

CHAPTER ONE: INTRODUCTION.....	1
STUDY BACKGROUND	1
GOALS AND OBJECTIVES.....	2
INTENDED AUDIENCE.....	2
SCOPE AND FORMAT	3
METHODOLOGY AND INFORMATION SOURCES.....	4
ANALYST CREDENTIALS.....	4
RELATED BCC RESEARCH	4
BCC ONLINE SERVICES.....	5
DISCLAIMER	5
CHAPTER TWO: EXECUTIVE SUMMARY.....	6
<i>SUMMARY TABLE GLOBAL SALES OF MRCAS EQUIPMENT,</i> <i>THROUGH 2016 (\$ MILLIONS).....</i>	6
<i>SUMMARY FIGURE TRENDS IN GLOBAL SALES OF MRCAS</i> <i>EQUIPMENT, 2010-2016 (\$ MILLIONS)</i>	6
EXECUTIVE SUMMARY (CONTINUED).....	7
CHAPTER THREE: OVERVIEW	8
GENERAL DESCRIPTION AND DEFINITION OF MRCAS	8
GENERAL DESCRIPTION (CONTINUED).....	9
<i>FIGURE 1 MEDICAL ROBOTIC AND COMPUTER-ASSISTED</i> <i>SURGICAL SYSTEMS.....</i>	10
HISTORY OF MEDICAL ROBOTICS AND COMPUTER-ASSISTED SURGERY	10
SURGICAL IMAGING TECHNOLOGIES	10
Surgical Imaging Technologies (Continued).....	11
IMAGE REGISTRATION TECHNIQUES.....	12
COMPUTER IMAGE PROCESSING.....	13
SURGICAL ROBOTS.....	14
“THE INTELLIGENT OPERATING ROOM”	15
SURGICAL SIMULATION.....	15
TECHNOLOGIES AND PRODUCTS	16
STANDALONE SURGICAL PLANNERS AND SIMULATORS	16
Technology	16
Modeling of Organs and Deformations	16
Modeling of Organs ...(Continued).....	17
Simulation of Actions and Force Feedback Reactions.....	18
Emerging Technologies.....	19
Web-Based Surgical Simulators	19
Virtual Reality Simulators.....	20
Recent Patents	21
Advantages of Surgical Planners and Simulators	22

Products	23
<i>TABLE 1 STANDALONE SURGICAL PLANNERS AND SIMULATORS</i>	23
Fifth Dimension Technologies	24
Haptica	24
CAE Healthcare	24
Mentice Medical Simulation.....	24
Merge Healthcare	25
Symbionix.....	25
SimQuest.....	26
SimSurgery	26
Surgical Science	26
VirtaMed	27
VOXEL-MAN	27
VRmagic	28
SURGICAL NAVIGATION SYSTEMS	28
Technologies.....	28
Imaging Technologies	28
Multimodal Imaging	28
Fluoroscopic Imaging.....	29
Video-Enhanced Imagery	30
Microscopic Imagery	31
Endoscopic Imagery	32
Dynamic (Interventional) Imaging.....	33
Compact MRI Scanners.....	33
Intraoperative CT	34
Intraoperative Ultrasound	35
Tracking Technologies	35
Optical Tracking.....	35
Electromagnetic Tracking	35
Display Technologies	36
Multiplanar Displays.....	36
Three-Dimensional Displays.....	36
Stereoscopic Displays.....	37
Virtual and Augmented Reality.....	37
Heads-Up Displays	37
Recent Patents	38
Recent Patents (Continued)	39
Recent Patents (Continued)	40
Advantages of Surgical Navigation Systems.....	41
Products	41
Image-Guided Surgical Navigation Systems	42
<i>TABLE 2 IMAGE-GUIDED SURGICAL NAVIGATION SYSTEMS</i>	42
Boulder Innovation Group	43
FlashPoint 5500.....	43

BrainLAB AG	43
VectorVision	43
Kolibri	44
Med Surgical Services.....	44
CBYON Suite (CBYON).....	44
Medtronic.....	45
StealthStation	45
Praxim/Orthopaedic Synergy.....	45
Nano-Station	45
Siemens Healthcare.....	46
NaviLink.....	46
Smith & Nephew.....	46
Dash	46
Stryker Corp.....	46
Stryker Navigation System II	46
ENlite.....	46
NavSuite.....	46
Zimmer.....	47
ORTHOsoft.....	47
Interventional Navigation Systems	47
<i>TABLE 3 INTERVENTIONAL SURGICAL NAVIGATION SYSTEMS.....</i>	<i>47</i>
<i>TABLE 4 COMPARISON OF NONFLUOROSCOPIC</i>	
<i>INTERVENTIONAL IMAGING TECHNOLOGIES.....</i>	<i>48</i>
B. Braun Aesculap	49
OrthoPilot.....	49
Kinamed.....	49
NaviPro.....	49
SONOWAND.....	49
SonoWand Invite	49
Odin/Medtronic	50
Polestar.....	50
Smith & Nephew.....	51
PiGalileo	51
Surgical Navigation Accessories and Add-Ons.....	51
<i>TABLE 5 SURGICAL NAVIGATION ACCESSORIES AND ADD-ONS.....</i>	<i>52</i>
Ascension Technology	52
Viking Stems	52
3D-HD Personal Head Display and	
Infomatix.....	52
4navitec.....	53
Pointers, Trackers, Adapters, and	
Other Accessories	53
SURGICAL ROBOTS.....	53
Technology	53

Robotically Assisted Micromanipulation	54
Steady-Hand Systems.....	55
Robotic “Wrists” and Other Dexterity	
Enhancements	55
Preprogrammed Robots	56
Constraint Robots	57
Voice Control	58
Other Emerging Technologies.....	58
New Robotic Arm Designs	58
Remote Surgery.....	59
Natural-Orifice Surgery	60
Microbots	61
Recent Patents	61
Recent Patents (Continued).....	62
Recent Patents (Continued).....	63
Advantages of Robotics.....	64
Products	65
<i>TABLE 6 SURGICAL ROBOTICS</i>	65
<i>TABLE 6 (CONTINUED)</i>	66
Acrobot.....	66
Sculptor	66
Biobot Surgical.....	66
Mona Lisa	66
Corindus	67
CorPath 200.....	67
Curexo Technology	67
ROBODOC.....	67
Freehand	67
FreeHand.....	67
Given Imaging.....	68
Given Imaging Diagnostic System	68
Hansen Medical	68
Sensei	68
Hitachi Medical Systems	68
Magnetic Resonance Image-Guided Surgical	
Robotic System	68
Intuitive Surgical Systems	69
Da Vinci	69
MAKO Surgical.....	70
RIO	70
Mazor Surgical Technologies.....	71
Renaissance	71
MicroDexterity	71
MicroDex.....	71

Prosurgics.....	71
EndoAssist	71
PathFinder.....	72
Robotic Systems and Technologies.....	72
Penelope CS.....	72
Schaerer Mayfield.....	73
NeuroMate.....	73
SOFAR.....	73
ALF-X.....	73
Titan Medical	74
Amadeus	74
DIGITAL OPERATING ROOMS AND EQUIPMENT	74
Technologies.....	75
Data Routing.....	75
User Interface	76
Open System Architectures.....	76
Recent Patents	77
Advantages	78
Products	78
<i>TABLE 7 INTELLIGENT OPERATING ROOM SOLUTIONS AND</i>	
<i>COMPONENTS.....</i>	<i>79</i>
Stryker.....	79
iSuite Operating Room of the Future.....	79
SIDNE.....	80
Karl Storz	80
OR 1.....	80
Smith & Nephew.....	81
Digital Operating Room.....	81
Intuitive Surgical.....	81
HERMES	81
Steris Corp.	82
3085 SP Operating Table/Harmony Surgical	
Lighting System	82
Skytron Surgical	82
Stellar Surgical Lighting Systems (Skytron	
Surgical)	82
Berchtold	82
CHROMOPHARE Surgical Lighting Systems.....	82
Valleylab.....	82
Force FX Electrosurgical Generator.....	82
PRINCIPAL SURGICAL APPLICATIONS OF MRCAS.....	83
<i>TABLE 8 PRINCIPAL SURGICAL APPLICATIONS OF MRCAS</i>	<i>83</i>
ORTHOPEDIC APPLICATIONS	83
Hip Replacement	84

Knee Replacement	85
Trauma.....	85
Pedicle Screw Fixation and Other Spinal Procedures	86
NEUROSURGICAL APPLICATIONS	87
Stereotactic Biopsy	87
Craniotomy	88
Shunt.....	88
Implants.....	89
Deep Brain Stimulation	89
EAR, NOSE, AND THROAT (ENT) APPLICATIONS	90
Functional Endoscopic Sinus Surgery	90
CARDIAC APPLICATIONS	90
Coronary Bypass Surgery	90
Heart Valve Repair and Replacement	91
Percutaneous Coronary Intervention	91
OTHER ENDOSCOPIC APPLICATIONS	92
CHAPTER FOUR: THE GLOBAL MARKET FOR MRCAS EQUIPMENT	93
GLOBAL MRCAS MARKET	93
<i>FIGURE 2 TRENDS IN THE GLOBAL MRCAS MARKET, 2010-2016 (\$</i>	
<i>MILLIONS)</i>	93
MARKET BY COUNTRY/REGION	93
<i>TABLE 9 MAJOR INTERNATIONAL MARKETS FOR MRCAS</i>	
<i>DEVICES AND EQUIPMENT, THROUGH 2016 (\$ MILLIONS)</i>	94
<i>FIGURE 3 GLOBAL MRCAS MARKET SHARES BY</i>	
<i>COUNTRY/REGION, 2010 VERSUS 2016 (PERCENT OF TOTAL</i>	
<i>SALES)</i>	94
<i>FIGURE 3 (CONTINUED)</i>	95
MARKET BY TYPE OF EQUIPMENT.....	95
<i>TABLE 10 GLOBAL MRCAS MARKET BY TYPE OF EQUIPMENT,</i>	
<i>THROUGH 2016 (\$ MILLIONS)</i>	96
<i>FIGURE 4 GLOBAL MRCAS MARKET SHARES BY EQUIPMENT</i>	
<i>SEGMENT, 2010 VERSUS 2016 (PERCENT OF TOTAL SALES)</i>	96
<i>FIGURE 4 (CONTINUED)</i>	97
MARKET BY TYPE OF APPLICATION	97
<i>TABLE 11 GLOBAL MRCAS MARKET BY TYPE OF APPLICATION,</i>	
<i>THROUGH 2016 (\$ MILLIONS)</i>	98
<i>FIGURE 5 GLOBAL MRCAS MARKET SHARES BY APPLICATION</i>	
<i>SEGMENT, 2010 VERSUS 2016 (PERCENT OF TOTAL SALES)</i>	98
<i>FIGURE 5 (CONTINUED)</i>	99
INDUSTRY STRUCTURE AND COMPETITION	99
OVERALL MARKET LEADERS.....	99
<i>FIGURE 6 U.S. OVERALL MRCAS MARKET LEADERS, 2010</i>	
<i>(PERCENT OF TOTAL SALES)</i>	100
<i>TABLE 12 MAJOR MRCAS VENDORS' MARKET SHARES, 2010</i>	100

SURGICAL PLANNERS AND SIMULATORS	101
FIGURE 7 GLOBAL SURGICAL PLANNER AND SIMULATOR	
MARKET LEADERS, 2010 (PERCENT OF TOTAL SALES).....	101
SURGICAL NAVIGATION SYSTEMS	102
FIGURE 8 GLOBAL SURGICAL NAVIGATION SYSTEM MARKET	
LEADERS, 2010 (PERCENT OF TOTAL SALES	102
SURGICAL ROBOTS.....	102
FIGURE 9 GLOBAL SURGICAL ROBOT MARKET SHARES, 2010	
(PERCENT OF TOTAL SALES).....	103
INTELLIGENT OPERATING ROOM SOLUTIONS	103
FIGURE 10 GLOBAL INTEGRATED OPERATING ROOM SOLUTIONS	
MARKET LEADERS, 2010 (PERCENT OF TOTAL SALES).....	104
CHAPTER FIVE: THE U.S. MARKET FOR MRCAS EQUIPMENT	105
MARKET ENVIRONMENT	105
DEMOGRAPHIC TRENDS	105
TABLE 13 TRENDS IN NUMBER OF AMERICANS AGE 55 AND	
OLDER, THROUGH 2016 (MILLIONS)	105
TRENDS IN THE INCIDENCE OF CERTAIN DISEASES OR	
CONDITIONS	105
Trends in Cardiac Disease	105
Trends in Hip and Knee Replacement.....	106
TABLE 14 PROJECTED TRENDS IN MINIMALLY INVASIVE HIP AND	
KNEE REPLACEMENT PROCEDURES, THROUGH 2016 (NUMBER	
OF PROCEDURES).....	107
ECONOMIC TRENDS	107
TECHNOLOGICAL DEVELOPMENTS.....	107
Adaptation of Minimally Invasive Techniques to New	
Types of Surgical Procedures.....	108
New Products and Technologies	108
Development of Lower-Cost Systems.....	109
Increasing Patient Access to Minimally Invasive	
Surgery.....	109
Facilitating Surgeon Awareness and Training in	
Minimally Invasive Procedures	109
Offsetting Manpower Constraints and Reducing	
Hospital Labor Costs	109
CHANGING STRUCTURE OF THE U.S. HEALTH CARE	
INDUSTRY.....	110
Hospital Consolidation	110
Developments in Health Insurance	111
Distribution Channels	111
FIGURE 11 U.S. DISTRIBUTION CHANNELS FOR MRCAS	
EQUIPMENT (PERCENT OF TOTAL SALES MADE THROUGH	
EACH CHANNEL).....	112

LAWS AND REGULATIONS	113
FDA Regulations	113
FDA Regulations (Continued)	114
FDA Regulations (Continued)	115
Patient Protection and Affordable Care Act.....	116
CONCLUSIONS.....	117
MARKET SIZE AND SEGMENTATION	117
OVERALL MARKET.....	117
FIGURE 12 U.S. SALES OF MRCAS EQUIPMENT, 2010-2016 (\$	
MILLIONS).....	118
MARKET BY EQUIPMENT SEGMENT	118
TABLE 15 U.S. MRCAS MARKET BY TYPE OF EQUIPMENT,	
THROUGH 2016 (\$ MILLIONS).....	118
FIGURE 13 U.S. MRCAS MARKET SHARES BY TYPE OF	
EQUIPMENT, 2010 VERSUS 2016 (PERCENT OF TOTAL SALES)	119
FIGURE 13 (CONTINUED)	120
MARKET BY APPLICATION SEGMENT.....	120
TABLE 16 U.S. MRCAS MARKET BY TYPE OF APPLICATION,	
THROUGH 2016 (\$ MILLIONS).....	121
FIGURE 14 MAJOR MRCAS APPLICATION SEGMENTS, 2010	
VERSUS 2016 (PERCENT OF TOTAL SALES).....	122
FIGURE 14 (CONTINUED)	123
DETAILED MARKET ANALYSIS AND PROJECTIONS.....	123
SURGICAL PLANNERS AND SIMULATORS	124
Historical Sales.....	124
TABLE 17 U.S. SALES OF SURGICAL PLANNERS AND	
SIMULATORS, THROUGH 2010 (\$ MILLIONS)	124
FIGURE 15 U.S. SALES OF SURGICAL PLANNERS AND	
SIMULATORS, 2000-2010 (\$ MILLIONS).....	124
Projected Sales.....	125
TABLE 18 PROJECTED U.S. SALES OF PLANNERS AND	
SIMULATORS, THROUGH 2016 (\$ MILLIONS)	125
Risk Factors	126
SURGICAL NAVIGATION SYSTEMS	126
Historical Sales.....	126
TABLE 19 U.S. SALES OF SURGICAL NAVIGATION SYSTEMS,	
THROUGH 2010 (\$ MILLIONS).....	126
FIGURE 16 HISTORICAL GROWTH OF SURGICAL NAVIGATION	
SYSTEM SALES, 2000-2010 (\$ MILLIONS).....	127
Sales Projections.....	127
TABLE 20 PROJECTED U.S. SALES OF SURGICAL NAVIGATION	
SYSTEMS, THROUGH 2016 (\$ MILLIONS).....	128
Risk Factors	128
SURGICAL ROBOTS.....	129

Sales	129
<i>TABLE 21 U.S. SALES OF SURGICAL ROBOTS, THROUGH 2010 (\$ MILLIONS)</i>	129
<i>FIGURE 17 HISTORICAL GROWTH OF SURGICAL ROBOT SALES, 2000-2010 (\$ MILLIONS)</i>	129
Market Penetration	130
<i>TABLE 22 U.S. SURGICAL ROBOT MARKET PENETRATION, 2010</i>	130
Projected Sales	131
<i>TABLE 23 PROJECTED U.S. SALES OF SURGICAL ROBOTS, THROUGH 2016 (\$ MILLIONS)</i>	131
Risk Factors	132
INTELLIGENT OPERATING ROOM SOLUTIONS	133
Sales	133
<i>TABLE 24 U.S. SALES OF INTELLIGENT OPERATING ROOM SOLUTIONS, THROUGH 2010</i>	133
<i>FIGURE 18 HISTORICAL GROWTH OF INTELLIGENT OPERATING ROOM SALES, 2000-2010 (\$ MILLIONS)</i>	134
Market Penetration	134
<i>TABLE 25 U.S. INTELLIGENT OPERATING ROOM MARKET PENETRATION, 2010</i>	134
Projected Sales	135
<i>TABLE 26 PROJECTED U.S. SALES OF INTELLIGENT OPERATING ROOM SOLUTIONS, THROUGH 2016 (\$ MILLIONS)</i>	135
Risk Factors	136
 CHAPTER SIX: OTHER NORTH AND SOUTH AMERICAN MARKETS	
FOR MRCAS EQUIPMENT	137
MARKET ENVIRONMENT	137
DEMOGRAPHICS	137
<i>TABLE 27 OTHER NORTH AND SOUTH AMERICAN MARKET DEMOGRAPHIC INDICATORS, 2010</i>	137
ECONOMICS	138
<i>TABLE 28 OTHER NORTH AND SOUTH AMERICAN MARKET ECONOMIC INDICATORS, 2010</i>	138
REGULATORY ENVIRONMENT	138
Canada	138
Brazil	139
Mexico	139
Argentina	140
MARKET SIZE AND SEGMENTATION	140
OVERALL MARKET	140
<i>FIGURE 19 OTHER NORTH AND SOUTH AMERICAN MARKETS FOR MRCAS, 2010-2016 (\$ MILLIONS)</i>	141
MARKET BY COUNTRY	141

<i>TABLE 29 OTHER NORTH AND SOUTH AMERICAN MRCAS MARKET BY COUNTRY, THROUGH 2016 (\$ MILLIONS)</i>	142
<i>FIGURE 20 OTHER NORTH AND SOUTH AMERICAN MRCAS MARKET SHARES BY INDIVIDUAL COUNTRY, 2010 AND 2016 (% OF TOTAL MARKET)</i>	142
<i>FIGURE 20 (CONTINUED)</i>	143
MARKET BY EQUIPMENT SEGMENT	143
<i>TABLE 30 OTHER NORTH AND SOUTH AMERICAN MRCAS MARKET BY TYPE OF EQUIPMENT, THROUGH 2016 (\$ MILLIONS)</i>	144
<i>FIGURE 21 OTHER NORTH AND SOUTH AMERICAN MRCAS MARKET EQUIPMENT SHARES, 2010 AND 2016 (% OF TOTAL MARKET)</i>	144
<i>FIGURE 21 (CONTINUED)</i>	145
MARKET BY APPLICATION SEGMENT.....	145
<i>TABLE 31 OTHER NORTH AND SOUTH AMERICAN MRCAS MARKET BY TYPE OF APPLICATION, THROUGH 2016 (\$ MILLIONS)</i>	146
<i>FIGURE 22 OTHER NORTH AND SOUTH AMERICAN MRCAS MARKET APPLICATION SHARES, 2010 AND 2016 (% OF TOTAL MARKET)</i>	146
<i>FIGURE 22 (CONTINUED)</i>	147
CHAPTER SEVEN: EUROPEAN MARKETS FOR MRCAS EQUIPMENT	148
MARKET ENVIRONMENT	148
DEMOGRAPHICS.....	148
<i>TABLE 32 EUROPEAN MARKET DEMOGRAPHIC INDICATORS, 2010</i>	148
ECONOMICS	149
<i>TABLE 33 EUROPEAN MARKET ECONOMIC INDICATORS, 2010</i>	149
REGULATORY ENVIRONMENT.....	149
European Union.....	149
European Union (Continued)	150
MARKET SIZE AND SEGMENTATION	151
OVERALL MARKET.....	151
MARKET BY COUNTRY.....	151
<i>TABLE 34 EUROPEAN MRCAS MARKET BY COUNTRY, THROUGH 2016 (\$ MILLIONS)</i>	152
<i>FIGURE 23 EUROPEAN MARKET FOR MRCAS (\$ MILLIONS)</i>	152
<i>FIGURE 24 EUROPEAN MRCAS MARKET INDIVIDUAL COUNTRY SHARES, 2010 AND 2016 (PERCENT OF TOTAL MARKET)</i>	153
MARKET BY EQUIPMENT SEGMENT	154
<i>TABLE 35 EUROPEAN MRCAS MARKET BY TYPE OF EQUIPMENT, THROUGH 2016 (\$ MILLIONS)</i>	154
<i>FIGURE 25 EUROPEAN MRCAS MARKET EQUIPMENT SHARES, 2010 AND 2016 (PERCENT OF TOTAL MARKET)</i>	155

MARKET BY APPLICATION SEGMENT.....	156
<i>TABLE 36 EUROPEAN MRCAS MARKET BY TYPE OF APPLICATION, THROUGH 2016 (\$ MILLIONS)</i>	156
<i>FIGURE 26 EUROPEAN MRCAS MARKET APPLICATION SHARES, 2010 AND 2016 (% OF TOTAL MARKET)</i>	156
<i>FIGURE 26 (CONTINUED)</i>	157
 CHAPTER EIGHT: ASIA-PACIFIC AND REST-OF-WORLD MARKETS	
FOR MRCAS EQUIPMENT	158
ASIA-PACIFIC.....	158
MARKET ENVIRONMENT	158
Demographics	158
<i>TABLE 37 ASIA-PACIFIC MARKET DEMOGRAPHIC INDICATORS, 2010</i>	158
Economics	159
<i>TABLE 38 ASIA-PACIFIC MARKET ECONOMIC INDICATORS, 2010</i>	159
Regulatory Environment.....	160
Japan.....	160
China.....	161
India.....	162
Australia.....	162
New Zealand	163
MARKET SIZE AND SEGMENTATION.....	163
Overall Market	163
<i>FIGURE 27 ASIA-PACIFIC REGION SALES OF MRCAS EQUIPMENT, 2010-2016 (\$ MILLIONS)</i>	163
Market by Country	164
<i>TABLE 39 ASIA-PACIFIC MRCAS MARKET BY COUNTRY, THROUGH 2016 (\$ MILLIONS)</i>	164
<i>FIGURE 28 ASIA-PACIFIC MRCAS MARKET SHARES BY COUNTRY, 2010 VERSUS 2016 (PERCENT OF TOTAL SALES)</i>	165
Market by Equipment Segment.....	166
<i>TABLE 40 ASIA-PACIFIC MRCAS MARKET BY TYPE OF EQUIPMENT, THROUGH 2016 (\$ MILLIONS)</i>	166
<i>FIGURE 29 ASIA-PACIFIC MRCAS MARKET SHARES BY EQUIPMENT SEGMENT, 2010 VERSUS 2016 (PERCENT OF TOTAL SALES)</i>	167
Market by Application Segment	168
<i>TABLE 41 ASIA-PACIFIC MRCAS MARKET BY TYPE OF APPLICATION, THROUGH 2016 (\$ MILLIONS)</i>	168
<i>FIGURE 30 ASIA-PACIFIC MRCAS MARKET SHARES BY APPLICATION SEGMENT, 2010 VERSUS 2016 (PERCENT OF TOTAL SALES)</i>	169

CHAPTER NINE: MIDDLE EASTERN AND AFRICAN MARKET FOR	
MRCAS EQUIPMENT	170
MARKET ENVIRONMENT	170
DEMOGRAPHICS.....	170
<i>TABLE 42 MIDDLE EASTERN AND AFRICAN MARKET</i>	
<i>DEMOGRAPHIC INDICATORS, 2010.....</i>	<i>170</i>
ECONOMICS	170
<i>TABLE 43 MIDDLE EASTERN AND AFRICAN MARKET ECONOMIC</i>	
<i>INDICATORS, 2010.....</i>	<i>171</i>
REGULATORY ENVIRONMENT.....	171
Saudi Arabia	171
Turkey	171
MARKET SIZE AND SEGMENTATION	172
OVERALL MARKET.....	172
<i>FIGURE 31 MIDDLE EASTERN AND AFRICAN MARKET FOR MRCAS</i>	
<i>EQUIPMENT, 2010 THROUGH 2016 (\$ MILLIONS).....</i>	<i>172</i>
MARKET BY COUNTRY.....	172
<i>TABLE 44 MIDDLE EASTERN AND AFRICAN MRCAS MARKET BY</i>	
<i>COUNTRY, THROUGH 2016 (\$ MILLIONS).....</i>	<i>173</i>
<i>FIGURE 32 MIDDLE EASTERN AND AFRICAN MRCAS MARKET,</i>	
<i>COUNTRY SHARES, 2010 VERSUS 2016 (PERCENT OF TOTAL</i>	
<i>SALES).....</i>	<i>173</i>
<i>FIGURE 32 (CONTINUED)</i>	<i>174</i>
MARKET BY EQUIPMENT SEGMENT	174
<i>TABLE 45 MIDDLE EASTERN AND AFRICAN MRCAS MARKET BY</i>	
<i>TYPE OF EQUIPMENT, THROUGH 2016 (\$ MILLIONS).....</i>	<i>175</i>
<i>FIGURE 33 MIDDLE EASTERN AND AFRICAN MRCAS MARKET</i>	
<i>EQUIPMENT SHARES, 2010 VERSUS 2016 (PERCENT OF TOTAL</i>	
<i>SALES).....</i>	<i>175</i>
<i>FIGURE 33 (CONTINUED)</i>	<i>176</i>
MARKET BY APPLICATION SEGMENT.....	176
<i>TABLE 46 MIDDLE EASTERN AND AFRICAN MRCAS MARKET BY</i>	
<i>TYPE OF APPLICATION, THROUGH 2016 (\$ MILLIONS).....</i>	<i>177</i>
<i>FIGURE 34 MIDDLE EASTERN AND AFRICAN MRCAS MARKET</i>	
<i>APPLICATION SHARES, 2010 VERSUS 2016 (PERCENT OF TOTAL</i>	
<i>SALES).....</i>	<i>177</i>
<i>FIGURE 34 (CONTINUED)</i>	<i>178</i>
CHAPTER TEN: VENDOR PROFILES	179
ANAMEDIC.....	179
BERCHTOLD GMBH	179
BOULDER INNOVATION GROUP.....	180
BRAINLAB AG	180
B. BRAUN AESCULAP	181
CAE HEALTHCARE	181

CONMED CORP.	182
CUREXO TECHNOLOGY CORP.	182
FIFTH DIMENSION TECHNOLOGIES	183
4NAVITEC GMBH.....	183
GE HEALTHCARE.....	184
GIVEN IMAGING, LTD.	184
HANSEN MEDICAL (ROBOTICS).....	185
HAPTICA	185
HITACHI MEDICAL CORP.	186
IMMERSION CORP.	186
INTEGRA RADIONICS, INC.....	187
INTUITIVE SURGICAL, INC.....	187

TABLE 47 INTUITIVE SURGICAL, INC., FINANCIAL

<i>PERFORMANCE, THROUGH 2010 (\$ MILLIONS)</i>	188
KINAMED, INC.	188
MAKO SURGICAL CORP.	189
MAZOR SURGICAL TECHNOLOGIES, LTD.	189
MED-SURGICAL SERVICES INC.	189
MEDTRONIC, INC.	190
MENTICE MEDICAL SIMULATION AB	190
MERGE HEALTHCARE	191
MICRODEXTERITY SYSTEMS, INC.	191
MUSCULOGRAPHICS, INC.....	192
ODIN MEDICAL TECHNOLOGIES	192
PRAXIM MEDIVISION	193
PROSURGICS, LTD.	193
ROBOTIC SURGICAL TECH, INC.	194
SCHAERER MAYFIELD NEUROMATE AG.....	194
SIEMENS HEALTHCARE.....	195
SIMBIONIX USA CORP.....	195
SIMSURGERY	196
SMITH & NEPHEW PLC.....	196
SONOWAND.....	197
STERIS CORP.....	197
KARL STORZ GMBH	198
STRYKER CORP.	198
SURGICAL SCIENCE AB.....	199
TITAN MEDICAL INC.....	199
VIKING SYSTEMS, INC.....	199
ZIMMER, INC.....	200