

Contents

	Foreword	ix
	Acknowledgments	xii
	Glossary	xiii
01	Introduction	1
	References	8
02	What is BIM?	9
2.1.	Definition of BIM	9
2.2.	BIM capability and BIM maturity	10
2.3.	History of BIM, 3D CAD and BIM models	11
2.4.	Conclusions	28
	References	29
03	Benefits of BIM adoption and implementation	31
3.1.	The business and financial case for adopting BIM	31
3.2.	Who are the beneficiaries of BIM implementation and adoption?	33
3.3.	Quantifying benefits of BIM implementation	36
3.4.	Summary	50
	References	51
04	Obstacles to BIM adoption and implementation	53
4.1.	Legal, technological and financial obstacles to widespread BIM adoption	53
4.2.	Obstacles to BIM implementation in healthcare	73
4.3.	Summary	75
	References	76
05	Case studies showcasing BIM in healthcare	79
	References	81
5.1.	Albert Wimmer	82
5.1.1	Neue Villen, Vienna, Austria	82
5.1.2	Lessons from Albert Wimmer	86
	References	88
5.2.	Arup	89
5.2.1	Morriston Hospital, Swansea, Wales	89
5.2.2	Leighton Hospital, Cheshire, England	92
5.2.3	New Cross Hospital Urgent and Emergency Care Centre, Wolverhampton, England	93
5.2.4	Lessons from Arup	97
5.3.	Aukett Swanke	101
5.3.1	King Edward VII Memorial Hospital, Hamilton, Bermuda	101
5.3.2	King's Mill Hospital, Nottingham, England	105
5.3.3	Mansfield Community Hospital, Mansfield, England	110
5.3.4	Lessons from Aukett Swanke	111
	Reference	112

5.4.	BDP	113
5.4.1	Alder Hey in the Park, Liverpool, England	114
5.4.2	Department of Chemical Engineering and Biotechnology, University of Cambridge, Cambridge, England	125
5.4.3	Lessons from BDP	127
	References	131
5.5.	Bowman Riley	132
5.5.1	Bradford Royal Infirmary, Bradford, England	134
5.5.2	Good Shepherd Hospital, Manzini, Swaziland	137
5.5.3	The French Horn Residential Care Home, Gerrards Cross, England	140
5.5.4	Lessons from Bowman Riley	143
5.6.	C.F. Møller	144
5.6.1	Køge University Hospital (USK), Køge, Denmark	147
5.6.2	New North Zealand Hospital, Hillerød, Denmark	149
5.6.3	Vendsyssel Hospital, Hjørring, Denmark	150
5.6.4	Aarhus University Hospital, Aarhus, Denmark	154
5.6.5	Lessons from C.F. Møller	157
5.7.	EGM Architecten	159
5.7.1	AZ Maria Middelares, Gent, Belgium	163
5.7.2	Reinier de Graaf Hospital, Delft, the Netherlands	166
5.7.3	Hospital Nobo Otrabanda, Curaçao	169
5.7.4	Drie Eiken Care Hotel, Edegem, Belgium	173
5.7.5	Lessons from EGM Architecten	176
5.8.	HKS	177
5.8.1	Royal Liverpool University Hospital, Liverpool, England	181
5.8.2	The Christie Proton Beam Therapy Centre, Manchester, England	182
5.8.3	Midland Metropolitan Hospital, Smethwick, England	184
5.8.4	The Christie at Salford Royal, Salford, England	188
5.8.5	Lessons from HKS	192
	References	195
5.9.	HLM Architects	196
5.9.1	Bransholme Health Centre, Hull, England	201
5.9.2	Royal Hospital for Sick Children and Department of Clinical Neurosciences, Edinburgh, Scotland	204
5.9.3	Craigavon Area Hospital, Portadown, Republic of Ireland	208
5.9.4	Sheffield Children's Hospital, Sheffield, England	209
5.9.5	Lessons from HLM Architects	212
5.10.	Hoare Lea	215
5.10.1	Bristol Royal Infirmary, Bristol, England	219
5.10.2	Sheffield Children's Hospital, Sheffield, England	222
5.10.3	Alder Hey in the Park, Liverpool, England	225
5.10.4	Lessons from Hoare Lea	233

5.11. IAA Architecten	239
5.11.1 Medisch Spectrum Twente Hospital, Enschede, the Netherlands	243
5.11.2 Medisch Spectrum Twente Hospital, Oldenzaal, the Netherlands	248
5.11.3 Het Weggeler (care centre), Almelo, the Netherlands	251
5.11.4 Verslavingszorg Noord Nederland (North Netherlands Drug Rehabilitation), Eelde, the Netherlands	253
5.11.5 Lessons from IAA Architecten	255
5.12. KPF	257
5.12.1 Methodist Hospital Research Institute, Houston, TX, USA	259
5.12.2 Lessons from KPF	265
5.13. NBBJ	268
5.13.1 Royal Liverpool University Hospital, Liverpool, England	272
5.13.2 Department of Materials Science and Metallurgy, University of Cambridge, Cambridge, England	278
5.13.3 The Forum, Cambridge Biomedical Campus, Cambridge, England	282
5.13.4 Dumfries and Galloway Royal Infirmary, Dumfries, Scotland	285
5.13.5 Quadram Institute, Institute of Food Research, Norwich, England	285
5.13.6 Lessons from NBBJ	288
5.14. PM Devereux	292
5.14.1 Adult inpatient mental health unit, Farnham Road Hospital, Guildford, England	296
5.14.2 Barts Health New Hospitals Project, London, England	301
5.14.3 The Crescent, King Fahad Medical City, Riyadh, Saudi Arabia	304
5.14.4 Royal National Orthopaedic Hospital, Stanmore, England	307
5.14.5 Lessons from PM Devereux	307
5.15. Rambøll	312
5.15.1 Tunbridge Wells Hospital, Pembury, England	314
5.15.2 Lessons from Rambøll	318
5.16. Rogers Stirk Harbour + Partners	325
5.16.1 Cancer Care Centre, Guy's Hospital, London, England	328
5.16.2 Lessons from Rogers Stirk Harbour + Partners	330
5.17. Ryder Architecture	334
5.17.1 Dumfries and Galloway Royal Infirmary, Dumfries, Scotland	337
5.17.2 Raffles Hospital, Singapore	343

	5.17.3 Emergency Care Centre, Queen Elizabeth Hospital, Gateshead, England	345
	5.17.4 Lessons from Ryder Architecture	347
06	BIM sits within healthcare information modelling	351
	6.1. How BIM sits within HIM, making a strategic contribution to patient care and staff outcomes	351
	6.2. The physical environment, patient wellbeing and BIM implementation	353
	6.3. The business case for HIM	354
	References	366
07	What next for BIM adoption and implementation?	369
	7.1. Lessons from worldwide adoption and implementation of BIM	373
	7.2. Road-mapping BIM implementation and HIM in England	388
	References	391
	Index	393