optional but preferred)*	Process Professional *(or equivalent work experience)* • Continuing Education CPU's in Process Architecture topics • Cross-functional facilitation and coordination • Proficient in at least 2 recognized methodologies • Author of published articles and whitepapers on Process Architecture-related topics (optional but preferred) • Certified Business Architect (optional) • Lean certified or Lean /Six Sigma black belt certification (optional) • PMI PMP certification or equivalent years of experience in competency (optional but preferred)	• Leadership Training • Cross-functional facilitation • Executive level communication • Public speaking • Proficient in more than 2 recognized methodologies • Lean certified or Lean /Six Sigma Master Black Belt (optional but preferred)
Work Experience	• Entry level – 5 years of active involvement in process engagements • Development of process artifacts and deliverables	• 7 years of active in process and performance improvement engagements • 2-3 years demonstrated leadership on small-to-medium process and performance improvement engagements • Demonstrated ability to plan and manage a full budget for a project schedule • Demonstrated proficiency of BPM, Change Management, and other methods that are part of a collaborative team • Demonstrated understanding of general business operations and economic profit model of enterprise	• 10 + years of active involvement in process and performance improvement engagements • 2-3 years of demonstrated leadership in large cross-enterprise engagements • Proven ability to work with all levels of management in the enterprise • Proven proficiency in Executive level communication from a cross-functional business operational perspective • Demonstrated competency in translating corporate business strategy into a process based operational improvement plan

		• Proven ability to work with disparate groups of people at all levels in the enterprise	• Consistently deliver successful projects with proven return on investments realized
Equivalent Business Title	**Process Analyst**	**Process Architect**	**Chief Process Architect**
Business Process Management Competencies			
Process Modeling, Analysis & Design (New Solution Design)	• Process Modeling and Analysis – Independently participate in As-Is discovery and analysis – Independently participate in To Be design and its iteration – Participate in To Be modeling simulation – Activity based costing – Lean analysis – Customer Experience analysis – Process optimization analysis • Assist in business value & ROI assessment	• Advanced Process Modeling and Analysis • Lead interviews and workshops • Lead As-Is process analysis & design • Lead To-Be business design • Activity based costing • Process simulation • Process optimization • Design and assist in implementation of performance measurements • Lead business improvement and any relevant business application requirements definition • Direct business value & ROI assessment • Lead project success measurement against goals • Manages business process design reviews • Sequences and assigns business process design work among process architects • Prepares, presents and obtains approval of business cases for process architecture from stakeholders	• Build collaborative teams and customize project methodologies for each project • Lead business transformation team that guide: – Process analysis & design – Activity based costing – Process simulation – Process optimization • Lead business value & ROI assessment and realization • Detailed understanding of how IT applications are built and interfaced • Detailed understanding of how BPMS applications are built • Ensures that all levels of business management understand how the transformation will impact their functional area interests based on their role in the company The repository responsibility is not covered much at all in the capabilities. I believe there are number of related capabilities that should be included in the modelling section

		• Understanding of rules capture and coding • Understanding of process and workflow streamlining, problem resolution, change management and relevant BPMS tool use	
Process Methodology	Value Chain Analysis (cross functional process mapping) • Linking business strategy to process architecture Process Improvement • Process Scope assessment • SIPOC • Value Stream Mapping • Rummler Brache, Lean, DMAIC • Waterfall business transformation	Value Chain Analysis (cross functional process mapping) • Linking business strategy to process architecture Understanding Process Improvement & Enterprise Architecture Frameworks • Rummler Brache, Lean, DMAIC, Six Sigma • Business Process frameworks SCOR, APQC PCF and/or Enterprise Architecture (Zachman, TOGAF) frameworks & principles) • Understanding of how Change Management integrates into the overall transformation initiative	Value Chain Analysis (cross-functional process mapping) • Linking business strategy to process architecture Applying Process Improvement & Enterprise Architecture Frameworks • Rummler Brache, Lean, DMAIC, Six Sigma • Applying an integrated Change Management methodology in the overall transformation initiative • Creating composite methodologies from the different specialized discipline methodologies that collaborative teams require
Process Measurement & Management (Performance Measurement)	• Understand Process Measurements (common metrics to include cycle time, utilization, cost, defect rates, quality of output) – Focus on what metrics to capture and how to capture them • Ability to identify where in a process or workflow performance should be measured • Ability to use Simulation Modeling to identify work choke points • Ability to construct performance measurement formula	• Understand advanced Process Measurement (tying value chain processes to corporate performance metrics) • Focus is on what to do with the captured metrics • Strategic Process Management & Methods • Process Benchmarking • Ability to design and develop process measurement analytics and supervise the construction of the analytics tools • Ability to identify problems and create resolution/mitigation models and measure	• Applying value chain processes to corporate performance metrics (Advanced Process Measurement) • Applying unique value and performance evaluation models to leverage captured metrics • Creating and implementing a sustainable process governance model to ensure adoption of process measurement • Apply Process Benchmarking to focus on what to change and how to improve • Applying Strategic Process Management & Methods in a governance model

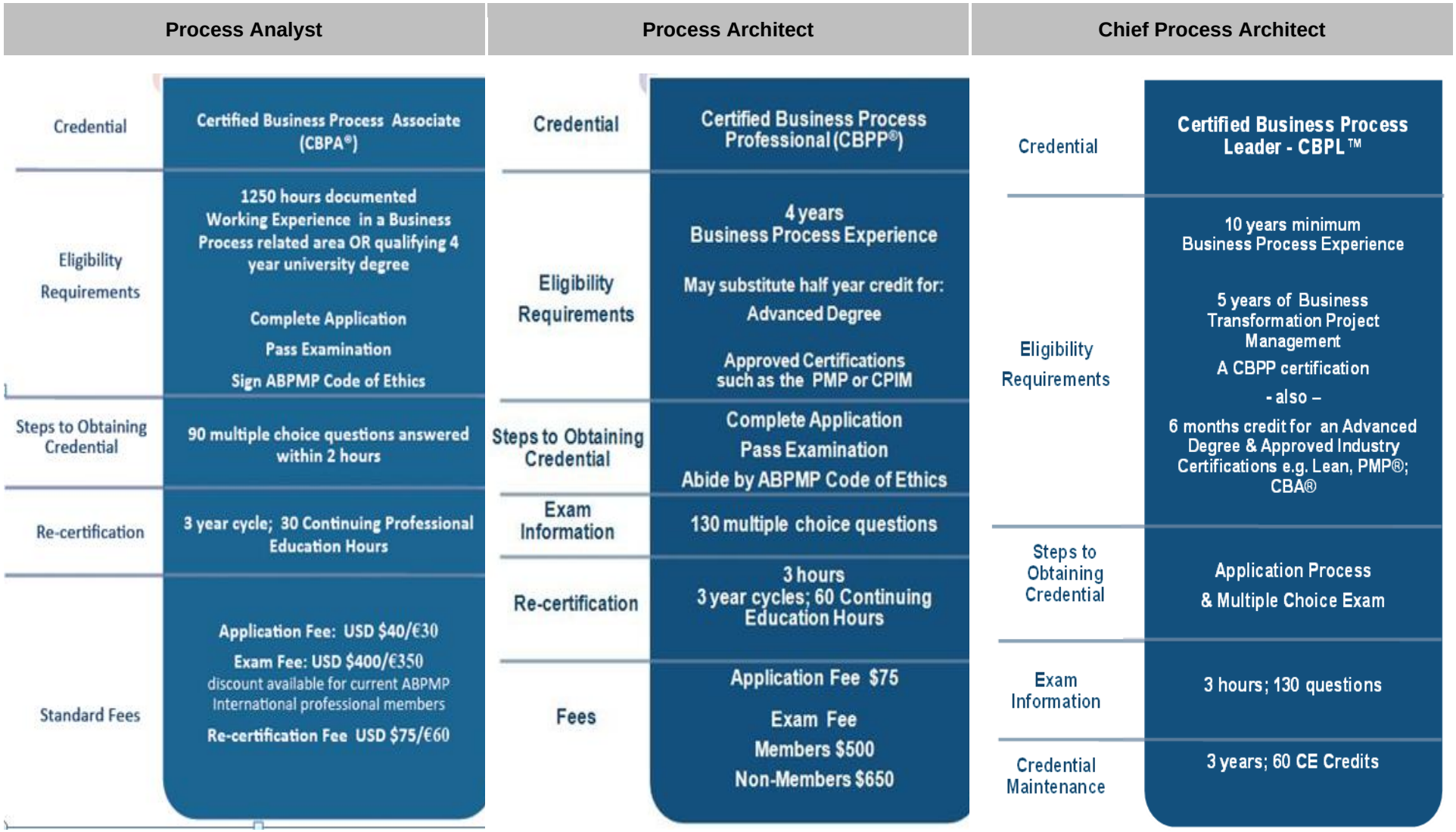
	• Understand when and how to use simulation to measure performance improvement • Understands the project requesting process and the information that is needed to support requests	for resolution against performance standards, etc. • Works with business managers to create project requests	• Leverage Process Benchmarking to create customized process evaluation standards • Ability to leverage advanced analytics in designing and creating flexible Business Intelligence tools as part of business transformation solutions and Process Performance Measurement
Change Management & Facilitation	• Understanding of Change Management methods and techniques used in the industry • Understanding of Industry Roles & Responsibilities that integrate into transformation practices related to process management • Understanding of company change management policies • Ability to apply change management company change management practices to project and in all interactions with internal project clients	• Applying Change Management methods and techniques used in the industry • Applying company change management policies in planning and estimating projects • Understand when to apply change management principals and when they are not needed • Ability to design, plan, and conduct Organizational readiness and assessments (Note: determine what amount of change an organization can absorb for implementation phases) • Understanding and utilization of facilitation capabilities to plan and manage the Stakeholder transformation • Identify training needs for business operation changes and obtain and schedule training and competency testing • Develop mentoring programs for changed business activity • Develop communication plans that will facilitate the planned changes • Ensuring successful change management by evaluating benefit realization	• Leading and Implementing Change Management methods and techniques used across industries • Applying Advanced change management processes - Organizational readiness and assessment (how to determine what amount of change an organization can absorb for implementation phases) • Lead and Facilitate the transformational effort which includes influencing stakeholders in the prioritization, approach and implementation of change management in their business areas

		• Develops mitigation strategies for cross-organizational impacts for process improvement projects	
Technology	• Understand how BPMS tools are used • Understand the business modeling symbology in the latest version of BPMN or newer version • Ability to use BPM modelers to create process and workflow models • Ability to use simulation tools • Understand the use of rules engines and how to enter rules • Ability to use project planning and tracking tools • Understand document management technology and how it will be used in new process or workflow solutions • Understand big data concepts and how it will be used for research, customer experience management, and information mining	• Ability to define roles and access rights to the BPM tools – working with the BPMS administrator in IT • Ability to manage the capture of information in the BPM tools and review models for compliance with standards • Ability define and set up standards in the project for BPMS use in modeling, rules capture, information capture, performance measurement and simulation information entry • Ability to work with the data architects to define dataflow, data transformation, interface needs and sources for all information • Ability to work with IT to define document management needs for the project and set up a document management repository • Ability to work with doc • Understand digital mobility application use and development • Understand emerging technology and how it can be used – e.g. cloud computing, mobility computing, the Internet of all things • Ability to review project plans and help the project manager define technology needs • Ability to work with the solution project manager and it to determine the best approach for the technical support side of a solution	Communicate at an Executive Level: • How BPMS tools, data schemas, interfaces (SOA), and other technology works – what it does, what it takes to make it do it. • Communicate and effectively interact with IT staff about the use of technology in solutions • Utilize the approaches being used by the IT group to build applications and to support BPMS application generation and translate into the appropriate level of business “speak” for effective adoption of the technology. • Assess and Recommend the impact of different technology options of the solution’s (such as the use of mobility computing, or cloud use) impact on the business transformation. • Familiar with common enterprise technologies like ERP, CRM, SCM and how they fit into Enterprise execution of Strategy. • Familiar with newer technologies like AI, Machine Learning, Deep Learning, RPA, Blockchain, and how to apply them to business scenarios.

		• Familiar with newer technologies like AI, Machine Learning, Deep Learning, RPA, Blockchain and how to apply them to business scenarios.	
Equivalent Business Title	**Process Analyst**	**Process Architect**	**Chief Process Architect**
General Business Competencies			
Individual and Leadership Behavior	• Understands business and how it works – understands the business operation of the company • Understands business direction, corporate strategy, goals and objectives • Understands how Business Architecture, Process Architecture, Enterprise Architecture, Change Management and workflow management all fit together and the models that define them • Demonstrates understanding of intrinsic drivers that influence customer behavior • Demonstrates an understanding of the potential for consequences to the organization as a whole related to problems and the need for effectiveness and efficiency • Ensures new business process designs and changes to process designs align to corporate strategy • Maintains business objective and customer goal balance	• Understands the different roles that are needed in projects and how to integrate them into a collaborative team • Prioritizes and escalates process improvement and performance decisions • Scans internal and external environments for emerging business techniques and tools • Advocates a focus on customer and internal business needs • Understands how to balance time, cost and scope in project planning and solution design • Understands and applies the concept of “do that which is most important first” in planning for process improvement • Understands that change is disruptive and works with business managers to a minimize the disruption caused by the project implementation • Nurtures strong collaborative relationships across the entire organization • Able to create cost benefit analysis and investment plans	• Works with Senior Executives to proactively identify opportunities for transformation and improvement in both process and workflow • Works with Business Managers to define how strategy will impact process and at a lower level workflow in business units • Leads large cross-organizational business process design initiatives with complex integration issues and potential for significant organizational impact • Motivates teams and identifies ways to improve the organization’s service capabilities • Represents Process Architecture in strategy sessions • Sets direction for Process Architecture within the organization • Educates leadership on the benefits of a well-managed process organization • Ensures Human Resources (HR) policies • support Process Management practice • to insure top talent is recruited into Process Architecture roles • Updates stakeholders on Process Architecture activities and accomplishments

	• Builds collaborative relationships across the organization departments • Proactively identifies potential expertise gaps and helps recruits appropriate resources • Works with Project Manager to communicate deadline and budget impacts to stakeholders • Wields influence with no direct authority • Displays beginner political acumen and client-facing skills	• Solicits stakeholder buy-in • Leads business process design teams • Empowers, delegates, and mentors process design team members • Determine ways to remove barriers and mitigate risks for process design teams • Possesses strong negotiation skills • Identifies and raises Process Architecture issues • Displays advanced political acumen and client-facing skills • Possesses excellent facilitation skills	• Prepares annual budget for Process Architecture practice • Evaluates, prioritizes and resolves Process Architecture organizational issues • Sets strategy for change management of Process Architecture practice • Encourages process architect cross-training and knowledge-sharing • Supports on-going process architecture skills development • Represents Process Architecture at business unit governance reviews • While the “Strategy impact on processes, business and economic profit” is mentioned, the detailed capabilities could be elaborated to include more on Targeting Value.
Solutions Delivery	• Applies Process Architecture tools and methodologies • Identifies interdependencies and impacts across organizational boundaries • Understands the impacts and consequences of specific business process design decisions • Create and maintains Process Architecture artifacts • Maintains business models and business rule definitions	• Leads process design teams in the development of process architecture artifacts • Creates solution implementation approaches and plans • Organizes the business managers and staff with IT and collaborative partners to implement and test the solution implementation • Creates “disaster recovery” plans including solution blackout with IT • Works with IT to test implementation of the applications and the database load prior to solution cutover	• Facilitates enterprise level business and digital transformation initiatives. • Leads overall Process Architecture organization and program schedules • Monitors Process Architecture, business transformation and improvement engagements • Reviews and approves the solution delivery plans and monitors solution implementation activities • Manages and reports the solution success evaluation criteria

		• Works with business managers to train staff and test their competency • Creates implementation mentoring programs • Monitors the use of Process Architecture tools and methodologies in planning and executing the solution implementation • Executes training and mentoring programs on Process Architecture	
Business & Financial IQ	• Thorough understanding of core processes, business structures and enabling technologies and potential impacts of changes • Understands company and department budgets and how they are created • Has a general understanding of the financial impact of an initiative to the organization • Understands how to evaluate, quantify and prioritize process project risks • Understand Financial Models • Ability to build / cost benefit models and investment models • Ability to build ROI models for project requests	• Develops ROI models to financially quantify process and performance improvement engagements during project acceptance review and prioritization • Understands how to identify evaluate, • quantify and prioritize enterprise projects optimize the financial benefit to the organization or enterprise • Understands how to identify and quantify risks to the organization or enterprise	• Develops countermeasures and plans for addressing relevant industry forces and potential impact to long-term organizational process strategy • Develops and communicates at an Executive level, the comprehensive financial and operational cost/benefit analysis to support business performance improvement and transformation efforts • Understands the financial and operation differences between proposed transformational business models • Monitors the business environment and utilizes available tools (SWOT, etc.) to best determine recommended adjustments to strategy to continually create value to the enterprise.


Process Analyst
Credential
Certified Business Process Associate (CBPA®)
Eligibility Requirements
1250 hours documented Working Experience in a Business Process related area OR qualifying 4 year university degree
Complete Application
Pass Examination
Sign ABPMP Code of Ethics
Steps to Obtaining Credential
90 multiple choice questions answered within 2 hours
Re-certification
3 year cycle; 30 Continuing Professional Education Hours
Standard Fees
Application Fee: USD $40/€30
Exam Fee: USD $400/€350
discount available for current ABPMP International professional members
Re-certification Fee USD $75/€60
Process Architect
Credential
Certified Business Process Professional (CBPP®)
Eligibility Requirements
4 years Business Process Experience
May substitute half year credit for:
Advanced Degree
Approved Certifications such as the PMP or CPIM
Steps to Obtaining Credential
Complete Application
Pass Examination
Abide by ABPMP Code of Ethics
Exam Information
130 multiple choice questions
Re-certification
3 hours
3 year cycles; 60 Continuing Education Hours
Fees
Application Fee $75
Exam Fee
Members $500
Non-Members $650
Chief Process Architect
Credential
Certified Business Process Leader - CBPL™
Eligibility Requirements
10 years minimum Business Process Experience
5 years of Business Transformation Project Management
A CBPP certification
- also –
6 months credit for an Advanced Degree & Approved Industry Certifications e.g. Lean, PMP®; CBA®
Steps to Obtaining Credential
Application Process
& Multiple Choice Exam
Exam Information
3 hours; 130 questions
Credential Maintenance
3 years; 60 CE Credits

11.2 Appendix B: ABPMP BPM Core Curriculum

The Need for a BPM Curriculum

As business continues to address globalization and increasing competition, companies are becoming more collaborative and process-centric. This view requires the necessary and needed skills to integrate business processes over different business functions and often disparate information technologies to bring value to the customer. The purpose of this section is to provide a path of educational courses to address this growing need. Most business schools still emphasize a business function perspective. In contrast, those who complete the required program will have the knowledge to manage business processes by leveraging the people and technology to meet the changing needs of the business environment. Successful completion of a BPM degree or concentration will prepare the graduate for meaningful participation in the employer's BPM activities. The suggested curriculum allows for an undergraduate major in BPM and a Master of Science in BPM. In addition, the modular format can be adapted to a specialized certificate program in BPM. The suggested coursework consists of five core BPM courses that start with a general introduction to BPM and continue throughout the process life cycle of modeling, analysis, design, and implementation. In addition, three elective courses allow for a more in-depth exploration of BPM followed by a capstone course on Business Process Strategy.

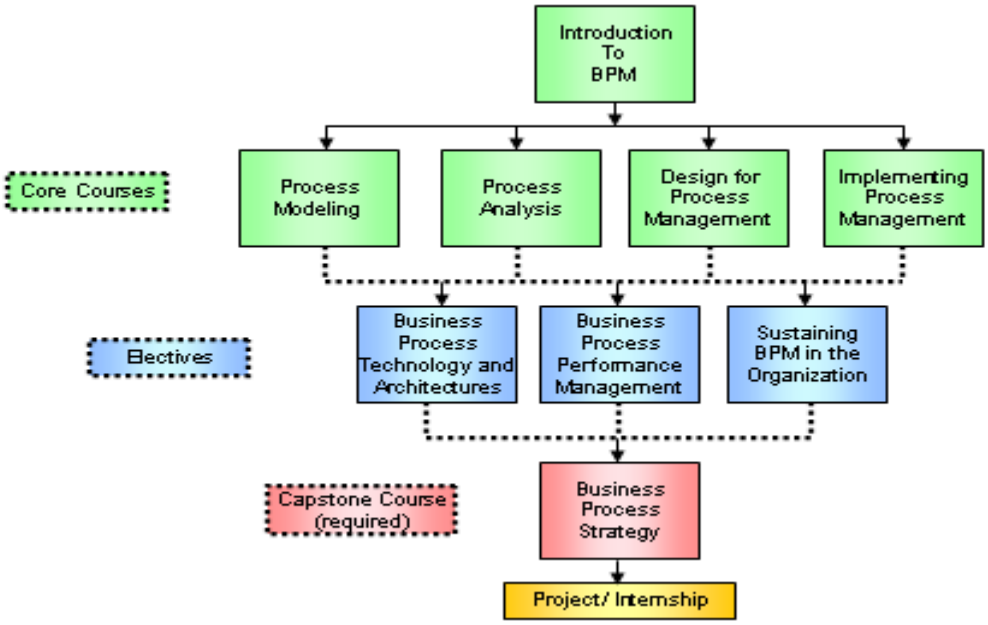


Figure B.1 General BPM Course Sequence

Business Process Management (BPM) introduces a change in organizational focus from functional silos to integrated business processes. Driven by the need to compete in a fast-paced, real-time economy,

organizations are beginning to recognize the need to achieve a process-centric organization. This transition requires not only an understanding and deployment of successful process management principles, but also the understanding and ability to improve end-to-end processes enabled by appropriate Business Process Management systems and technologies.

As organizations are beginning to realize the need to increase business process-related skills, the interest and need have arisen for a common BPM educational curriculum outline that leads toward a BPM Certification. In addition, colleges and universities must also provide a learning environment that embraces the Business Process Management practices of the new process-centric organization.

Since BPM involves several organizational dimensions such as culture, governance, organizational issues, process, and technology, a BPM curriculum needs to be well rounded, containing courses in both organizational and technical areas. At the present time, there are very few dedicated BPM programs in colleges and universities worldwide. Those that do exist vary in focus and coverage. In addition, organizations in need of trained graduates in the BPM arena know little about the existing programs. This model curriculum aims to create a template for addressing both the needs of industry and the services of educational institutions services to industry.

Contributors

The authors of this model curriculum represent the academic and practitioner communities. Indeed, all the contributors to this section have some degree of both BPM practical and teaching experience.

Intended Users

Faculty can adopt all or part of the model curriculum to promote a process-centric emphasis that meets the changing needs of for-profit and not-for-profit organizations. Industry can assess this model curriculum and propose modifications and extensions to maintain shared expectations for graduates. A BPM model curriculum is relevant to more than a business school. For example, it applies to an information science program, an information studies school, a health sciences school, and an industrial psychology program in a psychology department. Students within any relevant academic unit can assess an education institution’s commitment to a process-centric approach by comparing the school curriculum to the model curriculum.

Who Would the Curriculum Benefit?

Ultimately the organization will benefit from an educated and trained staff that both understand and have deployment knowledge for improving business processes. Individuals from both business and technical sides of the organization will benefit from an understanding of the BPM body of knowledge and learning to share a common set of procedures and practices.

Colleges and universities will benefit from a BPM curriculum framework to help them remain competitive. Students graduating from this program have desirable skills and knowledge.

What Type of Programs Would Be Beneficial?

Various educational opportunities have emerged that focus on BPM. They include professional seminars, university certificates, and degree programs. Certificate programs (for example, four courses) permit currently employed individuals to apply BPM skills quickly in the workplace. While many of these have merit, a comprehensive BPM curriculum that concentrates on an established guide to a BPM common body of knowledge surrounding defined knowledge areas is the goal of this appendix.

This model curriculum is reviewed for endorsement by the ABPMP Board of Directors, ABPMP Advisory Board, and Education Committee. It represents authoritative guidance for educational institutions planning to incorporate a business process focus in their educational programs at the undergraduate and graduate levels. Feedback from both industry and educational institutions will be used to modify the model curriculum content and thus maintain its currency and value.

Model Curricula

The following sections include the BPM model curricula divided into undergraduate, Master's Degree in BPM, and an MBA with a BPM focus.

Undergraduate BPM Program

The following sections cover the goals, student background profile, career opportunities, and curriculum overview for an undergraduate BPM program.

Goals

The undergraduate BPM major student acquires the knowledge and skills initially to model, analyze, design and implement business processes working with an experienced BP developer. If the student takes sufficient computer technology courses, the graduate can work with the BP suite support services. One intent of the model curriculum is for every student to understand the value of a process-centric organization design, appropriate metrics, and how business processes execute in contrast to a functional structure approach.

Student Background Profile

Students should have mastered an understanding of economics, organizational strategy and design, use of information technology in business, and the basic business functional areas. This knowledge may have been obtained as a business school undergraduate or by having completed a four or more-course minor in business.

Career Opportunities and Paths for Graduates

Undergraduates may seek BPM entry-level positions as process analysts, BPM software maintainers, BPM junior consultants, or junior administrators of business processes or rules repositories. With experience, individuals can increase their seniority in current areas or move into other BPM areas, for example, design, implementation, or performance evaluation.

Curriculum Overview

The following table provides an overview of the model undergraduate curriculum.

Type	Course Title	Sample Content
core	Introduction to BPM	• Overview BOK material, BPM, and related topics BPM life cycle • Why process management? • What is involved in BPM? • Business Architectures • Explore BPM career paths
core	Process Modeling	• Modeling and simulation • Business and operational modeling • Modeling end-to-end processes to task level models • Simulation and optimizing • Activity-based costing simulation • BPMN • Event-driven models
core	Process Analysis	• Business analysis techniques • Process analysis techniques • Applied and descriptive statistics • Assessment methods: ○ BPM maturity assessment ○ Analysis of support; skill sets; change management
core	Design for Process Management	• Operational design • Design principles • Techniques and methods of successful process designs • What drives process design?
core	Implementing Process Management	• Project management for process • Implementing process change • Project management and change management
core	Business Process Technology and Architectures	• BPMS • BPM repository • Technologies • SOA
elective	Business Process Performance Management	• Monitoring, controlling, refining processes • KPIs; metrics • How to map performance • Data warehousing • Business analysis

		• Business intelligence
Capstone (required)	Business Process Strategy	• Enterprise Process Management • BPM organization • Process portfolio • Leading by metrics • How to sustain BPM initiatives • Engaging Process Owners for the long term • Establishing process-oriented customer focus cases
elective	Internship or Project	• Analyze current situation • Design BP improvement and implementation plan • Presentation and report to client

Master's Degree in BPM Program

The following sections cover the goals, student background profile, career opportunities, and curriculum overview for a Master's Degree BPM program.

Goals

The Graduate Master's Degree in BPM student has a more advanced depth of knowledge for developing, evaluating, and managing business processes. This graduate should be prepared to assume greater responsibility for an initial job position than an undergraduate. The MS program graduate initially may be responsible for evaluating (perhaps managing) a business process that is not an enterprise end-to-end process. If sufficient technical courses are taken, the graduate can work with business process and business rules repositories in addition to business process development.

Student Background Profile

Students may enter this graduate curriculum with a business or non-business undergraduate degree. Ideally, the student has at least two to four years of experience in for-profit, not-for-profit, or government positions. The student's primary asset is an understanding of how an organization operates for planning, execution, and control. The design and improvement of collaborative business processes requires an understanding of each major functional area of an organization. The use of information technology in organizations is also helpful.

Career Opportunities and Paths for Graduates

Depending on the student's prior work experience, the BPM graduate may begin as a junior or senior business analyst or designer, a BPM consultant, a business process performance evaluator, BPMS junior or senior support staff, a junior repository administrator, or a controls evaluator. These examples are not exhaustive.

Curriculum Overview

The following table provides an overview of the model Master's Degree curriculum.

Type	Course Title	Sample Content	BPM Program
core	Introduction to BPM	• General overview of BPM • How people, process, and technology are involved in BPM • Overview of Business Architectures • BPM life cycle • Explore BPM career paths	x
core	Process Modeling	• Business and operational modeling • Modeling end-to-end processes to task level models • BPMN • Event-driven models • Introduction to simulation	x
core	Process Analysis	• Business and process analysis techniques • Applied and descriptive statistics • Assessment methods and metrics • Simulation and optimizing • Analysis of support; skill sets; change management	x
core	Design for Process Management	• Operational design • Design principles • Techniques and methods of successful process designs • What drives process design? • Simulation testing of process design	x
core	Implementing Process Management	• Improvement methodologies • Implementing process change • Project management for process implementation • Organizational change management • Process evaluation and quality control	x
core	Business Process Technology and Architectures	• BP Application Integration	x

		• BPM Suites • BPM & BRM Repositories • SOA and web services • Business and IT architectures	
elective	Advanced Business Process Technology	• TPS and BI support • Enterprise content management • XML, SOA, BPN, and BPEL • Network support • BPM server configuration	
Elective	Business Process and Rules Repository	• Workflow engine • Rules engine • BP collaboration support • Repository management and maintenance • Repository integrity and security	
elective	Business Process Performance Management	• BP and enterprise performance • Monitoring and controlling processes • Metrics (KPIs and CSFs) • Measurement methods • Measurement frameworks	x
Capstone (required)	Business Process Strategy	• Leveraging the BPM organization • Managing the process portfolio and leading by metrics • How to sustain BPM initiatives • Strategies for managing BP for the long-term cases	x
elective	Internship or Project	• Identify the BP problem root cause or opportunity • Scope the BP improvement including politics • Analyze current situation • Design BP improvement and implementation plans • Presentation and report to client	x

Introduction to BPM is suggested as the first course a student should be required to complete and should be the pre-requisite for all other courses. The modeling, analysis, design, and implementation of business processes are considered the core of BPM. The understanding and ability to develop a business process

strategy is key to BPM success, and as a result, recommended as a capstone course. Several electives are suggested for programs that do not have the liberty of a full ten-course sequence.

MBA Concentration in BPM

The following sections cover the goals, student background profile, career opportunities, and curriculum overview for an MBA with a BPM concentration.

Goals

The MBA BPM concentration student initially should be prepared to manage a BP segment (less complexity) and participate in the development and evaluation of business processes with guidance from an experienced BPM practitioner.

Student Background Profile

Students should have mastered an understanding of economics, organizational strategy and design, statistics, use of information technology in business, and the basic business functional areas. Ideally, the student has at least two to four years of experience in for-profit, not-for-profit, or government positions. The undergraduate degree need not be in business or computer science.

Career Opportunities and Paths for Graduates

Depending on the student's prior work experience, the BPM graduate may begin as a junior or senior business analyst or designer, a BPM consultant, a business process performance evaluator, a junior repository administrator, or a controls evaluator.

Curriculum Overview

The following table provides an overview of the model curriculum for an MBA with a BPM concentration.

Type	Course Title	Sample Content	BPM Program
core	Introduction to BPM	• General overview of BPM • How people, process, and technology are involved in BPM • Overview of Business Architectures • BPM life cycle • Explore BPM career paths	x
core	Process Analysis and Design	• Business and process analysis techniques • Applied and descriptive statistics • Assessment methods and metrics • Simulation and optimizing • Analysis of support; skill sets; change management • Design principles	x

		• Techniques and methods of successful process designs	
elective	Business Process Technology and Architectures	• BP application integration • BPM suites • BPM and BRM repositories • SOA and web services • Business and IT architectures	x
elective	Business Process Performance Management	• BP and enterprise performance • Monitoring and controlling processes • Metrics (KPIs and CSFs) • Measurement methods • Measurement frameworks	x
Capstone (required)	Business Process Strategy	• Leveraging the BPM organization • Managing the process portfolio and leading by metrics • How to sustain BPM initiatives • Strategies for managing BP for the long-term cases	x

The number of BPM courses will vary by MBA program and whether courses are quarterly or a semester in length. In addition, several MBA programs already have courses that could be enhanced with BPM cases and required for the student interested in a BPM track — courses such as *Change Management* and *Project Management*.

Student Backgrounds

A BPM curriculum may appeal to students from varied disciplines. Since BPM merges organization and technology concepts, the curriculum is appropriate to students of organizations and those focused on technology. Students from all business disciplines (accounting, information systems, marketing, management, operations, and so on) can benefit from a BPM curriculum. Likewise, technology-based disciplines such as those based in computer science and schools of information are also appropriate.

Common Business Process Management Courses

The proposed *Common Business Process Management* curriculum is primarily designed for a university at both the graduate (both a Master's and MBA emphasis) and undergraduate Levels. A feasible major for BPM would best reside at the graduate level, but a less rigorous approach to the same courses could also be offered at the undergraduate level. While a business school would be the most appropriate place for a BPM curriculum, other academic units with specialized degrees can adapt portions of this curriculum as appropriate. In addition, there are several types of specialty programs that the proposed Business Process Management curriculum could be adapted for, such as executive education and BPM certification programs.

Course Descriptions

The following table provides an overview of the model *Common BPM* curriculum.

Course	Description
Introduction to BPM	An introduction to concepts and strategies required to successfully manage your business processes from a holistic end-to-end perspective.
Process Modeling	To have effective and efficient repeatable end-to-end processes, an organization must understand existing processes and use appropriate techniques to model and design improved processes. This course gives overviews of process modeling methods for all levels of the organization. Appropriate process modeling techniques are explained and aligned with process analyses and process design. Students learn use of process modeling tools.
Process Analysis	To develop effective and efficient repeatable end-to-end processes, an organization must understand existing processes and use appropriate techniques to model and represent those processes. This course provides an overview of process analysis methods for all levels of the organization. Appropriate process modeling techniques are aligned with process analyses.
Design for Process Management	The design of business processes needs to consider results from a process analysis and then use process modeling techniques to develop an improved process design. Process design should occur at various stages of the BPM practice cycle and at various levels of detail. This course introduces process design techniques practiced today. Appropriate process modeling techniques are applied to the design of a renewed process.
Process Transformation	Business process implementation is the bridge between design and execution. This course examines the steps required to transform the approved process design into a set of documented, tested, and operational sub-processes and workflows that are accepted by the appropriately trained stakeholders.
Business Process Technology and Architectures	BPM technologies, systems, and tools are in continuous development in the marketplace. This course examines the functional contributions of BPM technologies, systems, and tools.
Advanced Business Process Technology	An in-depth examination of BPM technologies, systems, and tools. The emphasis of this course is on technical specifications, current vendor offerings, and actual use of selected tools.
Business Process and Rules Repository	How to design and implement business process and rules repositories including relevant metadata. Interfaces with manual and computer-based tasks are considered. Performance metrics, regulatory compliance, and current vendor offerings are discussed. Limited scale repositories will be constructed.
Business Process Performance Measurement	The success of BPM requires a set of meaningful outcome and execution performance metrics that convey the value added to business operations and strategy for assessment by senior executives, Process Owners, and process staff. An integrated network of performance metrics spanning customer requirements through fulfillment and cash inflow is needed to deliver this information to appropriate stakeholders. Performance metrics for extended enterprise business processes must be included to enable an end-end complete evaluation. Both business-oriented and technology-oriented metrics will be addressed. Criteria for generating reports will be discussed, for example, events, user queries, or dates. Class examples and cases will be used to illustrate how to develop an effective BPM performance evaluation system.

Sustaining Business Process Management In the Organization	The benefits from BPM are harvested from a long-term commitment, not as a short-term burst of productivity. Thus, the sustainability of BPM benefits follows from a transformation to a process-centric culture by all relevant organization stakeholders. Without successful change management, BPM cannot deliver continual, perhaps radical improvement benefits. An effective program for sustaining BPM value will be discussed including senior executive support, incentives consistent with BPM improvement, and creating BPM innovation focus groups. Successful implementation of BPM improvements must be celebrated openly and enthusiastically to maintain a commitment to BPM improvements. Industry examples and cases will enable discussion of implementing a BPM sustainability plan.
Business Process Strategy	Alignment between business process objectives and enterprise strategy is essential to harvest BPM benefits. Efficiency without effectiveness will not accomplish institutional objectives. Customer requirements must shape business strategy, objectives, metrics, and organization. This thrust must continue to shape BPM objectives, strategy, and metrics. Clear delineation of end-to-end (cross-functional) business processes with Process Owners should include extended business processes and more detailed business sub-processes. Given finite enterprise resources, the proposed business process investments must be analyzed within the context of the current business process portfolio. For BPM to be successful, clear accountability from the business Process Owner through business sub-processes' owners must be established in conjunction with appropriate metrics.

Detailed Course Descriptions

The previous sections offered course content highlights and summaries. In contrast, this section provides greater descriptive depth, including course title, course description, course objectives, course topics, and any pertinent discussion. This content should help instructors create detailed syllabi for their BPM courses. This content will change as the BPM industry and the BPM CBOK change.

Introduction to Business Process Management

The following sections provide the course description, objectives, topics, and discussion points for the *Introduction to Business Process Management* course.

Course Description:

An introduction to concepts and strategies required to successfully manage your business processes from a holistic end-to-end perspective.

Course Objectives:

The objective of this course is to provide a general overview and understanding of all of the concepts and strategies related to Business Process Management. This is a high-level course designed for managers, business leaders, and anyone else looking for an understanding of Business Process Management concepts.

Major Topics:

The following topics will be covered in this class.

- Management discipline for continuous process management
    - Monitoring and measuring process performance

    - Customer focus in process management
- Structure and organization of process management within the enterprise
    - Skills required for Business Process Management
    - Roles involved in BPM
    - Role of technology in BPM
- Definitions of BPM concepts and terminologies
    - Processes
    - Process types
    - Activities
    - Analysis
    - Design
    - Modeling
- Technologies used in process management
    - Modeling
    - Process monitoring
    - Process integration
- BPM life cycle
- BPM industry (providers, outsourcers)
- Critical success factors

Discussion:

The approach of this course is to provide a broad and general overview of BPM concepts. This includes explaining the concept of Business Architectures and the relationship of people, processes, and technologies involved in BPM. Different BPM career paths are also explored. The audience for this core course includes business users and others interested in learning about BPM.

Process Modeling

The following sections provide the course description, objectives, topics, and discussion points for the *Process Modeling* course.

Course Description:

In order to have effective and efficient repeatable end-to-end processes, an organization must understand existing processes and use appropriate techniques to model and design improved processes. This course provides an overview of process modeling methods for all levels of the organization. Appropriate process modeling techniques are explained and aligned with process analyses and process design. Students learn how to use process modeling tools.

Course Objectives:

At the end of this course the student will have obtained proficiency in the following:

- Purpose of modeling
- Process modeling techniques and standards
- Modeling and analyzing business processes for various end to end processes and task level models
- Introduction to business process simulation

Major Topics:

The following topics will be analyzed during this course.

- Process modeling
    - Purpose of process modeling
    - Definition and scope of modeling
    - Process modeling standards, techniques, and methodology
        - Notation techniques
        - Perspectives (domain, enterprise, technology, data)
        - Charts, swim lanes
        - BPMN
        - Personnel
    - Process modeling technologies
        - Technical tools
        - Manual tools
    - Introduction to business process simulation

Discussion:

The approach to this course is to teach students how to model end-to-end processes and how to use the process modeling tools available. The audience for this core course includes business users and others not familiar with BPM modeling.

Process Analysis

The following sections provide the course description, objectives, topics, and discussion points for the *Process Analysis* course.

Course Description:

To develop effective and efficient repeatable end-to-end processes, an organization must understand existing processes and use appropriate techniques to model and represent those processes. This course provides an overview of process analysis methods for all levels of the organization. Appropriate process modeling techniques are aligned with process analyses.

Course Objectives:

At the end of this course the student will have obtained proficiency in the following:

- Purpose of process analysis
    - Efficiency of process
    - Effectiveness of process
    - Impact of process
- Business process analysis techniques
- Analyzing business processes through the application of assessment methods and metrics

Major Topics:

The following topics will be analyzed during this course.

- Process analysis
    - Purpose of process analysis
        - Effectiveness of process

        - Efficiency of process
        - Decisions made through process
    - When to perform process analysis
        - Continuous monitoring
        - Event triggered
        - Performance
    - Defining process analysis
        - Customer interactions
        - Performance metrics and benchmarks
        - Process controls
        - Process attributes
    - Preparing process analysis
        - Scope of analysis
        - Choosing analysis resources
        - Roles of analysis
        - Researching data for analysis
    - Analysis Process
        - Business environment
        - Culture
        - Customer interactions
        - Critical business goals
    - Analysis models
        - Business environment
        - Performance metrics
        - Customer interactions
        - Business rules
        - Process capacity
        - Process controls
        - Process resources (human and technology)
    - Analysis tools, techniques, and frameworks
    - Simulation and optimization
- Critical success factors

Discussion:

The approach of this course is to introduce students to different analysis methods for business processes. This includes both applied and descriptive statistics, simulation and optimization techniques, and process metrics and benchmarks. The audience for this core course includes business users and business process analysts and designers.

Design for Process Management

The following sections provide the course description, objectives, topics, and discussion points for the *Design for Process Management* course.

Course Description:

The design of business processes needs to consider results from a process analysis and then use process modeling techniques to develop an improved process design. Process design should occur at various stages of the BPM practice cycle and also at various levels of detail. This course introduces process

design techniques practiced today. Appropriate process modeling techniques are applied to the design of a renewed process.

Course Objectives:

At the end of this course students should have learned the following:

- Business process design principles
- Techniques and methods of process designs
- Simulation testing of process design

Major Topics:

The following topics will be analyzed during this course.

- Process modeling techniques for design and implementation
- Designing and modeling the renewed process (*to-be*)
- Simulation testing of the renewed process (*to-be*)

Discussion:

The approach of this course is to explain concepts related to process design as well as the simulation and testing of process design. The audience for this core course includes business users, business process analysts and designers, and BPM technologists.

Process Transformation

The following sections provide the course description, objectives, topics, and discussion points for the *Process Transformation* course.

Course Description:

Business process implementation is the bridge between design and execution. This course examines the steps required to transform the approved process design into a set of documented, tested, and operational sub-processes and workflows that are accepted by the appropriately trained stakeholders.

Course Objectives:

At the end of this course the student will have obtained proficiency in the following:

- How to implement and manage process change
- Process evaluation and quality control

Major Topics:

- The implementation phase
- Deploying BPM
- Process automation
- BPM best practices and methodologies
- BPM reporting and monitoring
- Preparing for business testing
- Developing rollout plans
- Implementing changes
- Managing business process and organizational change
- Project management for BPM

Discussion:

The approach of this course is to explain how to implement and manage change at the process level. The audience for this core course includes business users, business process analysts and designers, and BPM technologists.

Business Process Technology and Architectures

The following sections provide the course description, objectives, topics, and discussion points for the *Business Process Technology and Architectures* course.

Course Description:

Tasks within business processes are executed manually and/or by computer-based applications. For the latter, source data and an IT platform are necessary. This course will address how a Business Architecture (business process content) is translated into an IT architecture (hardware and system software) — that is those components of an IT architecture relevant to BPM support. The functionality provided by BPM suites and their toolsets will be discussed. Languages and notations for representing business processes will be examined. The role of web services and service-oriented architecture for enabling business process agility will be explored. Exercises with BPM tools will be included.

Course Objectives:

At the end of this course students will be able to:

- Transform Business Architecture requirements into a BPM subset of an IT architecture
- Specify the BPM technology functionality necessary to execute computer-based execution of business processes and supporting manual tasks
- Prepare and evaluate RFP for BPM technology
- Explain the role of web services and SOA for supporting BPM

Topics:

- Evaluating BPM software and BPM suites
- BPM solution architectures
- Business Process Modeling Notation (BPMN)
- The Business Process Modeling Language (BPEL)
- BPM framework
- Business activity monitoring (BAM)
- BPM tools and trends

Discussion:

The approach of this course is to provide a functional overview of BPM platforms with sufficient examples of BPM technology to participate in BPM software and hardware procurement requirements and evaluations. The audience for this core course includes business users, business process analysts and designers, and BPM technologists.

Advanced Business Process Technology

The following sections provide the course description, objectives, topics, and discussion points for the *Advanced Business Process Technology* course.

Course Description:

Building on the *Business Process Technology and Architectures* prerequisite course, this course presents an in-depth analysis of BPM support technology and how to use it. Thus, the content is more appropriate for individuals pursuing a technical career interest. All the components in the technology chain including business processes, Internet technology, intranets, and applications and data supported by an SOA platform will be addressed. Exercises provide an opportunity to experience basic functions of leading BPM software.

Course Objectives:

At the end of this course students will be able to:

- Explain the interoperability among BPM relevant applications, data sources, networking, system software, and hardware
- Specify the technical requirements to execute a typical BPM suite
- Design content management system functions for capturing business process documents

Major Topics:

- BPMS configuration management
- Defining and selecting industry-standard or vendor-specific interfaces between BPMS, both related software applications and data sources
- Preparing and evaluating RFPs for BPMS
- BP languages, for example, BPEL (execution) and XPDL (extensible process description)
- Security for:
    - Protecting the integrity of BP software, workflows, and data
    - Permitting BP software to execute by whom or what application
- Coordinating with operative business processes in extended enterprise entities
- Linking business activity monitoring to business Process Performance Measurement
- Creating collaborative tools and common workspaces to facilitate BP execution productivity

Discussion:

Much of the value from this course will be the students' experience using leading software for designing and executing selected business processes within an integrated platform configuration.

Business Process and Rules Repositories

The following sections provide the course description, objectives, topics, and discussion points for the *Business Process and Rules Repositories* course.

Course Description:

To promote business process effectiveness, efficiency, and regulatory compliance, the business processes should be clearly and completely documented and automated to the greatest extent feasible. The design, deployment, and evaluation of business process and rules repositories will be studied at both the functional and technical levels. Both these repositories represent the knowledge bases for successful business process engine execution. Policies for administering these repositories will be examined. Leading vendor product functionalities will be compared. Actual experience using these repositories will be included.

Course Objectives:

At the end of this course students will be able to:

- Define the role of business and rule repositories for delivering value to enterprise customers and other supply chain stakeholders
- Describe the functional components or business process and rules repositories
- Define the policy, governance, and performance requirements
- Explain the contribution of business process and rules repositories to the flow of business process execution
- Compare the leading repository vendors' product offerings

Major Topics:

- Business process and rules repositories functional and technical components
- How business process and rules repositories operate [active or passive]
- Development and maintenance of process and rules repositories including version control
- Content of process and rules repositories including ownership
- Integrity and security for repositories
- Performance metrics and evaluation
- Regulatory compliance and records retention

Discussion:

Whether active or passive, the information resident in these repositories is critical to the effective and compliant execution of business processes and rules.

Business Process Performance Measurement

The following sections provide the course description, objectives, topics, and discussion points for the *Business Process Performance Measurement* course.

Course Description:

The success of BPM requires a set of meaningful outcome and execution performance metrics that convey the value added to business operations and strategy for assessment by senior executives, Process Owners, and process staff. An integrated network of performance metrics spanning customer requirements through fulfillment and cash inflow is needed to deliver this information to appropriate stakeholders. Performance metrics for extended enterprise business processes must be included to enable an end-end complete evaluation. Both business-oriented and technology-oriented metrics will be addressed. Criteria for generating reports will be discussed, for example, events, user queries, or date. Class examples and cases will be used to illustrate how to develop an effective BPM performance evaluation system.

Course Objectives:

At the end of this course students will be able to:

- Develop BPM metrics that improve alignment between business strategy and business process services
- Identify key business process activities and outcomes that should be evaluated
- Develop valid and reliable key performance metrics for both business and technology activities
- Specify the manual and computer-based components of an effective BPM assessment system
- Build and assess business processes (through in-class exercises)

Major Topics:

- Relationship between BPM performance and enterprise performance management
- Specifying types of BP metrics (outcomes, operations, and development) for relevant classes of stakeholders
- How to develop valid and reliable BPM metrics
- How to develop valid and reliable BRM metrics
- How to assure that BPM and BRM metrics continue to be aligned with enterprise strategy, customer requirements, and environmental influences (for example, industry competition, regulatory agencies, and technological change)
- Sources and validity of data captured for BPM and BRM metrics
- Types of analysis and alerting reports based upon specified classes of triggers
- Building a BPM performance repository for longitudinal analysis
- Developing criteria for deciding whether a BPM performance gap requires remediation
- Using cases to evaluate the appropriateness and quality of BPM metrics

Discussion:

Suggested pre-requisites: *Intro to BPM*, *Process Modeling*, *Process Analysis* (metrics), and B*usiness Process Strategy* (align BPM metrics with enterprise metrics). Students may want to take *Business Process Technology and Architectures* to obtain a comprehensive viewpoint. Some lecture is needed to create a foundation for metrics development, but the majority of the content should emphasize real examples, cases, and exercises to cement the concepts. If feasible, business process performance software and dashboard building software should be used (at least a demo) to create an implementation experience, but not at the cost of diminishing the learning of foundation material. If the set of courses in a particular program variation has not included experience with BPM simulations to analyze the impacts of changing process components to assess performance improvements — include an exercise in this course. You can't construct metrics until you experience them. This is a *must* course for any full curriculum or certificate subset. It should be a significant module in a certificate or executive course.

Sustaining Business Process Management in the Organization

The following sections provide the course description, objectives, topics, and discussion points for the *Sustaining Business Process Management in the Organization* course.

Course Description:

The benefits from BPM are harvested from a long-term commitment, not as a short-term burst of productivity. Thus, the sustainability of BPM benefits follows from a transformation to a process-centric culture by all relevant organization stakeholders. Without successful change management, BPM cannot deliver continual, perhaps radical, improvement benefits. An effective program for sustaining BPM value will be discussed including senior executive support, incentives consistent with BPM improvement, and creating BPM innovation focus groups. Successful implementation of BPM improvements must be celebrated openly and enthusiastically to maintain a commitment to BPM improvements. Industry examples and cases will enable discussion of implementing a BPM sustainability plan.

Course Objectives:

At the end of this course students will be able to:

- Explain the sustainability movement and its application to BPM
- Develop BPM sustainability objectives and benefits
- Create a plan for institutionalizing BPM as a normal way of conducting business
- Develop metrics for assessing the effectiveness of a BPM sustainability plan
- Evaluate the types of BPM sustainability in relation to the complexity and dynamics of the organization's market space

Course Topics:

- Sustainability programs and practices in the for-profit and not-for-profit sectors globally
- What are sustainable business processes?
- How can sustainable business processes facilitate enterprise sustainability?
- How to get sustainable BPM jump-started in your organization
- What are meaningful metrics of BPM sustainability?
- What is the relationship of BPM sustainability with enterprise agility?
- Which organizations have adopted BPM sustainability in practice?

Discussion:

Course prerequisites: *BP Performance Management* and *Business Process Strategy*. Since sustainability has many interpretations, numerous examples to make the BPM sustainability clear will be important. The challenge of attaining BPM sustainability in relation to industry competition, customer requirements predictability, technological change, and regulatory mandates needs clarification. Senior executives must be seen as continuous advocates of a process-centric organization despite strategic uncertainties.

Business Process Strategy

The following sections provide the course description, objectives, topics, and discussion points for the *Business Process Strategy* course.

Course Description:

Alignment between business process objectives and enterprise strategy is essential to harvest BPM benefits. Efficiency without effectiveness will not accomplish institutional objectives. Customer requirements must shape business strategy, objectives, metrics, and organization. This thrust must continue to shape BPM objectives, strategy, and metrics. Clear delineation of end-to-end (cross-functional) business processes with Process Owners should include extended business processes and more detailed business sub-processes. Given finite enterprise resources, the proposed business process investments must be analyzed within the context of the current business process portfolio. For BPM to be successful, clear accountability from the business Process Owner through business sub-processes' owners must be established in conjunction with appropriate metrics.

Course Objectives:

At the end of this course students will be able to:

- Explain the importance of alignment between enterprise and Business Process Management strategies
- Create BPM objectives consistent with providing customer value

- Develop a business process organization with business process and sub-process owners to establish clear accountability
- Develop end-to-end business processes that promote collaborative cross-functionality
- Analyze risks and rewards of new business process investments in the context of limited resources and an existing business process portfolio
- List the benefits of establishing a Center of Excellence and a Business Process Project Office

Course Topics:

- Enterprise and BPM strategy alignment
- Application of business strategy models to BPM strategy
- Creating end-to-end, cross-functional business processes including the extended enterprise
- Developing appropriate business process metrics consistent with the enterprise strategy
- Building a business process organization with clear business process and sub-process accountability
- Developing BPM metrics at each level to evaluate the contribution towards generating business value
- To apply portfolio theory to the evaluation of current and proposed BPM investments
- To understand the potential benefits from establishing a Center of Excellence and a Business Process Project Office

Discussion:

None

Internship or Project

The following sections provide the course description, objectives, topics, and discussion points for a BPM internship or final project.

Course Description:

Course prerequisites include *Introduction to BPM*, *Process Modeling*, and *Business Process Performance*. After examining business strategy frameworks and models, students use cases and field projects to analyze BPM strategy, structure, and performance. Students experience the analysis, development, and improvement of existing or new business processes in real or simulated environments.

Course Objectives:

At the end of this course students will be able to:

- Synthesize and apply the knowledge from prior BPM courses
- Demonstrate effective consultant's skills
- Analyze a business process improvement opportunity
- Use previously discussed and piloted BPM software in more complex situations

Major Topics:

- Business process current status discovery techniques
- Successful consulting skills
- Surfacing root causes from apparent symptoms
- Effective written and oral communication

Discussion:

Concrete experience has no substitute. The internship can be a gateway to employment after graduation.

Model Curriculum Key Concepts
• A model curriculum guides the education of new and experienced BPM Professionals • Curriculum content will vary in scope and depth by type of constituency, for example, undergraduate or graduate students • Model curriculum content is a joint effort of educators and practitioners • The model curriculum content must reflect changes in practices, concepts, regulations, and technology • Value of the model curriculum is a function of the extent of adoption by educational institutions

11.3 Appendix C: ABPMP Code of Ethics

Code of Ethics

ABPMP is committed to the highest standard of professional ethics and believes that Business Process Management Professionals should:

- Conduct their professional and personal lives and activities in an ethical manner
- Recognize a standard of ethics founded on honesty, justice, and courtesy as principles guiding their conduct and way of life
- Practice their profession according to this code of ethics and standards of conduct

All ABPMP members must agree to and sign the following code of ethics and statement of professional conduct.

The keystone of professional conduct is integrity. Business Process Management Professionals will discharge their duties with fidelity to the public, their employers, and clients with fairness and impartiality to all. It is their duty to interest themselves in public welfare and be ready to apply their special knowledge for the benefit of humankind and the environment.

I acknowledge that:

I have an obligation to society and will participate to the best of my ability in the dissemination of knowledge pertaining to the general development and understanding of Business Process Management. Further, I shall not use knowledge of a confidential nature to further my personal interest, nor shall I violate the privacy and confidentiality of information entrusted to me or to which I may gain access.

I have an obligation to my employer or client whose trust I hold. Therefore, I shall endeavor to discharge this obligation to the best of my ability, to guard my employer or client's interests, and provide advice wisely and honestly. I shall promote the understanding of Business Process Management methods and procedures using every resource available to me.

I have an obligation to my fellow members and professional colleagues. Therefore, I shall uphold the high ideals of ABPMP as outlined in the Association Bylaws. Further, I shall cooperate with my fellow members and shall treat them with honesty and respect at all times.

I accept these obligations as a personal responsibility and as a member of this Association. I shall actively discharge these obligations and I dedicate myself to that end.

11.4 Appendix D: ABPMP Standards of Conduct

Standards of Conduct

These standards expand on the Code of Ethics by providing specific statements of behavior in support of the Code of Ethics. They are not objectives to be strived for; they are rules that no true professional will violate. The following standards address tenets that apply to the profession.

In recognition of my professional obligations I shall:

- Avoid conflict of interest and make known any potential conflicts
- Protect the privacy and confidentiality of all information entrusted to me
- Accept full responsibility for work that I perform
- Ensure that the products of my work are used in a socially responsible way, to the best of my ability
- Support, respect, and abide by the appropriate local, national, and international laws
- Make every effort to ensure that I have the most current knowledge and that the proper expertise is available when needed
- Share my knowledge with others and present factual and objective information to the best of my ability
- Be fair, honest, and objective in all professional relationships
- Cooperate with others in achieving understanding and in identifying problems
- Protect the proper interests of my employer and my clients at all times
- Take appropriate action in regard to any illegal or unethical practices that come to my attention; I will bring charges against any person only when I have reasonable basis for believing in the truth of the allegations and without any regard to personal interest
- Not use knowledge of a confidential or personal nature in any unauthorized manner or to achieve personal gain
- Never misrepresent or withhold information that is germane to a problem or situation of public concern nor will I allow any such known information to remain unchallenged
- Not take advantage of the lack of knowledge or inexperience on the part of others
- Not use or take credit for the work of others without specific acknowledgment and authorization
- Not misuse authority entrusted to me

I acknowledge that I have read, understand, and will uphold these professional ethics and standards of conduct.

Signed:

_____

Date:

_____

11.5 Appendix E: Chapter References

Chapter 2

1. Champlin, Brett. 2006. "BPM Professionals: Roles and Responsibilities for an Emerging Discipline." BPM Strategies Magazine, October. BPMInstitute.org.
2. De Bruin, Tonia and Michael Rosemann. 2005. "Application of a Holistic Model for Determining BPM Maturity." *Business Process Trends*. February.
3. Delphi Group. 2003. "BPM 2003: Market Milestone Report." Delphi Group White Paper. Boston, MA: Delphi Group. http://www.delphigroup.com.
4. Dwyer, Tom. 2004. "BPMInstitute's State of Business Process Management." Executive White Paper, April. BPMInstitute.org.
5. Fisher, David M. 2004. "Optimize Now Or Else!: How to Leverage Processes and Information to Achieve Enterprise Optimization." BearingPoint Presentation. Miami, FL: Process World. April 25 –28, 2004.
6. Harmon, Paul. 2004. "Evaluating An Organization's Business Process Maturity." *Business Process Trends Newsletter* 2 3: 1-11. http://www.caciasl.com/pdf/BPtrendLevelEval1to5.pdf.
7. Parker, Burton G. 1995. "Data Management Maturity Model." McLean, VA: MITRE Software Engineering Center. July.
8. Porter, Michael. 1985. *Competitive Advantage.* New York: Free Press.
9. Rummler-Brache Group. 2004. "Business Process Management in U.S. Firms Today." Rummler-Brache Group. March.
10. Scheer, August-Wilhelm, Ferri Abolhassan, Wolfram Jost, and Mathias Kirchmer. 2004. *Business Process Automation: ARIS in Practice*. Berlin, Heidelberg: Springer Berlin Heidelberg.
11. Sinur, Jim. 2004. "Leveraging the Three Phases of Process Evolution." Gartner Research Presentation. Miami, FL: Process World. April 25–28, 2004.
12. Towers, Steve and BPMG. 2005. *In Search of BPM Excellence: Straight From the Thought Leaders.* Tampa, FL: Meghan-Kiffer Press.
13. Zur Muehlen, Michael. 2004. *Workflow-Based Process Controlling: Foundation, Design, and Application Of Workflow-Driven Process Information Systems*. Berlin: Logos.

Chapter 4

1. Bagni, Raul, Berchi, Roberto, and Cariello, Pasquale. 2002. "A Comparison of Simulation Models Applied to Epidemics." *Journal of Artificial Societies and Social Simulation*. 53 http://jasss.soc.surrey.ac.uk/5/3/5.html.
2. Brocke, Jan vom, and Michael Rosemann. 2010. *Handbook on Business Process Management*: *Strategic Alignment, Governance, People and Culture*. Berlin, Heidelberg: Springer.
3. Burlton, Roger. 2013. "Delivering Business Strategy Through Process Management." in Brocke, Jan V., and Michael Rosemann. 2014. *Handbook On Business Process Management 2: Strategic Alignment, Governance, People and Culture*. Berlin: Springer.
4. Cantara, Michele. 2015. "Start up your Business Process Competency Center." *Documentation of the Gartner Business Process Management Summit*, National Harbor.

5. Elzinga, D. Jack, Thomas R. Gulledge, and Chung-Yee Lee. 1999. *Business Process Engineering: Advancing the State of the Art*. Boston, MA: Springer US.
6. Franz, Peter, and Mathias Kirchmer. 2012. *Value-Driven Business Process Management: The Value-Switch for Lasting Competitive Advantage*. New York: McGraw Hill Professional.
7. George, Mark O. 2010. *The Lean Six Sigma Guide to Doing More With Less Cut Costs, Reduce Waste, and Lower Your Overhead*. Hoboken, N.J.: John Wiley & Sons.
8. Jackson, TL. 2006. *Hoshin Kanri for The Lean Enterprise: Developing Competitive Capabilities and Managing Profit*. New York: Productivity Press.
9. Kirchmer, Mathias. 1999a. *Business Process Oriented Implementation of Standard Software: How To Achieve Competitive Advantage Efficiently and Effectively*. Berlin: Springer.
10. Kirchmer, Mathias. 1999b. "Market- and Product-Oriented Definition of Business Processes." In: Elzinga, D. Jack, Thomas R. Gulledge, and Chung-Yee Lee. 1999. *Business Process Engineering: Advancing the State of the Art*. Boston, MA: Springer US.
11. Kirchmer, Mathius and Peter Franz. 2014a. "Chief Process Officer: The Value Scout." Research Paper. London, Philadelphia: BPM-D. June.
12. Kirchmer, Mathius and Peter Franz. 2014b. "The BPM-Discipline: Enabling the Next Generation Enterprise." Executive Training Documentation. London, Philadelphia: BPM-D.
13. Kirchmer, Mathius and Rolf Hofmann. 2013. "Value-driven Process Governance: Wettbewerbsvorteile durch die richtige Processorganisation." *IM + io*. München: GBI-Genios Deutsche Wirtschaftsdatenbank GmbH. March.
14. Kirchmer, Mathius. 2013. "How to Create Successful IT Projects with Value-Driven BPM." *CIO Magazine Online*. February 27. Framingham, MA: IDG Communications, Inc.
15. Kirchmer, Mathius. 2014. "Value-driven Design and Implementation of Business Processes: From Strategy to Execution at Pace with Certainty." Business Modeling and Software Design: 4th International Symposium. BMSD 2014. Luxembourg, Luxembourg. June 24-26. New York: Springer.
16. Kirchmer, Mathius. 2015. "The Process of Process Management: Mastering the New Normal in a Digital World." Business Modeling and Software Design: 5th International Symposium. BMSD 2015. Milan, Italy. July 6-8. New York: Springer.
17. Kirchmer, Mathius. 2017. *High Performance through Business Process Management: Strategy Execution in a Digital World, Third Edition*. Berlin: Springer.
18. Kirchmer, Mathius. 2019. "Value-driven Digital Transformation: Performance through Process." *IM + io*. München: GBI-Genios Deutsche Wirtschaftsdatenbank GmbH. June 28.
19. Kirchmer, Mathius., Franz, P., Gusain, R. 2018. "From Strategy to Process Improvement Project Portfolios and Value-Realization: A Digital Approach to the Discipline of Business Process Management." Business Modeling and Software Design: 8th International Symposium. BMSD 2018. Vienna, Austria. July 2-4. Proceedings 03-05. New York: Springer.
20. LEADing. 2014. "A Value Ontology and Value Semantic Description: Views, Stakeholders and Concerns, Version 3." Lead ES20007BCPG. Leading Practice Publication.
21. Mitchel, Charles, Rebecca L. Ray, and Bart van Ark. 2014. "CEO Challenge 2014: People and Performance, Reconnecting with the Customer and Reshaping the Culture of Work." White Paper. New York: The Conference Board.

22. Morris, Daniel. 2014. "Architect, Design, Deploy, Improve ADDI: A BPMS Development Methodology." Whitepaper. Chicago: Wendan Consulting.
23. Rummler, Geary A., Alan Ramias, and Richard A. Rummler. 2009. *White Space Revisited: Creating Value through Process*. Hoboken: John Wiley & Sons.
24. Scheer, August-Wilhelm. 1998. *ARIS: Business Process Modeling.* New York: Springer.
25. Scheer, August-Wilhelm. 2013. "Tipps fuer den CIO: Vom Tekki zum Treiber neuer Business Modelle." *IM + io*. München: GBI-Genios Deutsche Wirtschaftsdatenbank GmbH. December.
26. Slama, Dirk, and Ralph Nelius. 2011. *Enterprise BPM: Erfolgsrezepte für unternehmensweites Prozessmanagement*. Heidelberg: Dpunkt.verlag.
27. Stary, Christian. 2012. *S-BPM ONE: Scientific Research 4th International Conference Proceedings*. Vienna, Austria. April. Berlin: Springer.
28. Supply Chain Council. 2017. *SCOR Supply Chain Operations Reference Model, Version 12*. Cypress, TX: The Supply Chain Council. https://www.apics.org/apics-for-business/frameworks/scor12.
29. Wikipedia contributors, "Hoshin Kanri." Wikipedia, The Free Encyclopedia. https://en.wikipedia.org/w/index.php?title=Hoshin_Kanri&oldid=909775603 accessed June 23, 2017.

Chapter 6

1. Balanced Scorecard Institute. n.d. "Overview Balanced Scorecard." Balancedscorecard.org. http://www.ariscommunity.com/balanced-scorecard.
2. Champlin, Brett. 2006. “BPM Professionals: Roles and Responsibilities for an Emerging Discipline.” BPM Strategies Magazine, October. BPMInstitute.org.
3. Davenport, Thomas H. 2010. *Process Innovation: Reengineering Work Through Information Technology*. Boston, MA: Harvard Business School Press.
4. De Bruin, Tonia and Michael Rosemann. 2005. "Application of a Holistic Model for Determining BPM Maturity." *Business Process Trends*. February.
5. Delphi Group. 2003. "BPM 2003: Market Milestone Report." Delphi Group White Paper. Boston, MA: Delphi Group. http://www.delphigroup.com.
6. Dwyer, Tom. 2004. "BPMInstitute's State of Business Process Management." Executive White Paper, April. BPMInstitute.org.
7. Fischermanns, Guido. 2013. *Praxishandbuch Prozessmanagement*. Giessen: Schmitz.
8. Gartner Staff. n.d. "Reviews for Business Process Management Platforms." *Gartner Peer Insights*. Stamford, CT: Gartner Inc. https://www.gartner.com/reviews/market/BusinessProcessManagementPlatforms.
9. Hammer, Michael, and James Champy. 2003. *Business Reengineering: Die Radikalkur für das Unternehmen*. Frankfurt: Campus-Verl.
10. Harmon, Paul. 2004. "Evaluating An Organization's Business Process Maturity." Business Process Trends Newsletter. 2 3. http://www.caciasl.com/pdf/BPtrendLevelEval1to5.pdf.
11. IIBA. 2009. *BABOK: A Guide to the Business Analysis Body of Knowledge*. Toronto: International Institute of Business Analysis.

12. Kirchmer, Mathias. 2017. *High Performance Through Business Process Management: Strategy Execution in a Digital World, Third Edition*, 24. Cham, Switzerland: Springer.
13. Kirchmer, Mathius and Peter Franz. 2014. "Targeting Value in a Digital World." Whitepaper. London, Philadelphia: BPM-D.
14. Kirchmer, Mathius. 2015. "The Discipline of Value-driven Business Process Management." Executive Education Documentation 3 Days. Philadelphia: BPM-D.
15. Ko, Ryan K. L. 2009. "A Computer Scientist's Introductory Guide to Business Process Management BPM." *Crossroads.* 15 4: 11-18.
16. Madison, Dan. 2005. *Process Mapping, Process Improvement and Process Management: A Practical Guide For Enhancing Work and Information Flow*. Chico, CA: Paton Press.
17. Mahal, Arjit Singh. 2010. *How Work Gets Done: Business Process Management, Basics and Beyond*. 1–11. Westfield, NJ: Technics Publications.
18. Morris, Daniel, and Joel Brandon. 1994. *Re-engineering Your Business*. New York: McGraw-Hill.
19. Osterloh, Margit, and Jetta Frost. 2003. *Prozessmanagement als Kernkompetenz: Wie Sie Business Reengineering Strategisch Nutzen Können*. Wiesbaden: Gabler.
20. Parker, Burton G. 1995. "Data Management Maturity Model." McLean, VA: MITRE Software Engineering Center. July.
21. Porter, Michael. 1985. *Competitive Advantage.* New York: Free Press.
22. Rummler, Geary A. 2007. *Serious Performance Consulting: According To Rummler*. San Francisco, CA: Pfeiffer.
23. Rummler, Geary A., Alan Ramias, and Richard A. Rummler. 2009. *White Space Revisited: Creating Value through Process*. Hoboken: John Wiley & Sons.
24. Rummler-Brache Group. 2004. "Business Process Management in U.S. Firms Today." Rummler-Brache Group. March.
25. Scheer, August-Wilhelm, Ferri Abolhassan, Wolfram Jost, and Mathias Kirchmer. 2004. *Business Process Automation: ARIS in Practice*. Berlin, Heidelberg: Springer Berlin Heidelberg.
26. Sinur, Jim. 2004. "Leveraging the Three Phases of Process Evolution." Gartner Research Presentation. Miami, FL: Process World. April 25–28, 2004.
27. Spanyi, Andrew. 2006. *More for Less: The Power of Process Management*. Tampa, FL: Meghan-Kiffer Press.
28. Towers, Steve and BPMG. 2005. *In Search of BPM Excellence: Straight From the Thought Leaders*. Tampa, FL: Meghan-Kiffer Press.
29. Zur Muehlen, Michael. 2004. *Workflow-Based Process Controlling: Foundation, Design, and Application Of Workflow-Driven Process Information Systems*. Berlin: Logos.

Chapter 7

1. ABPMP. 2009. *Guide to the Business Process Management Common Body of Knowledge BPM CBOK Version 2.0*. Charleston, SC: ABPMP.
2. Alter, Steven. 1979. "Implementation Risk Analysis." In Doktor, R., R. L. Schultz, and D. P. Slevin. 1979. *The Implementation of Management Science*. 13: 103–120. Amsterdam: North-Holland.

3. Bossidy, Larry, and Ram Charan, Editors. 2002. *Execution: The Discipline of Getting Things Done*. Danvers, MA: Crown Publishing.
4. Bradach, Jeffrey L. 1996. "Organizational Alignment: The 7-S Model." *Harvard Business School Note 9-497-045*. November 19. Boston, MA: Harvard Business School Press.
5. Cartlidge, Alison, Colin Rudd, Marco Smith, Paul Wigzel, Stuart Rance, Sue Shaw, and Theresa Wright. 2004. "An Introductory Overview of ITIL." *Best Management Practice Portfolio*. London: TSO. http://www.get-best-practice.co.uk.
6. Casson, Don. 2006. "Evergreen ITIL and Change Management Survey." Q2. https://www.evergreensys.com.
7. Central Computer and Telecommunications Agency, CCTA. 1989. *IT Infrastructure Library, Second Edition*. London: HMSO.
8. CMMI Product Team. 2010. *CMMI for Services, Version 1.3 CMU/SEI-2010-TR-034*. Pittsburgh, PA: Software Engineering Institute, Carnegie Mellon University. http://resources.sei.cmu.edu/library/asset-view.cfm?AssetID=966.
9. CMMI Product Team. 2010. *CMMI for Development, Version 1.3 CMU/SEI-2010-TR-033*. Pittsburgh, PA: Software Engineering Institute, Carnegie Mellon University. http://resources.sei.cmu.edu/library/asset-view.cfm?AssetID=9661.
10. Cokins, Gary. 2001. *Activity-Based Cost Management: An Executive's Guide*. New York: John Wiley & Sons.
11. Florac, William A., and Anita D. Carleton. 2011. *Measuring the Software Process: Statistical Process Control for Software Process Improvement*. Boston, MA: Addison-Wesley.
12. Ginzburg, Michael J. 1979. "A Study of the Implementation Process." In Doktor, R., R. L. Schultz, and D. P. Slevin. 1979. *The Implementation of Management Science*. 13: 85–102. Amsterdam: North-Holland.
13. Hammer, Michael, and Lisa W. Hershman. 2010. *Faster, Cheaper, Better: The 9 Levers for Transforming How Works Get Done*. New York: Crown Business.
14. Harvard Business Review. 2005. *The Essentials of Managing Change and Transition: Business Literacy for HR Professionals*. Harvard Business School. Boston, MA: Harvard Business School Press and Society for Human Resource Management.
15. Kan, Stephen H. 2008. *Metrics and Models in Software Quality Engineering*. Boston, MA: Addison-Wesley.
16. Kaplan, Robert S., and David P. Norton. 1996. *The Balanced Scorecard*. Boston, MA: Harvard Business School Press.
17. Kolb, David A., and Alan L. Frohman. 1970. "An Organizational Development Approach to Consulting." *Sloan Management Review*. 12: 51–65.
18. Kotter, John P. 1996. *Leading Change*. Boston, MA: Harvard Business School Press.
19. Morris, Betsy. 2006. "New rule: Look Out, Not In. Old Rule: Be Lean and Mean." *CNN Money*. https://money.cnn.com/2006/07/10/magazines/fortune/rule4.fortune/index.htm.
20. Project Management Institute. 2004. *A Guide to the Project Management Body of Knowledge*. Newtown Square, PA: Project Management Institute.
21. Prosci Staff. n.d. "Prosci Change Management Methodology." Pro-Sci Change Management Learning Center. http://www.change-management.com/change-management-overview.htm.

22. Pyzdek, Thomas, and Paul A. Keller. 2010. *The Six Sigma Handbook: A Complete Guide for Green Belts, Black Belts, and Managers at All Levels*. New York: McGraw-Hill.
23. Sayer, Natalie J., and Bruce Williams. 2012. *Lean for Dummies.* Hoboken, N.J.: John Wiley & Sons.
24. Schein, Edgar H. 1987. *Process Consultation Volume II*. Reading, MA: Addison-Wesley.
25. U.K.OGC 2004, IT Infrastructure Library, 2nd ed., U.K. Office of Government Commerce
26. Waterhouse, Peter. 2006. "State of ITIL Adoption in North America: Survey Results." Webcast.
27. Wheeler, Donald J. 2000. *Understanding Variation: The Key to Managing Chaos.* Knoxville, TN: SPC Press.

Chapter 8

1. Acreto Staff 2019. "Infographic: Enterprise vs. IoT." Acreto.com. Jersey City, NJ: Acreto. https://acreto.io/infographic-enterprise-vs-iot.
2. Aguirre Mayorga, Santiago H. 2016. *Minería de Procesos: Fundamentos Y Metodología De Aplicación, Spanish Edition*. Bogotá: Pontificia Universidad Javeriana.
3. Bondel, Gloria. n.d. "Business Capability & Business Capability Map." *EAM Initiative Wiki*. Software Engineering Business Information Systems. Munich, Germany: Eam-initiative.org. https://eam-initiative.org/pages/yg7qjgxv78f5/Business-Capability-Business-Capability-Map.
4. Boulton, Clint. 2018. "What Is RPA? A Revolution In Business Process Automation." *CIO Magazine*. Framingham, MA: IDG Communications, Inc. https://www.cio.com/article/3236451/what-is-rpa-robotic-process-automation-explained.html.
5. Burnson, Patrick. 2019. "Digital Transformation Can Enable Typical Procurement Organizations To Reduce Costs by 45%." *Supply Chain Management Review*. August 27. Northbrook, IL: Peerless Media. https://www.scmr.com/article/digital_transformation_can_enable_typical_procurement_organizations_to_redu.
6. Carson, Brant, Giulio Romanelli, Patricia Walsh, and Askhat Zhumaev. 2018. "Blockchain Beyond the Hype: What Is the Strategic Business Value?" *McKinsey Digital*. June. New York: McKinsey & Company. https://www.mckinsey.com/business-functions/mckinsey-digital/our-insights/blockchain-beyond-the-hype-what-is-the-strategic-business-value#.
7. Champlin, Brett. 2006. "BPM 101." *BPM Institute Conference.* April 19–20. Chicago, IL: Brainstorm Group.
8. Davenport, Thomas H. 1992. *Process Innovation: Reengineering Work Through Information Technology*. Boston, MA: Harvard Business School Press.
9. Fuller, JR. 2016. "How to Design an IoT-Ready Infrastructure: The 4-Stage Architecture." *TechBeacon*. Berkshire, UK: Micro Focus International. https://techbeacon.com/enterprise-it/4-stages-iot-architecture.
10. Gonzalez, Adrian. 2015. "One More Prediction For 2016: Blockchain Technology Will Make Its Debut In Supply Chain Management." *Talking Logistics*. Newton, MA: Adelante SCM. https://talkinglogistics.com/2015/12/21/one-more-prediction-for-2016-blockchain-technology-will-make-its-debut-in-supply-chain-management/.

11. Guilder, George. 2018. "Two Blockchain Breakthroughs That Will Change the World." Profitablenews.com. Baltimore, MD: Profitable News. https://profitablenews.com/two-blockchain-breakthroughs-that-will-change-the-world.
12. Hammer, Michael, and James Champy. 2003. *Reengineering the Corporation: A Manifesto for Business Revolution*. New York: Collins Business Essentials.
13. Hammer, Michael. 1996. *Beyond Reengineering: How the Process Centered Organization Is Changing Our Work and Our Lives*. New York: HarperBusiness.
14. Hartanto, Jerry. 2019. "AI, Machine Learning, and Deep Learning: The Complete Guide." *InfoWorld.* February 21. https://www.infoworld.com/article/3339561/ai-machine-learning-and-deep-learning-everything-you-need-to-know.html.
15. Hung, Mark. 2017. "Leading the IoT." *Gartner Insights on How to Lead in a Connected World.* Stamford, CT: Gartner Inc. https://www.gartner.com/imagesrv/books/iot/iotEbook_digital.pdf
16. Khoshafian, Setrag. 2019. "Process + Data: It's About Time!" *RTInsights*. August 20. New Rochelle, NY: RTInsights.com. https://www.rtinsights.com/process-data-its-about-time.
17. Koplowitz, Rob, Christopher Mines, and Allison Vizgaitis. 2017. "Artificial Intelligence Revitalizes BPM: New Features Will Drive Deeper Customer Engagement In Core Processes." *Forrester.com*. February 10. Cambridge, MA: Forrester Research, Inc. https://www.forrester.com/report/Artificial+Intelligence+Revitalizes+BPM/-/E-RES136829.
18. Le Clair, Craig and Derek Miers. 2011. "The Forrester Wave: Dynamic Case Management, Q1 2011." Cambridge, MA: Forrester Research, Inc.
19. Le Clair, Craig, Alex Cullen, Shaun McGovern, and Diane Lynch. 2016. "Digitization Leaders Share Robotic Process Automation Best Practices." *Forrester.com*. May 2. Cambridge, MA: Forrester Research, Inc. https://www.forrester.com/report/Digitization+Leaders+Share+Robotic+Process+Automation+Best+Practices/-/E-RES134021.
20. Leinwand Paul and Cesare Mainardi. 2010. "The Coherence Premium." *Harvard Business Review.* 88 (6). Boston, MA: Harvard Business School Press.
21. Manyika, James, Michael Chui, Brad Brown, Jacques Bughin, Richard Dobbs, Charles Roxburgh, and Angela Hung Byers. 2011. "Big Data: The Next Frontier for Innovation, Competition, and Productivity." *McKinsey Global Institute Report*. May. New York: McKinsey & Company. https://www.mckinsey.com/business-functions/mckinsey-digital/our-insights/big-data-the-next-frontier-for-innovation.
22. Marr, Bernard. 2018. "The Key Definitions of Artificial Intelligence AI That Explain Its Importance." *Forbes.com*. February 14. New York: Forbes Inc. https://www.forbes.com/sites/bernardmarr/2018/02/14/the-key-definitions-of-artificial-intelligence-ai-that-explain-its-importance/#298b05004f5d.
23. Martin, Craig R. 2014. "Business by Design." Slideshare. https://www.slideshare.net/craigrmartin/business-by-design-43447500.
24. Mearian, Lucas. 2019. "Cios, You're Doing Blockchain Wrong." *Computerworld*. February 15. Framingham, MA: IDG Communications, Inc. https://www.computerworld.com/article/3340122/cios-you-re-doing-blockchain-wrong.html.

25. Munasinghe, Geethe. 2017. "An Introduction to WSO2 IoT Architecture." WSO2. Mountain View, CA: WSO2. https://wso2.com/library/articles/2017/07/an-introduction-to-wso2-iot-architecture.
26. One Network Enterprises Staff. 2017. "The 8 Keys to Achieving Success with Artificial Intelligence in Supply Chain." Dallas, TX: One Network Enterprises. http://www.onenetwork.com.
27. Panetta, Kasey. 2019. "7 Common Mistakes in Enterprise Blockchain Projects." *Gartner.com*. July 1. Stamford, CT: Gartner Inc. https://www.gartner.com/smarterwithgartner/top-10-mistakes-in-enterprise-blockchain-projects.
28. Porter, Michael. 1985. *Competitive Advantage.* 1: 11–15. New York: Free Press.
29. Prahalad, C.K and Gary Hamel. 1990. "The Core Competence of the Corporation." *Harvard Business Review.* May-June. Boston, MA: Harvard Business School Press.
30. ProcessMaker Staff. 2018. "Low Code versus Microservices." *ProcessMaker*. Durham, NC: ProcessMaker. http://documents.bpm.com/processmaker/2018-WP-LowCodevMicroservices.pdf.
31. Robledo, Pedro. 2018. "Process Mining Plays an Essential Role in Digital Transformation." *Medium.com*. New York: Medium. https://medium.com/@pedrorobledobpm/process-mining-plays-an-essential-role-in-digital-transformation-384839236bbe.
32. Rouse, Margaret. 2019. "What is robotic process automation RPA?" Definition. WhatIs.com. Newton, MA: TechTarget. https://internetofthingsagenda.techtarget.com/definition/robotic-process-automation.
33. Russell, Katie. 2019. "How Will Blockchain Change the Supply Chain?" *Fronetics.* August 1. Newburyport, MA: Fronetics. https://www.fronetics.com/how-will-blockchain-change-the-supply-chain.
34. Sawchuk, Christopher and Kurt Albertson. 2019. "World-Class Procurement: Redefining Performance in a Digital Era." *Procurement Executive Insight: The Hacket Group*. May 24. Miami, FL: The Hackett Group. https://bpc19.hackettconferences.com/wp-content/uploads/sites/7/2019/06/Hackett-NA-BPC-19-World-Class-Procurement-1906.pdf.
35. Scribani, Jenny. 2018. "Blockchain Governance: How Boundaries Can Help The Blockchain To Scale." *Visual Capitalist*. September 25. Vancouver, BC: Visual Capitalist. https://www.visualcapitalist.com/blockchain-governance-scale.
36. Spanyi, Andrew. 2006. *More for Less: The Power of Process Management*. Tampa, FL: Meghan-Kiffer Press.
37. Spend Matters Team. 2015. "Why Bitcoin's Blockchain Technology Could Revolutionize Supply Chain Transparency" *Spend Matters.* http://spendmatters.com/2015/11/09/why-bitcoins-blockchain-technology-could-revolutionize-supply-chain-transparency.
38. Techopedia Staff. n.d. "What is Data Architecture?" Definition. Techopedia.com. Edmonton, AB, Canada: Techopedia. https://www.techopedia.com/definition/6730/data-architecture.
39. Van Veen, Fjodor and Stefan Leijnen. 2019. "A Mostly Complete Chart of Neural Networks." Utrecht, Netherlands: The Asimov Institute. https://www.asimovinstitute.org/neural-network-zoo.

40. Violino, Bob. 2018. "Eight Keys to a Successful RPA Implementation." *CIO Magazine Online*. July 26. Framingham, MA: IDG Communications, Inc. https://www.cio.com/article/3292923/8-keys-to-a-successful-rpa-implementation.html#tk.cio_rs.
41. Violino, Bob. 2018. "Five Reasons RPA Deployments Fail." *CIO Magazine Online*. October 17. Framingham, MA: IDG Communications, Inc. https://www.cio.com/article/3313638/5-reasons-rpa-deployments-fail.html#tk.cio_rs.
42. Voshmgir, Shermin. 2019. *Token Economy: How Blockchains And Smart Contracts Revolutionize the Economy*. Berlin: BlockchainHub.
43. Whittle, Ralph, and Conrad B. Myrick. 2005. *Enterprise Business Architecture: The Formal Link Between Strategy and Results*. 31. Boca Raton, FL: Auerbach.

Chapter 9

1. Aalst, Wil van der, and Kees Max van Hee. 2004. *Workflow Management: Models, Methods, and Systems*. Cambridge, MA: The MIT Press.
2. Aguirre, DeAnne and Micah Alpern. 2014. "10 Principles of Leading Change Management." *Strategy+Business*. June 6. New York: PricewaterhouseCoopers. https://www.strategy-business.com/article/00255?gko=6c601.
3. Balanced Scorecard Institute n.d. "What is the Balanced Scorecard?" Balancedscorecard.org. https://www.balancedscorecard.org/BSC-Basics/About-the-balanced-scorecard.
4. Chang, James F. 2006. *Business Process Management Systems Strategy and Implementation*. Boca Raton, FL: Auerbach.
5. Cummins, Fred A. 2010. *Building the Agile Enterprise: With SOA, BPM and MBM*. Burlington, MA: Elsevier Science.
6. Derler, Andrea, Anthony Abbatiello, and Stacia Garr. 2017. "Better Pond, Bigger Fish: Five Ways to Nuture Developing Leaders For an Ecosystem of Growth." January 23. *Deloitte Insight*s. New York: Deloitte. https://www2.deloitte.com/us/en/insights/deloitte-review/issue-20/developing-leaders-networks-of-opportunities.html.
7. Dumas, Marlon, Wil van der Aalst, and Arthur Ter Hofstede. 2010. *Process-Aware Information Systems: Bridging People and Software Through Process Technology*. Hoboken, NJ: Wiley Interscience.
8. Fischer, Layna. 2011. *Taming the Unpredictable. Real World Adaptive Case Management: Case Studies and Practical Guidance*. Lighthouse Point, FL: Future Strategies Inc.
9. Folz, Christina. 2016. "10 Tips for Changing Your Company's Culture—and Making It Stick." June 27. SHRM. Alexandria, VA: Society for Human Resource Management. https://www.shrm.org/resourcesandtools/hr-topics/employee-relations/pages/10-tips-for-changing-your-companys-culture—and-making-it-stick.aspx.
10. Hartanto, Jerry. 2019. "AI, Machine Learning, and Deep Learning: The Complete Guide." *InfoWorld.* February 21. https://www.infoworld.com/article/3339561/ai-machine-learning-and-deep-learning-everything-you-need-to-know.html.
11. Harvard Business Publishing Staff. 2018. "The 2018 State of Leadership Development: Meeting the Transformation Imperative." Boston, MA: Harvard Business Publishing.

https://2uzkee3eob510v4rszskfx11-wpengine.netdna-ssl.com/wp-content/uploads/2018/11/20853_CL_StateOfLeadership_Report_2018_Nov2018.pdf.
12. Hollingsworth, David. 1995. *The Workflow Reference Model*. Doc. No. TC00-1003, Version 1.1. Winchester: Workflow Management Coalition.
13. Kellerman, Barbara. "The End of Leadership." United States: HarperBusiness, 2012.
14. Koplowitz, Rob, Christopher Mines, and Allison Vizgaitis. 2017. "Artificial Intelligence Revitalizes BPM: New Features Will Drive Deeper Customer Engagement In Core Processes." *Forrester.com*. February 10. Cambridge, MA: Forrester Research, Inc. https://www.forrester.com/report/Artificial+Intelligence+Revitalizes+BPM/-/E-RES136829
15. Krafzig, Dirk, Karl Banke, and Dirk Slama. 2005. *Enterprise SOA: Service-Oriented Architecture Best Practices*. Upper Saddle River, NJ: Prentice Hall Professional Technical Reference.
16. Lankhorst, Marc M. et al. 2009. *Enterprise Architecture at Work: Modelling, Communication and Analysis, Second Edition*. Berlin: Springer.
17. Luckham, David C. 2010. *The Power of Events: An Introduction to Complex Event Processing in Distributed Enterprise Systems*. Boston: Addison-Wesley.
18. Mind Tools Team. 2019. "Project Management Phases and Processes: Structuring Your Project." mindtools.com. https://www.mindtools.com/pages/article/newPPM_63.htm.
19. Moore, Connie, Alexander Peters,Tom Pohlmann, and Andrew Magarie. 2010. "Business Process Pros Hold The Key To 21st Century Business Transformation." *Forrester.com*. March 5. Cambridge, MA: Forrester Research, Inc. https://www.forrester.com/report/Business+Process+Pros+Hold+The+Key+To+21st+Century+Business+Transformation/-/E-RES56536.
20. Panorama Group Staff. 2019. "2019 ERP Report." Greenwood Village, CO: Panorama Consulting Group. https://cdn2.hubspot.net/hubfs/4439340/2019-ERP-Report-3.pdf.
21. Project Management Institute. 2004. *A Guide to the Project Management Body of Knowledge*. Newtown Square, PA: Project Management Institute.
22. Prosci Staff n.d. "Change Management Best Practices." Prosci.com. https://www.prosci.com/resources/articles/change-management-best-practices
23. Prosci Staff n.d. "Definition of Change Management." Prosci.com. https://www.prosci.com/resources/articles/change-management-definition.
24. Prosci Staff n.d. "What Is Change Management?" Prosci.com. https://www.prosci.com/resources/articles/what-is-change-management.
25. Rabinowitz, Noah. 2019. "Ten Orthodoxies That Distract Us From Real Leadership Development." *Capital H Blog*. April 24. New York: Deloitte. https://capitalhblog.deloitte.com/2019/04/24/ten-orthodoxies-that-distract-us-from-real-leadership-development/#more-8341.
26. Reichert, Manfred, and Barbara Weber. 2012. *Enabling Flexibility in Process-Aware Information Systems Challenges, Methods, Technologies*. Berlin: Springer.
27. Von Halle, Barbara. 2002. B*usiness rules Applied: Building Better Systems Using The Business Rules Approach*. New York: John Wiley & Sons.
28. Weske, Mathias. 2007. *Business Process Management: Concepts, Languages, Architectures*. Berlin: Springer.

Chapter 10

1. Bossidy, Larry, Ram Charan, and Charles Burck. 2011. *Execution: The Discipline of Getting Things Done*. London: Random House Business Books.
2. Davenport, Thomas H. 1992. *Process Innovation: Reengineering Work Through Information Technology*. Boston, MA: Harvard Business School Press.
3. Hamel, Gary. *Leading the Revolution.* Cambridge, MA: Harvard Business School Press.
4. Hammer, Michael. 2001. *The Agenda*. New York: Crown Business.
5. Kaplan, Robert S. and David P. Norton, "Using the Balanced Scorecard as a Strategic Management System," Harvard Business Review, January- February 1996.
6. Kaplan, Robert S. and David P. Norton. 2001. *The Strategy-Focused Organization*. Boston, MA: Harvard Business School Press.
7. Kaplan, Robert S., and David P. Norton. 1996. *The Balanced Scorecard*. Boston, MA: Harvard Business School Press.
8. Porter, Michael. 1996. "What is Strategy?" *Harvard Business Review.* November-December 1996. Boston, MA: Harvard Business School Press.
9. Rosemann, Michael. 2006. "Process Portfolio Management." Brisbane, Australia: Queensland University of Technology QUT.
10. Rummler, Geary A., and Alan P. Brache. 1995. *Improving Performance: How to Manage the White Space on the Organization Chart*. San Francisco, CA: Jossey-Bass.
11. Smith, Dick and Jerry Blakeslee with Richard Koonce. 2002. *Strategic Six Sigma: Best Practices from the Executive Suite*. New York: John Wiley & Sons.
12. Smith, Howard and Peter Fingar. 2003. *Business Process Management: The Third Wave*. Tampa, FL: Meghan-Kiffer Press.
13. Treacy, Michael and Fred Wiersema. 1995. *The Discipline of Market Leaders*. Boston, MA: Addison-Wesley.
14. Treacy, Michael. 2003. *Double-Digit Growth: How Great Companies Achieve It -- No Matter What*. New York: Penguin Group.

11.6 Appendix F: Glossary

The purpose of the CBOK Glossary is to define terms for business professionals. The definitions are thus not technical in nature but reflect plain business English. To help reduce confusion and promote understanding, some terms have descriptive information along with the definition.

ABPMP recognizes that any term in BPM or BPMS today is open to interpretation because people apply definitions used wherever they learned the term. Consequently, most terms have competing definitions, and this complicates communication in companies and among BPM Professionals. In creating this glossary, we had to decide whether to list numerous competing definitions or to provide a standard definition for each term. Our goal was to create consistency in BPM discussions for the BPM industry and our members, so we have provided a single standard definition for all terms. This glossary is thus a step in achieving the ABPMP goal of creating a standard understanding of BPM throughout the world.

Although these definitions may be somewhat different from those you currently use, they are the ABPMP standard definitions and are used throughout the CBOK.

A

Activity
The aggregation of tasks needed to deliver a definable part of a subassembly or service. An example is the milling of a part that will become part of a subassembly. Here the raw material will need to be heat treated, then milled, then degreased, then polished, then tested for tolerance. These tasks form a definable outcome or part of a sub-assembly. In a service business (insurance), an example is the claim review, which may be part of the claim adjudication subprocess, which in turn may be part of the line of business management process. Activities can aggregate to form scenarios. These are groups of activities and their tasks that are always executed in certain events or in response to specific needs — such as customer registration or onboarding in a banking wealth management line of business.

Activity-Based Costing
An approach to cost accounting. It starts by determining how much it costs to perform a given activity in a process, and then adds up costs of all activities in the process to determine the total process costs. Fixed, variable, and direct costs associated with the activity are considered. This analytical technique is used as part of a business transformation effort to gain an understanding of the cost and income associated with a product or service in order to determine true profitability.

Agile Methodology
One of several software development methodologies based on iterative and incremental development, as opposed to traditional linear or waterfall-type software development methodologies. An Agile methodology provides a framework to support the design, development, and testing of software solutions throughout their life cycle.

Agile methods (for example, Scrum) encourage rapid and flexible responses to change by promoting adaptive planning, collaborative requirement identification, and rationalization between a self-organizing cross-functional team, as well as time-boxed, incremental development of solutions. Many modern commercial software development efforts follow this type of approach.

Architecture
In process modeling, a purposeful arrangement of models in a framework that describes a whole business in terms of its component parts. These may be created in compliance with well-known frameworks to reduce ambiguity. Examples include architectures based on The Zachman Framework and its derivatives, such as The Open Group Architectural Framework (TOGAF).

ARIS (Architecture of Integrated Information Systems)
An approach to enterprise modeling. It offers methods for analyzing processes and taking a holistic view of process design management workflow and application processing. The ARIS approach provides a well-documented, methodological framework for BPM, based on Prof. August Wilhelm Scheer's research from the 1990s. ARIS uses a modeling language known as Event-Driven Process Chain (EPC), which brings multiple aspects of enterprise modeling together using the ARIS House of Business Engineering framework.

B

Benchmarking
A comparison of the performance of a process in one organization to performance of similar processes in companies within the same industry. Many companies seek benchmark data to help with business transformation efforts and determine how well other companies are managing similar processes.

Big Data
Data from the outside world, obtained from social media, sensors, and mobile capture.

Bottleneck
A constraint that creates a backlog around a specific point — the bottleneck. Usually, these constraints prevent the system from achieving more of its goals. There are many ways the constraints can show up. They can be internal or external to the system types and could be a result of equipment, people, policies, or ineffective processes. Identifying constraints and alleviating bottlenecks are often a key objective of business transformation projects.

Business Analyst (BA)
A person performing this role is responsible for analyzing the business operation's work and workflow to help propose changes that will eliminate problems, cut costs, improve quality, and improve customer interaction. Once improvements are identified, the Business Analyst then defines how information technology changes can improve business operation. Business Analysts usually work as part of the process team.

Business Architecture
The design of a business operation, usually described in terms of business capabilities and supporting technology capabilities. This design is conceptual and is used to determine how an organization will need to change to support a given strategy.

Business Architect
A person performing this role is responsible for determining how the business operation needs to change to support business strategy. The Business Architect works with the corporate planning group to define the business outcomes needed to deliver the strategy, and to identify how the current and anticipated business capabilities will need to change in order to produce these defined outcomes. The Business Architect then works with the Process Architect to define how the organization's processes must change to support this mix of current, modified, and new business capabilities.

Business Process Improvement (BPI)
Business process improvement focuses on incrementally improving existing processes. There are many approaches, including the popular Six Sigma approach. BPI is usually narrowly focused and continuously applied at various stages during the life of a process. BPI includes the selection, analysis, design, and implementation of the (improved) process. This usually results in an initiative or project to improve the performance of a particular process in alignment with the organizational strategy and customer expectations.

Business Process Management (BPM)
BPM is a management discipline that integrates the strategy and goals of an organization with the expectations and needs of customers by focusing on end-to-end processes. It brings together strategies, goals, culture, organizational structures, roles, policies, methodologies, and IT tools to:

a. Analyze, design, implement, control, and continuously improve end-to-end processes
b. Establish process governance

BPM is focused on delivering operational improvement, or, in a large-scale change, transformation. This process-centric approach to business management is supported by automated tools to deliver an operational environment that supports rapid change and continuous improvement. BPM provides a view of the business activity through the use of process models with clearly visible associated business and technical operational rules.

BPM Methodology
A formal, written, comprehensive list of organized tasks with supporting documentation on how the tasks should be performed, the data that the team should look for, and identification of the deliverables from tasks. Altogether, this information should provide direction on how the BPMS or BPM project should be done.

Business Process Management Center of Excellence (BPM CoE)
An internal group within an organization that specializes in BPM and BPMS use and helps the business address Enterprise Process Management and performance issues.

Business Process Management Operating Environment
BPM today melds business process design, improvement, and transformation methods and techniques, with Business Process Management Suite (BPMS) automation capabilities to achieve radical business transformation. In this emerging environment, the BPM teams use the full spectrum of BPMS tools to deliver business and IT change. Together, BPM and BPMS form a new operating environment that integrates new business management automation with legacy production applications to open access to data and functionality.

Business Process Modeling
The set of activities involved in creating representations of an existing or proposed business process. It can provide an end-to-end perspective or a portion of an organization's primary, supporting, or management processes.

Business Process Modeling Notation (BPMN)
A set of graphical standards that specify the symbol sets used in BPM diagrams and models. As such, they define the symbols used to depict process and workflow in business modeling.

BPMN was created by the Business Process Management Initiative, now merged with the Object Management Group (OMG), an information systems standards-setting group. BPMN has growing acceptance as a standard from many perspectives, which has resulted in its inclusion in several of the most widely-used modeling tools. BPMN provides a robust symbol set for modeling different aspects of business processes. Like most modern notations, the symbols describe definite relationships such as workflow and order of precedence.

In addition to symbol standardization, BPMN attempts to standardize terminology and modeling techniques. It serves a purpose similar to the Event-driven process chain (EPC) notation used in the ARIS methodology.

This standard has gone through several iterations; the latest is 2.0. However, the standard will continue to be modified and the version number and content will change. BPM modeling tool vendors and BPMS vendors are likely to adjust to the standards as they change.

Although BPMN provides a set of standard modeling symbols, most organizations still need to apply their own architectural and engineering standards to have a complete BPM modeling solution.

Business Process Management Suite (BPMS)
A set of automated tools that allow the organization to be modeled, showing flow, rule use, data use and more. A BPMS provides an integrated suite of software that defines the application architecture and infrastructure technology needs for the operation and execution of the applications that run within the

BPMS technical environment. The BPMS operating environment addresses business users' desire to see and manage work as it progresses across organizational activity.

A BPMS supports process modeling, design, development, and the managed execution of work and applications. The information in the BPMS design and rules libraries is used to automatically generate the applications that are used in the solution. This automation allows very fast change, with control over the way the change is applied.

A BPMS provides a new type of business environment that melds the organization and IT. We use the term “environment” to describe the resulting operation when using a BPMS, because these tool suites generate the applications and provide the overall operating environment through which the organization and the applications run.

While component parts of these tool suites have existed since the late 1980s, they were not combined until a breakthrough in the early 2000s. The real breakthrough that allowed this coalescing of products was the advent of rules-based application generation that was tied to process models. Since 2003, various component products have been brought together to form BPM product suites. It is the melding of the BPM approaches, techniques, and tools, along with their ability to quickly generate applications, that delivers the speed needed to optimize an operation and to support rapid change. This ability is what delivers both initial optimization and continuous improvement.

BPMS Architecture

A design of how the various component software tools that work together to provide a BPMS environment fit together.

BPMS/BPM or BPMS-Supported BPM

A business operation that follows a BPM approach to improvement using a BPMS tool to drive and support business activity and coordinate the use of legacy IT applications. This combination of approach and technology forms an operating environment where the organization actually runs using the BPMS.

BPMS Repositories

Electronic databases (repositories) that have the ability to store a majority of an organization’s business process information in a single location. A repository can significantly reduce the need for managing large volumes of Microsoft Office documents (for example, Word, Excel, and Visio) and simplifies version control. They do not, however, usually store all the real-time data that is collected from transactions processed through the BPMS-supported business operation (through data entry in the screens that are used) or obtained from legacy business applications or databases.

Business Process Transformation

The fundamental rethinking of a process. Transformation is focused on the end-to-end alignment and change of an organization’s functions, processes, organization, data, metrics, and technology in accordance with the strategic objectives and tactical demands of the organization, delivering a significant, measured increase in customer value.

The goal is innovation and the application of new concepts, capabilities, technology, and so on, to the design of the work that needs to be done. In this business redesign, no idea is off the table. No option is initially rejected — unless by company policy, law, or financial reality. Improvement is thus not the goal, but a by-product of a radical change to the way the process is approached and performed. This level of change is, by nature, invasive and disruptive.

C

Capability Maturity Model (CMM)

A Capability Maturity Model (CMM) lists important activities common to similar organizations and provides rating scales (for example, 1–5) for each activity, along with descriptions of what each rating means. A CMM is a way of evaluating how well an organization does what it does. CobiT is an example of a framework that contains a CMM used to rate the activities of IT divisions across all stages of service design and implementation. The ratings of a CMM *may* be correlated to other measures of organizational success, such as brand value, profitability, and market growth.

A CMM, when used by external, impartial, third-party evaluators, helps other interested parties compare multiple organizations. When used internally, a CMM can be used to establish an organizational vision and organizational and individual goals. This model helps set the time-frame in which an organization may achieve each level of the CMM.

Change Management

A structured approach to manage the people- and organization-related aspects of change to achieve the desired business outcomes. Change management is aimed at helping management, employees, and stakeholders to accept and embrace change in their current business environment. Change management often involves conducting formal change-impact assessments, developing individual action plans, improving communications, and providing training to counter resistance. The result is that these plans help align changes to the overall strategic direction of the organization.

Continuous Improvement

An approach to operational process improvement that is based on the need to continually review operations for problems, cost reduction opportunities, streamlining, and other factors that together allow optimization. Often associated with process methodologies, continuous improvement activity provides ongoing insight, measurement, and feedback on process performance to drive improvement in the execution of processes.

In continuous improvement (following evaluation techniques like Six Sigma), business managers work with BPM and IT professionals to implement performance monitoring and measurement — that is, to identify, define, measure, analyze, improve, and control business processes. This method leads to an ongoing list of improvement opportunities and related projects that allow the organization to optimize its operations.

Critical Success Factor (CSF)

Critical success factors (CSFs) are those activities and capabilities that are essential for an organization to succeed in its market. CSFs are those few things that absolutely, positively must go right to ensure success for the organization. Because these factors are industry (and at times geographically) specific, they vary from company to company. These factors relate to what the organization needs to do to succeed in a continuous manner, not necessarily what it is currently doing.

Typically referring to process-related improvement programs, CSFs are the key factors as relayed by stakeholders that are important to the success of the project or program.

Cross-functional processes

See Enterprise Process Management.

Cloud Computing
Cloud computing is the delivery of computing resources to an organization as a complete service over the Internet, rather than having the organization purchase each component separately and internally manage and support the computing resource. Think of it as renting a computing resource instead of buying, building, and operating your own computing infrastructure. Similar to the time-share computing services of the 1970s, 1980s, and 1990s, cloud computing provides users with access to software applications, data, hardware, and support resources without the users needing to know the location and other details of the computing environment. End-users access cloud-based applications through a web browser. Access is to business software and data that are stored on servers at remote locations. Cloud computing is also referred to as Software as a Service (SaaS).

D

Data Flow Analysis
An analysis technique that seeks to understand how data flows through a system. Data flow analysis looks at data use in different parts of an organization, as well as how data is used by applications supporting a given business process.

DCOR
Design Chain Operations Reference: a reference model created by the Supply Chain Council.

Dynamic Business Applications
Applications that can quickly adapt to changing business needs, competitive pressure, and market opportunity.

E

Enterprise Process Management (EPM)
EPM is the application of BPM principles, methods, and processes to an individual enterprise. It (a) assures the alignment of the portfolio and architecture of end-to-end processes with the organization's strategy and resources, and (b) provides a governance model for the management and evaluation of BPM initiatives.

Enterprise Process Model
A model that shows the full end-to-end activity (high-level view) needed to create the outcome (service or product) of the process. Enterprise process models are also called value chain models. Depending on the needs of the organization or project, these models can be created at different levels of detail — processes decomposed into subprocesses, activities, and tasks — to provide a complete functional view.

Enterprise Resource Planning (ERP) systems
A pre-packaged set of business software applications that help integrate internal and external management information across an organization. Typical areas of functionality include finance and accounting, sales and service, manufacturing, inventory management, procurement, and customer relationship management. ERP systems can run on a variety of computing platforms and typically feature a central database for storing information.

Enterprise Service Bus (ESB)
A software architecture — supported by a set of software tools, software, and a communication medium or carrier — that moves data between applications and communications equipment. The combined ESB components control the movement of data between computers.

Event-driven process chain (EPC)
Event-driven process chain models are a type of flowchart used for business process modeling. They serve a purpose similar to BPMN models in supporting business process improvement by helping to link different views of an enterprise model together. An EPC considers *events* as triggers to or results from a process step; this is useful for modeling complex sets of processes. EPC triggers resulting from a process step are called *functions*. Thus, the flow is normally event-function-event.

F

Failure Mode and Effects Analysis (FMEA)
A FMEA is a Six Sigma risk assessment technique that identifies how a product, service, or process can fail, estimates the related risks, and prioritizes actions that reduce the risk of failure.

Flowcharting
A type of diagram that represents in a visual format a sequence of events, processing steps, and/or decisions. Originally approved as an ANSI standard, flowcharting includes a very simple and small set of symbols, which are not standardized; it facilitates *quick capture* of process flow.

Framework
In process modeling, a framework is any planned association among the models applied to meet a policy, design, or usability requirement. The framework may or may not be architecturally significant. Example: a value chain for a process, with overlays depicting aspects of performers, timing, and financial elements, and with event chains describing details of process steps.

G

BPM Governance
BPM governance orchestrates the process of process management and provides a sustainable continuous process improvement capability, which is aligned with the business strategy.

H

Handoffs
Any point in a process where work or information passes from one system, person, or group to another is a *handoff* for that process. Handoffs are often illustrated as process interfaces or intermediary events.

I

Integrated Definition Language (IDEF)
A Federal Information Processing Standard that highlights the inputs, outputs, mechanisms, and controls of a process, and clearly links processes up and down levels of detail; IDEF is a good starting place for an enterprise-wide view of an organization.

ITIL
ITIL stands for Information Technology Infrastructure Library. It is a collection of best practices for Information Technology (IT) service management.

J

K

Key Performance Indicator (KPI)
KPI refers to the metrics or measures of a process that are indicative of overall performance.

Companies that measure performance should have set targets and standards for measuring performance on those things they consider to be really important. These measures are called key performance indicators (KPIs). KPIs measure factors that management believes are an indication of operational excellence. To be a realistic indicator, each KPI should be based on a reasonable target and should change over time as the organization improves.

L

Lean
A philosophy and approach that stresses the elimination of waste or non-value-add work through a focus on continuous improvement to streamline the operations. Lean is customer-centric and stresses the concept of eliminating any activity that fails to add value to the creation or delivery of a product or service. Lean is focused on providing higher quality, reduced cycle time, and lower costs. Because it produces improved production systems, it is believed to increase production capability and flexibility. But in practice, its concepts can be, and have been, applied in all areas of an organization. James Womack and Daniel Jones developed the term "Lean" in their book about the Toyota Production System (TPS), *The Machine That Changed the World*. Today, Lean is supported by tools and statistical methods that, although not as robust as those of Six Sigma, are an important part of improvement projects. For the most part, Lean has been used in manufacturing, where organizations are applying Lean tools in service and transactional settings with great success. Typical results show dramatic reductions in time while significantly boosting quality. This approach is sometimes combined with Six Sigma techniques and referred to as Lean/Six Sigma (L-SS).

M

Measurement
The quantification of data (or data set) in an acceptable standard and quality (accuracy, completeness, consistency, and timeliness).

Measurable Activity
Any properly defined activity is measurable. At a minimum, the number of cases coming into the activity, the time in the activity, the error rate, and multiple other factors can be measured. That an activity *can* be measured, however, does not mean it *should* be measured. A measurable activity is one that should be measured. It may be a cost driver, a quality checkpoint, or something else. But care should be taken in identifying measurable activity because it is easy to measure the wrong things, and it is easy to over-measure and create worthless reports.

Metric
A quantitative measure of a given attribute in a system, component, or process. Metric represents an extrapolation or a mathematical calculation of measurements, resulting in a derived value.

Modernization
Activity that uses the knowledge of the current operation and leverages new technology, new manufacturing techniques, and new management philosophies to define how the products or services will be produced by the operation.

N

Notation
The specific set of symbols and their rules of usage in describing a thing. There are notations created or adapted for use in BPM, just as in other fields. Flowcharting is an example of a notation used both for business process documentation and for documenting computer-programming logic. Other examples include BPMN and EPC.

O

P

Performance Management
Performance management is the use of performance information to control the process or workflow/business unit's productivity, quality, cost, and so on, against predetermined targets. This measurement information is used to direct specific improvement that helps reach performance targets.

Performance Measurement
All business activities can be monitored, measured, and evaluated when properly understood and modeled. Although this measurement can be used to monitor the overall performance of a process, it typically refers to the measurement of groups of activities against specific standards, targets, KPIs or success factors.

Performance Evaluation
The identification of gaps between how a process is currently performing in relation to how it should be performing to meet the organization's objectives. This evaluation can be against standards, targets or existing performance.

Process
A process is a set of functions in a certain sequence that delivers value to a customer. Processes are started by clearly defined external events.

They are formed from a combination of all the activities and support that are needed to produce and deliver an objective, outcome, product, or service, regardless of where the activity is performed. These activities are usually a cross-functional, cross-organization aggregation of activities that work together to create an end product or service. Activities are shown in the context of their relationship with one another to provide a picture of sequence and flow.

This context includes a defined set of activities or behaviors performed by humans, systems, or a combination of both to achieve one or more goals. Processes are triggered by specific events and have one or more outcomes that may result in the termination of the process or a handoff to another process. Processes are composed of a collection of interrelated tasks or activities that solve a particular issue. In the context of Business Process Management, a *business process* is defined as end-to-end work that delivers value to customers. The notion of end-to-end work is critical as it involves all of the work, crossing any functional boundaries, necessary to completely deliver customer value.

Process Analysis

Process analysis is the act of conducting a thorough review and arriving at a complete understanding of a business process (or portion thereof), with the goal of maintaining or achieving process excellence, or achieving incremental to transformational improvements in a business process.

Process analysis involves looking at all components of a process — inputs, outputs, mechanisms, and controls — inspecting each component individually and as they interact to produce results. These components can often be categorized into the people, processes, applications, data, and technology needed to support a business goal or objective. Analyses cover and *uncover* quality, time, and costs at all points of a business process, from inception to completion.

Aids to process analysis include:

- Visual process models, both static and dynamic
- Data collected at the beginning, duration, and end of key activities, lower-level processes, and the entire business process itself
- Business process analysis methods such as value chain analysis, end-to-end modeling, and functional decomposition

Some typical process analyses are:

- Resource utilization
- Distribution analysis
- Cycle time analysis
- Cost analysis
- Software application usage
- Global and local process variations

Holistic business process analyses evaluate:

- Total cost of the process tools (for example, computer systems)
- Impact of the process on internal participants (employees) and external (paying) customers and stakeholders
- Impact of the process on the organization's community (for example, environmental impacts) and other stakeholders

Process Analyst

A person with this role is responsible for working with business managers and staff to define and validate the current business operation and design future process models with business participants, Process Architects, and Process Designers. Their role is to help identify how a business operation really functions and then to help identify, design, build, and deploy improvement. They are often called upon to train project team members on modeling standards and approaches as defined by the Process Architect and Business Architect.

Process Manager or Leader

A person with this role manages process transformation projects, leads process discovery and design workshops, coaches Process Owners, and measures and reports on process performance.

Process Architect

A person with this role is focused on defining, redesigning, and optimizing activities in a process or group of processes. These people work with Business Architects to look at how processes need to change to deliver business goals, with Solution Architects to ensure performance, maintainability, and scalability, and with Enterprise Architects to identify IT capability, limitations, and support changes.

Process Component
The parts of a process: inputs, outputs, mechanisms, and controls.

- **Inputs** are resources or data that must be present, and *triggers* (different types of events) that invoke a process.
- **Mechanisms** are the *tools*, including machines, systems, and people, that perform *activities*, the actions upon and in response to the inputs.
- **Controls** are the requirements, constraints, guides, and restraints; and defining laws, policies, rules and regulations that shape and determine the actions upon the inputs. Mechanisms and controls can be the same: for example, regulations, money, or people.
- **Outputs** are the results of the actions of the mechanisms, guided by the controls and mechanisms, upon the inputs. Optimally, outputs are services or products meeting or exceeding the time, quality, or cost expectations of an organization's customers. They may also be events that trigger other processes in the same or in a different organization.

Process Culture
Organizations where the business processes are known, agreed on, communicated, and visible to all employees.

Process Design
Process design is the act of transforming an organization's vision, goals, and available resources into a discernible, measurable means of achieving the organization's vision. Process design may start with process analysis; best practices from similar organizations; process reference models from industry-standards organizations (for example, SCOR or eTOM) or third party consultants; or *greenfield* — ideas coupled with the experience and insights of the process design team. Process design focuses on defining what the organization will do to achieve its financial and other goals.

Process Designer
A person in this role works with business managers and staff to define and validate the future-state operational design of processes. The Process Designer is thus the catalyst to the future-state design and its continuous evolution. These people understand the mechanisms of the organization and know how to develop a solution that meets performance targets, is scalable, and can be easily maintained. The Process Architect views the process from the perspective of how it interacts with the bigger picture (outside-in).

Process Flow
The aggregation of subprocesses into a sequential relationship that shows the order in which they are performed.

Process Management Maturity
A measure of the state of an organization's journey to consider and manage work using a process-centric approach. The level of maturity is defined by comparing the organization's current operation against characteristics and capabilities that are defined in one of the many process maturity models in the market.

Process Manager
A person in this role performs and coordinates the work on a process or processes and manages the process and processes' business performance.

Process Modeling
Process modeling is the act of creating visible illustrations, which can be static or dynamic, of what an organization does to produce services or products (ideally of value to one or more customers). Optimally, process modeling results in an illustration that an independent evaluator can compare and match to the organization's process.

Process Organization
An organization that is structured, organized, managed, and measured around its primary business processes. Its knowledge area addresses two types of organizations:

- The process-driven organization
- The roles and responsibilities of the governing bodies needed to support the process-driven organization

Process Owner
A person in this role has the ongoing responsibility and accountability for the successful design, development, execution, and performance of a complete end-to-end (cross-functional) business process.

Process ownership can be adopted full time or as an additional responsibility, as a line or staff function.

Executive Process Owners (Enterprise Process Owners and Chief Process Officers) commonly have financial responsibility for groups of business processes. They have an inherent investment in the successful execution of cross-functional business processes that are key to the success of the organization.

Process Owners are among the essential components to business process success. A business process without an organizationally influential Process Owner is like a ship without a rudder, propeller, and sails — the business process can't execute in the most efficient and effective way possible.

Process Team
A process team is a Process Owner and the supporting players who define, analyze, and refine a business process.

The more common process team roles include:

- Process manager
- Process analyst
- Process designer
- Process architect
- Business analyst
- Subject matter expert
- Executive management and leadership

Process teams are often advised by a Business Architect and/or Process Architect.

Q

R

Reference Model
A normalized model that provides a high-level integrated view of an organization, its technology, and its data; it is used as a reference for building similar models. Reference models are useful in providing a

degree of standardization among elements of a discipline. A well-known reference model is the Supply Chain Operations Reference (SCOR), which allows for describing supply chains using common terminology and relationships to aid in comparisons and diagnostics.

Another popular industry reference model is the eTOM or Enhanced Telecom Operations Map published by the TM Forum. The eTOM model describes the full scope of business processes required by a telecom company and defines key organizational and business process elements and how they interact. eTOM is often associated with ITIL, a standard framework for best practices in information technology. Many consulting organizations also offer business process reference models for specific industries.

Risk Analysis

Examines the effectiveness of process control points against given stresses to determine when something will fail. It also can mean the level of risk that can be expected in a given course of action and the probability of failure — such as the probability of project failure if a given action is or is not taken.

Role

A business role is a group of related skills with a level of authority to perform a given task. This includes all task types whether they are a manual or system enabled. Business roles *are not* the same as:

- **Organizational jobs.** A job is a role that exists in the organization and comprises a common set of responsibilities. For example, a manager's job includes performing the function of a department manager and being responsible for direct report employees.
- **Organizational positions.** An organizational position is a specific opening that someone fills (in a specific location). This is a skill- and location-specific opening that is filled by a specific person. For example, a departmental manager in the San Francisco office.
- **Security roles.** A security role is a tactical object that gets assigned to a user ID, and allows the user access to the system.

Rules

The logic that defines what will be done, when it will be done, where it will be done, why it will be done, how it will be done, and how it will all be managed or governed. Rules can take many forms, from simple binary decisions to decisions involving more advanced Boolean logic rules. Examples range from simple yes/no decisions to multi-threaded decision trees to determine how a process responds to a given event.

S

SCOR

Supply Chain Operations Reference (SCOR) is business process reference model endorsed by the Supply Chain Council as a de-facto standard diagnostic tool for supply chain management. SCOR is a management tool spanning an organization's suppliers to its customers. This reference describes the business activities associated with all phases of satisfying the customer's demands. This reference model looks at business processes and activities used in all stages of supply chain activity. The SCOR a model is based on three major pillars: process modeling, performance measurements, and best practices. The process model is divided into five groups: Plan, Source, Make, Deliver, and Return. Each of these process groups is decomposed into progressively lower levels of detail to help model supply chain activities. Each level is a decomposition of the activities in the level above and all are supported by a set of standard key performance indicators (KPI).

Sensitivity Analysis (also known as a "what if" analysis)

An analytical technique that tries to determine the outcome of changes to the parameters of or the activities in a process. This is a measure of the sensitivity of something to a given change. It measures the hypothetical impact of different types of change (such as capacity or financial issues) on the overall process, workflow, or activity, and it is useful for determining how a change may impact the operation. It is also known as "what if" analysis and is used to support decision-making or the development of recommendations for decision-makers based on changing certain variables in the analytical model.

Also called hypothesis testing, the goal is to test the measurable outcomes of performance (for example time and cost) from different ways to achieve desired objectives.

Service Level Agreement (SLA)

An agreement between two or multiple parties that defines specific levels of performance related to given activities. The SLAs are targets or standards that must be met by a supplier, outsourcing company, vendor, service provider or partner. SLAs are written in plain language specifying the target performance levels and how the target performance will be measured. SLAs include the timing of the agreed measurement and a clearly defined issue resolution and escalation process for all parties agreeing to the SLA. An SLA may also build in penalties or incentives tied to performance targets for improved performance or for excellence.

As related to a process, SLAs focus on measurable outcomes that have been defined by stakeholders to meet set performance criteria.

Simulation

A modeling technique that uses business process models in a BPMS tool to make predictions about how a process may perform under different circumstances and workloads. Business process simulation can be either formal or informal and use a variety of techniques. Process simulation usually assigns values to activities and then defines a number of anticipated use cases to see how the organization process will respond under different circumstances. The simulation of complex business processes can often reveal outcomes that business process transformation teams can't anticipate. This is especially relevant when trying to model new automated business processes being carried out on mobile devices. Simulations require sufficient data, which typically allows the process to be mathematically simulated under various scenarios, loads, or other conditions.

SIPOC

SIPOC is a Six Sigma tool; it stands for *Supplier-Input-Process-Output-Customer*. A SIPOC diagram verifies that process inputs match outputs of the upstream process and that process outputs match the expected inputs of the downstream process.

Six Sigma

A method that drives business performance improvement by reducing or narrowing variation in work or in quality. The goal is to reach a statistical variation of Six Sigma (or six standard deviations of variation) within the limits defined by the customer's specifications. Since its introduction in 1987, Six Sigma has become one of the most recognized enterprise improvement methodologies for companies seeking to identify business problems, define improvement opportunities and projects, and deliver solutions to realize predictable and repeatable results.

SOA
An approach for linking resources to obtain or present data on an *on-demand* basis. It is a data access and delivery strategy pursued by the enterprise — it is not simply a tactic or technique that the enterprise adopts to pursue a goal of improved application interfacing.

Service-Oriented Architecture (SOA), is an approach for building computing applications that support or automate business processes by using a set of loosely coupled black-box components. SOA represents a dramatic change in the relationship between business and IT. SOA makes technology a true business enabler and empowers business and technology leaders alike.

From a technical perspective, SOA is a method to design and architect solutions. It could be implemented in a messaging or integration layer or it could be a way that an application is designed to provide services to other applications.

SOA Implementation
A project or initiative to implement business solutions using SOA technology.

SOA Execution
A program to invoke a service, but does not contain business logic.

SOA Interface
The software that calls data from, or presents data to, one or more applications that are external to the application being executed. The interface address information for locating the associated implementation(s) is called the request.

SOAP
Embedded within the SOA umbrella is a set of standards that govern data transfer. These standards, named Simple Object Access Protocol (SOAP), are a set of rules for transferring structured information across a network in the implementation of web services.

Swim Lanes
Swim lane models divide a screen or page into multiple parallel lines or lanes. The lanes are generally represented as long vertical or horizontal rectangles or sometimes-simple lines or bars. Each of these lanes is defined as a specific organizational unit or a business role that a person plays in performing the work. The work moves from activity to activity following the path of the flow from business unit to business unit or from role to role. By showing the flow from lane (role or organization) to lane, swim lanes help identify hand-offs in a process.

Software as a Service (SaaS)
Sometimes referred to as on-demand software, SaaS is a software delivery model in which application software and its associated data and infrastructure are hosted on the Internet and accessed by users with a web browser. This is the latest incarnation of the time-sharing concept of the late 1970s and the 1980s. In this option, SaaS customers sign on to the vendor's hardware and software environment and use the applications from any location (common examples include Salesforce and payroll automation). The hardware and applications or tools are located externally to the organization and may be any place in the world. SaaS computing services and applications are typically managed and supported by a third-party vendor on a fee-for-service basis.

Strategic BPM Planning
Strategic BPM planning defines the way BPM and BPMS will be used in the organization. It translates the vision of business improvement into action plans and aligns required BPM or BPMS capabilities with the approach that will be taken in improving business processes. Strategic BPM planning is important in delivering the business objectives of transformation projects.

Subject Matter Experts (SMEs)
These individuals are typically people who have a deep understanding of certain business functions or operations, often possessing years of experience as a participant in business operations. This term is also applied to people who have deep expertise in an area of IT, production operations, supply chain management, or other areas of activity.

Success Criteria
The topics or items that a project must address and the standards, targets, and limits that must be achieved in order for it to be a success.

Systems Dynamics Models
These models are "activity on arrow" diagrams rather than "activity on node" diagrams like most of the other notations. These are more often used to model an entire enterprise or line of business than to model lower-level workflow. They describe the enterprise business *architecture* from a dynamic behavioral perspective rather than a static structural perspective.

T

Task
A task is made up of steps or actions taken to perform a specific piece of work — such as to enter a claim's information into the line of business' claim system, register a patient in a hospital, or enter an order for a project into a sales system. A number of logically related tasks can be combined into a higher-level *activity*. A task may or may not have automated support. Some tasks can even be totally automated. Automated tasks may be shown in a workflow model to provide information that helps staff understand what is happening. Tasks can also combine to form scenarios that are repeated based on events, timing, and so on.

U

Unified Modeling Language (UML)
Maintained by the Object Management Group, a standard set of diagramming technique notations primarily for describing information systems requirements. UML models are most often associated with custom software development efforts, though they may also be associated with the custom development portions of an ERP implementation project for defining custom reports, interfaces, conversions, and enhancement (RICE) objects.

V

Value Chain
Value chains are large-scale business processes that are initiated by a customer request and result in the delivery of a process or service to a customer. A value chain includes everything that contributes to the delivery of a given product. By adding up all the costs of each activity in the value chain, and subtracting the total from the sales price, an organization can determine the profit margin on the value chain. Most organizations support from three to fifteen value chains. Introduced by Michael Porter in his 1985 book,

Competitive Advantage, this approach emphasizes capturing those processes and activities that *add value* to the service or product provided to a customer. Value chains provide a strategic view of business processes across the organization and products they support.

Value Chain Notations
A category of symbol sets used to visualize the accumulation of value or steps toward achievement of a goal.

Value Stream Mapping
A value stream map is a Lean Six Sigma tool used for detailed process analysis and design. It captures all key process activities and metrics and focuses on eliminating activities that do not add value to the product or service being built or delivered.

In Lean manufacturing, a value stream map is used to add process resource costs and time elements to a process model to clearly show the flow of materials and products and to depict process efficiency.

W

Workflow
Workflow is a generic term for the sequential movement of information or materials from one activity in a process or subprocess to another in the same overall process. As applied in the *BPM CBOK Guide*, this is the aggregation of activity within a single business unit. Activity is a combination of work from one or more processes. Work is organized around efficiency. The activities in the workflow are shown as a flow that describes each activity's relationship with all the others performed in the business unit. Modeling shows this work as a flow that describes each activity's relationship with all the others performed in the business unit.

Workflows can be manual, automated, or more likely a combination of both. Workflow models often include both the diagram and the specific rules that define the flow of information from one activity to the next. When used in conjunction with a workflow system or engine, it usually refers to a software-based workflow system that moves information from a database to one computer or organization after the other.

WSDL
The Web Services Description Language (WSDL) is a standard way of defining an SOA service interface.

Web Services
Web services are a set of standards that enable the integration of web-based applications. In BPMS, web services are used to move data and initiate processing in applications that are not part of the BPMS solution operating environment.

Web Application
A computer program or set of programs that are called from a web portal and used to perform a given business function—such as purchase a product. The term may also mean software application that is coded in a browser-supported language (such as Java) and reliant on a common web browser to render the application's executable over internal networks or over the Internet. These applications can either be purpose-built or purchased from a vendor; they usually link to other legacy or special-purpose background applications that can access multiple databases or perform given functions in the background while the web application continues to interact with the application user.

Web Portal

A website that provides a single point of access to information over internal networks and/or the Internet. Web portals usually provide access to specific information and capabilities that an organization wants to make available to a broad range of people in a consolidated manner. Well-structured web portals allow users to personalize their views. In addition to information gathering and sharing, web portals can be built to include workflow management, workgroup collaboration, and content management features to help deliver self-service support.

11.7 Appendix G: Contributors

ABPMP is deeply grateful to the following contributors for their many hours of writing, reviewing, editing, and other efforts. These are the people who directly contributed to the development of the cumulative volumes 1.0, 2.0, 3.0 and 4.0. There are many others who indirectly contributed thoughts, comments, and moral support to these contributors, and we extend our heartfelt thanks to them as well.

Professor Yvonne Lederer Antonucci, Ph.D.
Yvonne Lederer Antonucci is a Professor in the Department of MIS and Business Innovation Center at Widener University in Chester, PA.

Professor Martin Bariff, Ph.D., C.P.A.
Martin Bariff, Ph.D., C.P.A. is an Associate Professor of Information Management and Asst. Director, MS Marketing Analytics Program at the Stuart Graduate School of Business, Illinois Institute of Technology.

Tony Benedict, MBA, CPIM, CBPP, CBPL
Tony Benedict, MBA, CPIM, CBPP, CBPL is the President and Director of the Board of Directors for the Association for Business Process Management Professionals (ABPMP.org). Currently, he is a Partner at Omicron Partners, a Strategy and Operations advisory firm.

Andrew Spanyi, MBA
Andrew Spanyi is the founder and Managing Director of Spanyi International Inc. Andrew has nearly two decades of consulting experience including assignments as a Principal of the Rummler-Brache Group and as a Practice Manager with Kepner-Tregoe Inc. Andrew has authored two books, *More for Less: The Power of Process Management* and *Business Process Management is a Team Sport*. Andrew was Vice President for Education and chaired the Education Committee of the ABPMP. He is a Board Advisor and an at-large member of the ABPMP.

Dr. Mathias Kirchmer
Dr. Kirchmer is Managing Director, Co-CEO, BPM-D in Philadelphia. He was formerly Global Director of the BPM practice at Accenture. He is also an active member of the ABPMP Philadelphia Chapter.

Peter Franz
Peter is Managing Director, Co-CEO, BPM-D in Philadelphia. He was formerly Managing Director of the BPM practice at Accenture.

Raju Saxena, CBPP, CBPL
Raju is Senior Manager, FSO Advisory Services at Ernst & Young. He was formerly VP of Chapter Services and is currently VP of Marketing, and Director, Board of Directors for ABPMP.

Jack Hilty, CBPP, CBPL, CBA, PMP
Accomplished and successful Strategic Enterprise/Business Architect combines an extensive history of taking executive strategic direction and envisioning enterprise-wide transformational architecture-lead programs that deliver business intent. Lead multi-disciplinary teams and coordinate complex integrated

design initiatives across business, experience, application, data, technical and solutions architectures. Adept at creating new and adapting existing frameworks to align organizational principals, operating models, architecture standards, governance and best practices to achieve business vision and strategy for US-based and international organizations.

Jack is the Managing Principal at SentientPoint, Inc and was an adjunct professor at Northwestern University School of Continuing Studies (Business Analyst Certification Program) and taught at the University of Chicago Graham School (Business Process Management & Advanced Project Management Certification Program). In 2011 Jack received the prestigious Faculty Excellence Teaching Award from Northwestern University School of Continuing Studies.

Jack holds a Bachelor of Science Degree in Computer Science from DePaul University, completed the University of Chicago Project Management Strategy Certification Program, sits on the International Board of ABPMP, and is Past President of the Business Architects Association®.

Marc Scharsig, CBPP
Marc is currently Managing Director at BPM Global Services, LLC. He was formerly Senior Manager, BPM at Accenture.

Denis Lee, CBPP
Denis is President, BizArch Solutions, Inc and is currently a BPM consultant at Providence Health Services in Washington state. He is formerly VP of Conference Services at ABPMP and a member of the Portland Chapter.

Emmett Powell, CBPP
Emmett is a business process consultant and member of the Alabama Chapter of ABPMP.

Phil Vitkus, CBPP
Phil is a business process consultant with ESI Consultants.

Gabrielle Field, CBPP
Gabrielle is a Manager at Black and Veatch consulting. She led the Grid Modernization project at Duke Energy and was VP of Improvement at Raymond James. She is a former VP of Certification at ABPMP.

Dan Morris, CBPP, CBPL
Dan is a Principal at Wendan Consulting for Business Operation Excellence. He was previously North American Practice Manager for Business Process Excellence at TCS consulting. He is currently VP of Membership, and Director, Board of Directors at ABPMP.

Jose Furlan, CBPP
Jose is Director of Education Services, JDFurlan & Associates Ltd in Brazil. He is a former member of ABPMP Brazil.

Nancy Bilodeau, CBPP

Nancy is currently a Coach and Consultant. Previously, she worked for Sears Holding Corporation in various roles. She is also a former VP of Membership for ABPMP.

Brett Champlin, MBA, CSP, CCP, CDMP, CBPP
Brett Champlin, MBA, CSP, CCP, CDMP is the former President of the Association for Business Process Management Professionals (ABPMP.org) and a Manager in the Business Performance Improvement group with a Fortune 100 insurance company. He is currently enjoying retirement as a blues musician.

Todd Lohr, CBPP
Todd is Principal, US Practice Leader for Intelligent Automation at KPMG LLP and was a former VP of Chapter Services for ABPMP.

Connie Moore
Connie is currently Vice President and Principal Analyst at Deep Analysis. She was formerly Vice President and Research Director at Forrester Research.

David Kish
David Kish is currently a consultant with TCS in the Ecosystem, Strategy & Blockchain Practice.

Bruce D. Downing, Ph.D.
Bruce D. Downing, Ph.D. is the president of Provisory Services, Inc. a business management and Information Systems consulting firm focusing on Business Process Management, workflow, and records management systems. Bruce is a member of the ABPMP Ed Committee and the Philadelphia Chapter.

Jason Franzen, MBA
Jason Franzen is Director, Operations & Development, Assurant. Jason is a member of the ABPMP Education Committee and an at-large member of ABPMP.

Daniel J. Madison, MBA, CFA
Daniel J. Madison, MBA, CFA, Lean Office Certificate is a principal in Value Creation Partners, an organizational consulting and training firm. Dan is a member of the ABPMP Education Committee and an at-large member of ABPMP.

Sandra Lusk, PMP
Sandra Lusk has over twenty-five years of experience in system and process design and development working with utility, transportation, logistics, insurance, and banking organizations in the US, Canada, Australia, New Zealand, and Wales, UK. She was formerly President of the Association for Business Process Management Professionals, Portland Chapter.

Mark Treat
Mark Treat has extensive experience in designing and evaluating business processes. Presently, Mark is Chief Strategy Officer with Upward Health. Within ABPMP, Mark is a former Corporate Director, Chair of the Education Committee and contributed to the first BPM Common Body of Knowledge project.

Robyn L. Raschke, Ph.D., C.P.A.

Robyn is a Professor at the University of Nevada, Las Vegas and teaches undergraduate and graduate accounting information systems courses. She is an at-large member of the ABPMP and has consulted in industry.

One of the benefits of the partnership between ABPMP and EABPM is that we will begin incorporating the EABPM Body of Knowledge into the next version of this work. A significant effort has gone into the development of the EABPM Body of Knowledge and we would like to acknowledge those who have contributed to that effort.

Contributors to the EABPM Body of Knowledge

Hartmut F. Binner
Since 1978, Hartmut Binner has given lectures at the University of Applied Sciences in Hannover, Germany as an associate professor. Currently, he is the CEO of the Professor Binner Academy, which is a training provider based in Hannover offering a wide range of management seminars. He is a frequent author of publications on organizational research in the most well-known German professional journals on process and project management, BPM, and integrated process management systems.

From 1999 to 2003 Mr. Binner was the Chairman of the German *REFA*-Association, a federal authority on work design, method and process studies. Moreover, he is the Chairman of the Board of the "Gesellschaft für Organisation" *gfo*, the association for business organization and management in Germany.

Kai Krings, Ph.D
Kai Krings is the head of a subject matter expert circle in BPM sponsored by the German association for business organization and management (gfo).

During his eighteen-year career, he has gained a great deal of experience with business transformation projects. He started his career with MRP-implementation projects in small and medium-sized companies. Thereafter, he implemented team structures in the automotive supply industry and continued his career with the responsibility for the organizational development of a major player in the international glass manufacturing industry based in Germany.

During the last few years, he has implemented Business Process Management as a guiding management principle in a service and media company of a leading group in the financial industry in Germany. During this time he also conducted various business seminars in process and change management. Kai Krings is a member of the Board of Directors of gfo, the established association for business organization and management in Germany.

Horst Ellringmann
Horst Ellringmann is the senior partner of M&E Consulting based in Cologne, Germany. After completion of his academic degree in Electrical Engineering, he held various positions in manufacturing and service companies including positions in top management. After his corporate career of about fifteen years, he built a consulting firm that specializes in the field of environmental and quality management. In the mid-

1990s, he concentrated his consulting activities on Business Process Management and process reengineering. Horst Ellringmann has published several books and numerous publications on the subject of business management and organization.

Wolfgang Buchholz
Wolfgang Buchholz is a professor for Organization and Logistics at the University of Applied Sciences in Münster, Germany. After earning his diploma in Business Administration at the "Justus-Liebig-Universität" in Gießen, he received his Ph.D. in organization and strategic management.

Prior to his promotion to Professor at the University of Münster, he was co-founder and managing director of the consulting company Eic-Partner. He worked for several years in the chemical industry for Hoechst AG and as a management consultant for CSC.

Mr. Buchholz has published several books on innovation management, supply chain management, management of value nets and supplier relationship management, as well as articles on strategy and organization in a number of relevant professional journals, such as DBW, ZfbF, and ZFO.

Jakob Freund
Jakob Freund has a Master of Sciences in Business Computing. He is a general manager of the company camunda GmbH. The company develops and sells software for BPM applications. Camunda provides a web-based BPM platform for process hosting that is called "process as a service." Jakob Freund is the founder and chief analyst of BPM-Guide.de, and is also running BPM-Netzwerk.de the largest BPM web community in Germany, Austria, and Switzerland combined with over 3,000 members as of February 2008.

Jakob Freund gives lectures on BPM at the University of Applied Sciences in Berlin, Germany and the Business School PHW in Zurich, Switzerland. He has published several articles and white papers on BPM and is currently working on a book on BPM. He is the conference manager of the annual Process Solutions Day, and is also a regular speaker on BPM-related conferences and fairs in Germany, such as the Cebit. Jakob Freund has participated in many BPM and SOA projects as a member as well as a project manager. His main competencies are process automation including real-time monitoring, SOA, BPMN, BPEL, and process simulation.

Guido Fischermanns
Guido Fischermanns is Managing Partner of ibo Consulting and Training Corporation. After completion of his degree in Business Administration at the University of Aachen, he earned his doctorate with a dissertation on the topic of "organisational controlling." He has been teaching students and practitioners BPM and project management courses for over seventeen years and has twenty years of experience as a consultant for process improvement and business restructuring. Guido Fischermanns is head of the BPM expert circle for the "Gesellschaft für Organisation und Management" (gfo) in Germany and is a member of the gfo advisory board. He gives lectures on process and project management at the Justus-Liebig University in Gießen, Germany and at the school of economics at the University of Zurich, Switzerland. Guido Fischermanns is author of the German bestseller, *Process Management Handbook*, *7th Edition*, 2008.

Industry Analysts

Connie Moore, Vice President and Principal Analyst at Deep Analysis

Janelle Hill, VP, and Distinguished Analyst, Gartner, Inc.

Craig Le Clair, Forrester Research

Elise Olding, Gartner, Inc.

Jim Sinur, CEO @ Flueresque & former VP & Distinguished Analyst, Gartner, Inc.

David McCoy, Former VP at Gartner, Inc.

Business Process Management (BPM)

Business Process Management is a disciplined management approach to identify, design, execute, document, measure, monitor, and control both automated and non-automated business processes to achieve consistent, targeted results aligned with an organization's strategic goals. BPM involves the deliberate, collaborative and increasingly technology-aided definition, improvement, innovation, and management of end-to-end business processes that drive business results, create value for customers, and enable an organization to meet its business objectives with more agility.

STRATEGY EXECUTION – BPM LIFE CYCLE

Integrated Life Cycle Model for Business / Digital Transformation





ABPMP International

www.abpmp.org