

Contents

Foreword	vii
Preface	xi
CHAPTER 1 BIM Handbook Introduction	1
1.0 Executive Summary	1
1.1 Introduction	2
1.2 The Current AEC Business Model	2
1.3 Documented Inefficiencies of Traditional Approaches	10
1.4 BIM: New Tools and New Processes	15
1.5 What Is Not BIM Technology?	19
1.6 What Are the Benefits of BIM? What Problems Does It Address?	19
1.7 What Challenges Can Be Expected?	26
1.8 Future of Designing and Building with BIM (Chapter 8)	29
1.9 Case Studies (Chapter 9)	29
Chapter 1 Discussion Questions	29
CHAPTER 2 BIM Tools and Parametric Modeling	31
2.0 Executive Summary	31
2.1 The Evolution to Object-Based Parametric Modeling	32
2.2 Parametric Modeling of Buildings	45
2.3 Beyond Parametric Shapes	57
2.4 BIM Environments, Platforms, and Tools	70
2.5 Overview of the Major BIM Design Platforms	71
2.6 BIM Platforms	77
2.7 Lightweight Modeling Applications	94
2.8 Conclusion	95
Chapter 2 Discussion Questions	97

CHAPTER 3	Interoperability	99
3.0	Executive Summary	99
3.1	Introduction	100
3.2	Different Kinds of Exchange Formats	105
3.3	Background of Product Data Models	110
3.4	Other Efforts Supporting Standardization	129
3.5	The Evolution from File-Based Exchange to Building Model Repositories	136
3.6	Summary	148
	Chapter 3 Discussion Questions	148
CHAPTER 4	BIM for Owners and Facility Managers	151
4.0	Executive Summary	151
4.1	Introduction: Why Owners Should Care About BIM	152
4.2	BIM Application Areas for Owners	155
4.3	BIM Tool Guide for Owners	169
4.4	An Owner and Facility Manager's Building Model	172
4.5	Leading the BIM Implementation on a Project	175
4.6	Barriers to Implementing BIM: Risks and Common Myths	185
4.7	Guidelines and Issues for Owners to Consider When Adopting BIM	189
	Chapter 4 Discussion Questions	191
CHAPTER 5	BIM for Architects and Engineers	193
5.0	Executive Summary	193
5.1	Introduction	194
5.2	Scope of Design Services	197
5.3	BIM Use in Design Processes	203
5.4	Building Object Models and Libraries	240
5.5	Considerations in Adoption for Design Practice	253
5.6	New and Changed Staffing within Design Firms	258
	Chapter 5 Discussion Questions	260
CHAPTER 6	BIM for Contractors	263
6.0	Executive Summary	263
6.1	Introduction	264
6.2	Types of Construction Firms	265
6.3	Information Contractors Want from BIM	268

6.4	Processes to Develop a Contractor Building Information Model	270
6.5	Reduction of Design Errors Using Clash Detection	272
6.6	Quantity Takeoff and Cost Estimating	275
6.7	Construction Analysis and Planning	281
6.8	Integration with Cost and Schedule Control and Other Management Functions	293
6.9	Use for Offsite Fabrication	295
6.10	Use of BIM Onsite: Verification, Guidance, and Tracking of Construction Activities	296
6.11	Synergies of BIM and Lean Construction	297
6.12	Implications for Contract and Organizational Changes	300
6.13	BIM Implementation	302
	Chapter 6 Discussion Questions	303
CHAPTER 7	BIM for Subcontractors and Fabricators	305
7.0	Executive Summary	305
7.1	Introduction	306
7.2	Types of Subcontractors and Fabricators	308
7.3	The Benefits of a BIM Process for Subcontractor Fabricators	310
7.4	BIM-Enabled Process Change	324
7.5	Generic BIM System Requirements for Fabricators	328
7.6	Major Classes of Fabricators and Their Specific Needs	333
7.7	Adopting BIM in a Fabrication Operation	342
7.8	Conclusions	348
	Chapter 7 Discussion Questions	348
CHAPTER 8	The Future: Building with BIM	351
8.0	Executive Summary	351
8.1	Introduction	353
8.2	The Development of BIM up to 2010	353
8.3	Current Trends	354
8.4	Vision 2015	361
8.5	Drivers of Change and BIM Impacts up to 2020	380
CHAPTER 9	BIM Case Studies	391
9.0	Introduction	391
9.1	Aviva Stadium	397

9.2	Courtyard by Marriott	415
9.3	Sutter Medical Center, Castro Valley	431
9.4	Maryland General Hospital	480
9.5	Crusell Bridge	494
9.6	100 11th Avenue, New York City	514
9.7	One Island East Project, Hong Kong	526
9.8	Helsinki Music Center	539
9.9	Hillwood Commercial Project	557
9.10	United States Coast Guard BIM Implementation	566
 Glossary		585
 Bibliography		591
 Index		611