5. Other IT Solutions in Hospitals: An Overview

5.1 Commonly Used Information Technologies in Clinical Setting

5.1.1 Hospital Management System (HMS)

5.1.2 Clinical Data Repository (CDR)

5.1.3 Clinical Decision Support (CDS)
TABLE OF CONTENTS

1. Overview 15
   1.1 Statement of Report 15
   1.2 About This Report 15
   1.3 Scope of the Report 16
   1.4 Objectives 16
   1.5 Methodology 16
   1.6 Executive Summary 17

2. Picture Archiving and Communication Systems (PACS): An Overview 19
   2.1 Components and Architecture of PACS 19
      2.1.1 Image Acquisition Component 20
      2.1.2 PACS Controller 20
      2.1.3 Database Server and Archiving System 20
      2.1.4 Short-Time Archive 20
      2.1.5 Long-Time Archive 21
      2.1.6 Workstations 21
      2.1.7 Network 22
      2.2 Communication Protocols 23
         2.2.1 DICOM Standard 23
         2.2.2 HL7 Standard 23
      2.3 Current PACS Products and Software 24
         2.3.1 Agfa IMPAX 6 24
         2.3.2 Siemens syngo Suite 25
         2.3.3 OpenSourcePACS 26
      2.4 Future Trends and Developments in PACS 26

3. Medical Image Management in Healthcare Enterprise 27
   3.1 PACS and Medical Images 27
      3.1.1 Hospital Information System/Radiology System Database 27
      3.1.2 Database Gateway 28
      3.1.3 Imaging Modalities 28
      3.1.4 Acquisition Gateway 28
      3.1.5 PACS Controller – Image Database and Archive 28
      3.1.6 Workstations 28
      3.1.7 Application Servers 28
   3.2 HIS/CMS and Electronic Patient Record 28
      3.2.1 Enterprise Level Image/Data Distribution 29
      3.2.2 Business Models for Image/Data Management in the Enterprise Level 29

4. Processing of Medical Images 31
   4.1 Medical Image Management and Image Data Mining 31
   4.2 Bioimaging 32
   4.3 Virtual Reality in Medical Visualization 32
   4.4 Neuroimaging 33
   4.5 Software Techniques Coping with Large Data 33
   4.6 Utility of PACS in Medical Imaging 34
   4.7 Need for a PACS System 35
   4.8 Clinical Applications on PACS 35
      4.8.1 Advanced Applications 36
      4.8.2 Specialized Applications 36
   4.9 PACS in HER Architecture 39
   4.10 PACS Benefits 39
      4.10.1 Improvements to the Quality of Patient Care 39
      4.10.2 Improvements in Efficiencies and Effectiveness 40
      4.10.3 Cost Savings/Cost Avoidance 40
      4.10.4 Other Important Benefits 40
5. Other IT Solutions in Hospitals: An Overview 41
5.1 Commonly Used Information Technologies in Clinical Setting 42
5.1.1 Hospital Management System (HMS) 43
5.1.2 Clinical Data Repository (CDR) 44
5.1.3 Clinical Decision Support (CDS) 45
5.1.4 Computerized Physician Order Entry (CPOE) 46
5.1.5 EHR Systems 47
5.1.5.1 Use of Electronic Health Records in U.S. Hospitals 47
5.1.5.2 Adoption of Clinical Functionalities in Electronic Format 48
5.1.5.3 Adoption of Electronic Records in U.S. Hospitals 49
5.1.5.4 Barriers to Electronic Record Adoption 50
5.1.6 Electronic Medical Record (EMR) 52
5.1.7 Electronic Medication Administration Record (eMAR) 54

6. Market Analysis 55
6.1 Global Opportunities in Medical Imaging 55
6.1.1 Global Market for Medical Imaging Equipment 55
6.1.2 Global Medical Imaging Market Share by Modality 56
6.1.3 Increased Utilization Rate in the U.S. for Medical Imaging Modalities 57
6.1.4 Utilization Rate in the U.S. for CT 58
6.1.5 Utilization Rate in the U.S. for MRI 59
6.2 Global Market for PACS 59
6.2.1 Market Barrier for PACS 60
6.2.2 PACS in the Immediate Past 61
6.2.2.1 Return on Investments in PACS 61
6.2.2.2 International Scenario of PACS 62
6.2.3 Five PACS Trends for the Next Five Years 63
6.2.3.1 One Workstation and Many Applications 63
6.2.3.2 Efficient, Shared and Multi-Site Workflow 63
6.2.3.3 Movement to Thin or Zero-Client 64
6.2.3.4 The Incompleteness of EMRs without Medical Images 64
6.2.3.5 Paying for PACS on a Usage Basis 64
6.2.3.6 Long-term View 64
6.2.4 A Buyer’s Guide for PACS Workstations and Software 65
6.2.4.1 The PACS Workstation 65
6.2.4.2 PACS Radiology Reporting Workstation 65
6.2.4.3 PACS Mammography Workstation 65
6.2.4.4 PACS Cardiology Workstation 66
6.2.4.5 PACS Review Workstation 66
6.2.4.6 PACS Quality Assurance Workstation 66
6.2.4.7 Technical Considerations 66
6.2.4.8 Workstations and the DICOM Standards 66
6.2.4.9 The Database 67
6.2.4.10 DICOM Conformance 67
6.2.4.11 Network Image Distribution 67
6.2.4.12 Web Browser Technology 67
6.2.4.13 Thin Client Applications 68
6.2.4.14 Display Monitor 68
6.2.4.15 Display Card 69
6.2.4.16 Quality Control 69
6.2.4.17 Display Characteristics that Influence Image Viewing 69
6.2.18 Contrast Ratio 70
6.2.19 Luminance 70
6.2.20 Workstations and RIS 70
6.2.21 Integrating the Healthcare Enterprise (IHE) and Workstations 71
6.2.22 Operational Considerations 71
6.2.24 Reporting Workstation 71
6.2.25 Location and Environment 72
6.2.26 Reporting Workstation Tools 72
6.2.27 Viewing Images 74
6.2.28 Economic Considerations 74
6.2.29 Licensing 74
6.3 U.S. Market for PACS 75
6.3.1 U.S. PACS Replacement Studies 75
6.3.2 Pace of Cardiac PACS and CVIS 76
6.3.3 U.S.: The Maturing Cardiac-PACS Adoption 77
6.3.4 Upgrades and Replacements in PACS Market 77
6.3.5 U.S.: PACS Adoption 77
6.3.5.1 U.S.: PACS Installations 78
6.3.5.2 U.S.: PACS Vendor Market Size 80
6.3.5.3 PACS Image Distribution 82
6.3.6 HITECH Act 84
6.3.6.1 Summary of HITECH Act’s Components 84
6.3.6.2 HITECH’s Key Funds Allocation 85
6.3.6.3 Other Components of the HITECH Act 85
6.3.6.4 Health Information Privacy and Accountability Act (HIPAA) Implications 86
6.3.6.5 Hospital Incentives in HITECH 86
6.3.6.6 Physician Incentives in HITECH 86
6.4 PACS in Canada 87
6.4.1 PACS and Productivity Improvements in Canada 88
6.5 Brazilian PACS Market 88
6.5.1 Brazil’s Healthcare Sector 89
6.6 European Market for PACS 90
6.6.1 Leaders in European PACS Market 91
6.6.2 European RIS/PACS Market 92
6.6.3 European Cardio PACS Market 92
6.6.4 U.K. Survey on PACS 93
6.6.4.1 Sources of Dissatisfaction 94
6.7 PACS in the Italian NHS 94
6.7.1 Integration with Electronic Medical Records 95
6.7.2 PACS Implementations: Recent Trend 95
6.7.3 Future Scenario 95
6.8 PACS in Developing Countries 96
6.8.1 Key Issues for Developing Countries 97
6.8.2 PACS in China 97
6.8.3 PACS in India 98
6.8.4.1 Market Insight 98

7. Global Healthcare Information Technology (HIT) Market 100
7.1 HIT Adoption 100
7.2 Adoption of HIT in Primary Care 101
7.3 Global Market for Health Information Technology (HIT) 102
7.4 U.S. HIT Industry 103
7.4.1 U.S. Hospital Information System (HIS) Market 104
7.4.2 U.S.: Meaningful Use of HIT 104
7.4.3 Modest Increase in HIT Adoption 105
7.4.4 The U.S. HIT Scenario 106
7.4.4.1 Drivers of HIT Adoption 107
7.4.4.2 Physician Practice Management Software 107
7.4.4.3 Billing Systems 107
7.4.5 Essentials of the U.S. Hospital IT Market 108
7.4.5.1 Key Vendors in U.S. Hospital IT Market 108
7.4.6 U.S.: Healthcare IT Trends 109
7.4.6.1 PACS Utilization in U.S. by Imaging Modality 109
7.4.6.2 CPOE Adoption in U.S. Hospitals 110
7.4.6.3 EMR Adoption in U.S. Hospitals 111
7.4.7 Electronic Health Records in U.S. Hospitals 112
7.4.7.1 Modest Gains in Electronic Health Record Adoption 112
7.4.8 State of HER Adoption 115
7.4.8.1 Factors Driving HER Implementation 115
7.4.8.2 HER Adoption Leaders 117
7.4.9 U.S. Adoption of Clinical IT 117
7.4.9.1 Federal Investment in HIT 118
7.4.9.2 Standardization 118
7.4.9.3 HIT Certification 118
7.4.9.4 National and Regional Networks 119
7.4.9.5 HIT Systems and Their Features 119
7.4.9.6 Difference Between HER and EMR 119
7.4.9.7 EMR System 119
7.4.9.8 Computerized Physician Order Entry (CPOE) 120
7.4.9.9 Picture Archiving and Communication System (PACS) 120
7.4.9.10 Benefits and Adoption Cost of PACS 120
7.4.9.11 Benefits and Adoption Cost of CPOE 121
7.4.9.12 Benefits and Adoption Cost of EMR System 121
7.4.9.13 Pattern of HIT Adoption in For-Profit vs. Non-Profit Hospitals 122
7.4.9.14 HIT Adoption by Hospital Type 123
7.4.9.15 HIT Adoption by Size and Rural Status of the Hospital 124
7.4.9.16 HIT Adoption by Hospitals with Medicare and Medicaid Patients 125
7.4.9.17 HIT Adoption in Contract-Managed Hospitals 126
7.4.9.18 HIT Adoption in Primary Care 127
7.4.9.19 Factors that Influence HIT Adoption in Ambulatory Clinics 127
7.4.10 Road to Meaningful Use of IT in U.S. Hospitals 128
7.4.10.1 Federal Investment in Health IT: the ARRA 128
7.4.10.2 Potential of EHR Systems to Improve Patient Care 129
7.4.10.3 Adoption of HER Systems in U.S. Hospitals 130
7.4.10.4 Planning and Deliberation Needed for Hospital IT Adoption 133
7.4.10.5 Need for Redesigning Care Delivery 134
7.4.10.6 HER Systems and Patient Care 135
7.4.10.7 Need for Adequate Capital 136
7.4.10.8 External Challenges in Adopting HER Systems 137
7.4.11 Essentials of the U.S. Hospital IT Market 138
7.4.11.1 The EMR Adoption Model 138
7.4.11.2 Scoring Format 139
7.4.11.3 EMRAM Comparison, 2008–2009 139
7.4.11.4 National Review of EMR Scores 140
7.5 Healthcare IT in European Hospitals 141
7.5.1 Varying IT Budgets in European Countries 141
7.5.1.1 Limited IT Budgets for External IT Purchases in Europe 142
7.5.1.2 Anticipated Increase in IT Budget in Europe 143
7.5.1.3 Information Technology Budget Increase in a Contained Way in Europe 143
7.5.1.4 Limited Impact of Economic Downturn in Europe 144
7.5.1.5 Main Media for Storing and Archiving Medical Records 144
7.5.1.6 Hospital IT Market by Market Segment in Europe 145
7.5.1.7 Israel’s Health IT Industry 146
7.5.2 Israel’s Health IT Industry 146
7.5.3 Comparative Health IT 147
7.5.3.1 Denmark 147
7.5.3.2 Sweden 147
7.5.3.3 Netherlands 147
7.5.3.4 U.K. 148
7.5.3.5 Israel 148
7.5.3.6 U.S. 148
7.5.3.7 EMR Adoption and Use in Industrialized Countries 149
7.6 Healthcare IT Adoption in Asia 150
7.6.1 Health IT Market in Asia 150
7.6.2 Phenomenal Growth of IT Market in Asia 151
7.6.2.1 Competition Cauldron 151
7.6.3 HIT Adoption in China 152
  7.6.3.1 Chinese Government’s Policy 152
  7.6.3.2 Primary Drivers of HIT Adoption in China 152
  7.6.3.3 Primary Funders of HIT in China 152
  7.6.3.4 Future Direction of HIT Adoption in China 153
  7.6.4 Current HIT Scenario in China 153
  7.6.4.1 Components of Hospital Information System (HIS) in China 153
  7.6.4.2 Current Situation in Chinese Hospital Computerization 154
  7.6.4.3 Comparison with Computerization of Hospitals with Developed Countries 156
  7.6.4.4 Expanding HIT Market Investment in China 157
  7.6.4.5 Investment Structure of Chinese HIT Market 157
  7.6.5 Malaysian HIT Background 158
  7.6.6 Singapore’s Healthcare IT 159
  7.6.7 HIT Market in Australia 160
  7.6.8 HIT Market in India 161
  7.6.8.1 HIT Adoption in India 162
  7.6.8.2 Current Exemplars 162

8. Selected Company Profiles 163
  8.1 Agfa Healthcare 163
  8.1.1 Selected Products from Agfa Healthcare 163
  8.1.1.1 IMPAX RIS Gateway 163
  8.1.1.2 IMPAX 6 163
  8.1.1.3 IMPAX EL 163
  8.1.1.4 IMPAX ES 164
  8.1.1.5 IMPAX Enterprise 164
  8.1.1.6 IMPAX Integrated Reporting Solution (RIS/PACS/Speech) 164
  8.1.1.7 IMPAX for Breast Imaging 165
  8.1.1.8 Elefante.NET 165
  8.1.1.9 IMPAX RIS for Hospitals 165
  8.1.1.10 MediWeb Ordering 166
  8.1.1.11 MediWeb Results 166
  8.1.1.12 QDoc RIS 166
  8.1.1.13 QPlanner 167.
  8.1.1.15 RIS Management Reporting 167
  8.1.1.16 SpeechMagic 167
  8.1.1.17 TalkStation IS 168
  8.1.1.18 TalkStation Integrated Solutions 168
  8.1.1.19 TalkStation Radiology 168
  8.1.1.20 TalkStation TeleDictation 168
  8.1.1.21 TalkStation TeleReport 169
  8.1.1.22 TalkStation Web Typist 169
  8.1.1.23 Cardiovascular Entry Level Solution 169
  8.1.1.24 Cardiovascular Multimodality Edition 169
  8.1.1.25 Cardiovascular Solution 170
  8.1.1.26 IMPAX HeartStation ECG Management System 170
  8.1.1.27 Integrated Cardiovascular Solution 170
  8.1.1.28 IMPAX Registration and Fusion 171
  8.1.1.29 IMPAX Virtual Colonoscopy 171
  8.1.1.30 IMPAX X-Ray Angio Analysis 172
  8.1.1.31 IMPAX for Radiology 172
  8.1.1.32 IMPAX OT3000 173
  8.2 Aspyra, Inc. 173
  8.2.1 Aspyra’s Laboratory Products 173
  8.2.1.1 CyberLab 173
  8.2 Aspyra, Inc. 173
  8.2.1 Aspyra’s Laboratory Products 173
  8.2.1.1 CyberLab 173
  8.2.1.2 CyberLab Enhancements 174
  8.2.1.3 CyberMATE 175
8.2.1.4 CyberPATH 175
8.2.1.5 WebGateway 176
8.2.2 Aspyra’s Imaging Products 177
8.2.2.1 CyberRAD 177
8.2.2.2 AccessRAD 178
8.2.2.3 AccessNET 178
8.2.2.4 AccessMED 179
8.3 Avreo, Inc. 179
8.3.1 Selected Products from Avreo 180
8.3.1.1 interPRISE 180
8.3.1.2 interWORKS 180
8.3.1.3 interDAYHAWK 181
8.3.1.4 interVIEW 182
8.3.1.5 interORTHO 182
8.4 Carestream 183
8.4.1 Selected Products from Carestream 183
8.4.1.1 DIRECTVIEW Capture Link System 183
8.4.1.2 DIRECTVIEW EVP Plus Software 184
8.4.1.3 DIRECTVIEW General Radiography CR Software 184
8.4.1.4 CARESTREAM Image Suite Software 184
8.4.1.5 DIRECTVIEW CR Long-Length Imaging System 185
8.4.1.6 DIRECTVIEW Remote Patient Data Entry Software 185
8.4.1.7 DIRECTVIEW Total Quality Tool 185
8.4.1.8 Carestream Vue RIS 186
8.4.1.9 Carestream Vue PACS 186
8.4.1.10 Carestream Vue Motion 186
8.4.1.11 Carestream PACS 3D Functionality 186
8.4.1.12 ORTHOVIEW Orthopedic Digital Templating for Carestream PACS 187
8.4.1.13 Virtual Colonoscopy for Carestream PACS 187
8.4.1.14 Image Fusion Suite for Carestream PACS 187
8.4.1.15 Carestream Vue Mamm 187
8.4.1.16 Carestream Vue for Cardiology 188
8.4.1.17 Carestream Vue Connect 188
8.4.1.18 Carestream Vue for Vendor Neutral Archive 188
8.4.1.19 Carestream Vue for Cloud-Based Services 188
8.5 Cerner Corporation 189
8.5.1 Selected Products from Cerner 189
8.5.1.1 Acute Care Electronic Medical Record 189
8.5.1.2 Cardiovascular Solutions 189
8.5.1.3 Cerner Network 190
8.5.1.4 Clinical Imaging 190
8.5.1.5 Solutions for Community Hospitals 190
8.5.1.6 Computerized Provider Order Entry (CPOE) 190
8.5.1.7 Solutions for Critical Access Hospitals 191
8.5.1.8 Solutions for Critical care 191
8.5.1.9 Document Imaging 191
8.5.1.10 Solutions for Emergency Departments 191
8.5.1.11 Laboratory Information Solutions 192
8.5.1.12 Solutions for Medical Devices 192
8.5.1.13 Oncology Solutions 192
8.5.1.14 Perioperative Solutions 193
8.5.1.15 Solutions for Pharmacies 193
8.5.1.16 Point of Care Solutions 193
8.5.1.17 Radiology Solutions 193
8.6 DR Systems, Inc. 194
8.6.1 Selected Products from DR Systems 194
8.6.1.1 Unity RIS/PACS 194
8.6.1.2 Unity Cardiology CVIS 194
8.6.1.3 Digital Mammography Integrated with PACS 195
8.6.1.4 Unity Pathology 195
8.6.1.5 Integrated RIS 196
8.6.1.6 DR Scheduler 196
8.6.1.7 Management Reports 196
8.6.1.8 Document Scanning 197
8.6.1.9 Patient /Film Tracking 197
8.6.1.20 Advanced Image Processing 197
8.6.1.21 Catapult Technologist QC Workstation 198
8.6.1.22 Dominator Diagnostic Reading Workstation 198
8.6.1.23 Web Dominator 198
8.6.1.24 Digital Mammography 199
8.6.1.25 Diagnostic Reading Advanced Image Processing 199
8.6.1.26 Digital Transcription Workstation 200
8.6.1.27 Web Transcription 200
8.6.1.28 Instant Reporter 200
8.6.1.29 Report Manager 201
8.6.1.30 Output to Billing Systems and Services 201
8.6.1.31 HIS/RIS Interfaces 201
8.6.1.32 Dedicated Test System 201
8.6.1.33 Ambassador Clinical Review 202
8.6.1.34 Media Ambassador 202
8.6.1.35 LAN Ambassador 202
8.6.1.36 Network Media Ambassador 203
8.6.1.37 Web Ambassador 203
8.6.1.38 DR Web Launch 203
8.6.1.39 Orthopedic Tools 204
8.6.1.40 Central Image Server 204
8.6.1.41 Communicator Web Server 204
8.6.1.42 Storage Solutions 205
8.6.1.43 Unity PACS-SC 205
8.7 Fujifilm Corporation 206
8.8 GE Healthcare 206
8.8.1 GE’s Cardiology Imaging Software 206
8.8.1.1 CardIQ Function Xpress 206
8.8.1.2 CardIQ Fusion 207
8.8.1.3 ReportCard 4.0 207
8.8.1.4 CardIQ Physio 208
8.8.1.5 Innova EP Vision 208
8.8.1.6 SmartScore 4.0 209
8.8.1.7 CardIQ Xpress 2.0 Reveal 209
8.8.1.8 Dynamic VUE 209
8.8.1.9 Flow Analysis 4.0 210
8.8.1.10 Left Ventricle Analysis 210
8.8.1.11 StarMap 4.0 210
8.8.1.12 Stenosis Analysis 211
8.8.1.13 CardEP 211
8.8.2 Interventional Imaging Software 212
8.8.2.1 Integrated Registration 212
8.8.2.2 Innova 3D 212
8.8.2.3 Innova Vision 213
8.8.2.4 Innova Track Vision 213
8.8.3 Selected Neurology Imaging Software 213
8.8.3.1 Autobone and VesselIQ Xpress 213
8.8.3.2 Dynamic Shuttle 214
8.8.3.3 CT Perfusion 4D 214
8.8.3.4 Cortex ID 215
8.8.3.5 GSI Viewer 215
8.8.3.6 Integrated Registration 215
8.8.3.7 BrainWave 216
8.8.4 Selected Oncology Imaging Software 216
8.8.4.1 Advantage 4D 216
8.8.4.2 OncoQuant 217
8.8.4.3 PET VCAR 218
8.8.4.4 Motion VUE 218
8.8.4.5 AdvantageSim MD 218
8.8.4.6 GSI Viewer 219
8.8.4.7 CADstream 219
8.8.5 Selected Vascular Imaging Software 220
8.8.5.1 Angio Card 1.0 220
8.8.5.2 Vessel IQ Xpress 220
8.8.6 GE’s Other Imaging Software 220
8.8.6.1 DentaScan 220
8.8.7 GE’s Platforms 221
8.8.7.1 AW Server 221
3.9 INFINITT Healthcare, Co, Ltd. 221
8.9.1 Selected Products from INFINITT 222
8.9.1.1 Radiology PACS 222
8.9.1.2 Mammography PACS 222
8.9.1.3 Cardiology PACS 222
8.9.1.4 Dental PACS 223
8.9.1.5 Report Systems 223
8.9.1.6 Imaging EMR 223
8.9.1.7 RIS Solutions 224
8.9.1.8 3D: Colon 224
8.9.1.9 3D: Cardiac 225
8.9.1.10 3D: Lung 225
8.9.1.11 3D: Fusion 226
8.9.1.12 3D: Dental 226
8.10 LUMEDX Corporation 226
8.10.1 Selected Products from LUMEDX 227
8.10.1.1 CardioStar 227
8.10.1.2 Apollo Advance 227
8.10.1.3 CardioPACS 5.0 Enterprise Server 227
8.10.1.4 CardioPACS 5.0 Diagnostic Viewer 228
8.10.1.5 CardioPACS 5.0 Web Server 229
8.10.1.6 CardioPACS 5.0 Web Viewer 230
8.10.1.7 CardioPACS 5.0 LVA Module 231
8.10.1.8 CardioPACS 5.0 QCA Module 231
8.10.1.9 CardioPACS 5.0 CVUS Module 232
8.10.1.10 CardioPACS 5.0 IVUS Module 233
8.10.1.11 CardioPACS 5.0 Measurement Gateway 233
8.10.1.12 CardioPACS 5.0 MWL/MPPS SCP 234
8.10.1.13 CardioDoc Cath Reporting 235
8.10.1.14 CardioDoc Echo 236
8.10.1.15 CardioDoc PVI 238
8.10.1.16 CardioChart 240
8.10.1.17 CardioGate 240
8.10.1.18 CardioInventory 241
8.10.1.19 CardioCharge 241
8.10.1.20 Vascular Interventional Radiology Module 242
8.11 McKesson Corporation 243
8.11.1 McKesson’s Technology Solutions 244
8.11.2 Key solution areas 244
8.11.2.1 Clinical Management 244
8.11.2.2 Enterprise Imaging 244
8.11.2.3 Variable Thickness Regional Intensity Protocol (VTRIP) 245
8.11.2.4 Critical Results Reporting 245
8.11.2.5 Horizon Medical Imaging Enhanced Workflow Tools - Peer Review 245
8.11.2.6 Horizon Medical Imaging Mammography Plus 246
8.11.2.7 Horizon Rad Station – Advanced 246
8.11.2.8 Horizon Rad Station – Distributed 246
8.11.2.9 Horizon Rad Station – eJacket 247
8.11.2.10 Financial Management 247
8.11.2.11 Resource Management 247
8.11.2.12 Automation 247
8.11.2.13 Physician Practice Solutions 247
8.11.2.14 Horizon Ambulatory Care 248
8.11.2.15 Practice Partner 249
8.11.2.16 Connectivity 249
8.11.2.17 Pharmacy Management Software and Services 250
8.12 Meditech 250
8.12.1 Selected Products from Meditech 250
8.12.1.1 Emergency Department Management Solution 250
8.12.1.2 Enterprise Medical Record 250
8.12.1.3 Operating Room Management Solution 251
8.12.1.4 Bedside Verification Solution 251
8.12.1.5 Physician Care Manager 251
8.12.1.6 Anatomical Pathology Solution 252
8.12.1.7 Imaging and Therapeutic Service Solution 252
8.12.1.8 Laboratory and Microbiology Solution 252
8.12.1.9 Oncology Management Solution 253
8.12.1.10 Pharmacy Solution 253
8.12.1.11 Enterprise Patient Index and Medical Records 253
8.13 Merge Healthcare, Inc. 254
8.13.1 Selected Products from Merge Healthcare 254
8.13.1.1 Merge iConnect Access 254
8.13.1.2 Merge iConnect Share 254
8.13.1.3 Merge iConnect VNA 255
8.13.1.4 Merge iConnect Kiosk 255
8.13.1.5 Merge RIS 256
8.13.1.6 Merge PACS 256
8.13.1.7 Merge Financials 257
8.13.1.8 Merge Documents 257
8.13.1.9 Merge CADstream 257
8.13.1.10 Merge Mammo 258
8.13.1.11 Merge OrthoEMR 258
8.13.1.12 Merge OrthoCase 258
8.13.1.13 Merge Cardio 259
8.13.1.14 Merge Hemo 259
8.13.1.15 Merge AIMS 259
8.13.1.16 Merge Presurgical 260
8.13.1.17 Merge LIS 260
8.13.1.18 Merge LabAccess 260
8.14 NovaRad Corporation 260
8.14.1 Selected Products from NovaRad 261
8.14.1.1 NovaPACS 261
8.14.1.2 NovaRIS 261
8.14.1.3 NovaPro 261
8.14.1.4 NovaMG 261
8.14.1.5 NovaDash 261
8.14.1.6 NovaCardio 262
8.14.1.7 Nova Ortho 262
8.14.1.8 Nova View 262
8.14.1.9 Nova Vault 263
8.14.1.10 NovaRIS Billing 263
8.15 Philips Healthcare 263
8.15.1 Selected Products from Philips 263
8.15.1.1 Brilliance Everywhere 263
8.15.1.2 Brilliance Workspace 264
8.15.1.3 CT Visualization Software 264
8.15.2 Selected Philips’ Clinical Informatics 265
8.15.2.1 HeartStart Telemedicine System 265
8.15.2.2 Event Review Pro - EMS 265
8.15.2.3 Event Review Pro - Hospital 266
8.15.2.4 HeartStart Data Manager 266
8.15.2.5 HeartStart Data SDK 267
8.15.3 Selected Workflow Solutions in Nuclear Medicine 267
8.15.3.1 Extended Brilliance Workspace 267
8.15.3.2 NM Application Suite 267
8.15.3.3 PET Applications 268
8.15.3.4 CT Applications 268
8.16 Sectra Medical Systems S.L 268
8.16.1 Selected Products from Spectra 269
8.16.1.1 Sectra RIS/PACS 269
8.16.1.2 Sectra Breast RIS/PACS 269
8.16.1.3 Cross-Enterprise Sharing 269
8.16.1.4 Cross-Enterprise Archiving 269
8.16.1.5 Sectra PACS Components 270
8.16.1.6 Spectra Orthopedic PACS Solution 270
8.17 Siemens Healthcare 270
8.17.1 Selected Products from Siemens 271
8.17.1.1 The syngo.plaza 271
8.17.1.2 The syngo Imaging 271
8.17.1.3 The syngo Dynamics 272
8.17.1.4 The syngo Workflow 272
8.17.1.5 The syngo Portal Radiologist 273
8.17.1.6 The syngo Portal Executive 273
8.17.1.7 PACS Disaster Recovery 274
8.17.1.8 Med Administration Check 274
8.17.1.9 Medical Device Connectivity 275
8.17.1.10 Practice Management System 275
8.17.1.11 PDA Clinical Assistant 276
8.17.1.12 Computerized Physician Order Entry (CPOE) 276

APPENDIX

Appendix 1: Picture Archiving and Communication Systems (PACS): Myths and Facts 277
Appendix 1.1: Myth: PACS are Complicated and Expensive 277
Appendix 1.2: Myth: PACS Require Workstations 277
Appendix 1.3: Myth: Client License Required 277
Appendix 1.4: Fact: Planned Obsolescence 279
Appendix 1.5: Fact: DICOM and World Wide Web 279
Appendix 1.6: Facts: PACS Increases Referral Volume 280
Appendix 1.7: Fact: Arrival of Electronic Medical Records 280
Appendix 2: Cloud Infrastructure in Vendor Neutral Archive Configurations 281
Appendix 2.1: The concept of Vendor or PACS Neutral Archive 281
Appendix 2.2: Early VNA Configurations 282
Appendix 2.3: Market Description 282
Appendix 2.4: Leading Edge Innovations in Storage Solutions 283
Appendix 2.5: HTTP Access Methodology 283
Appendix 2.6: Metadata 283
Appendix 2.7: Introduction of MINT 284
Appendix 2.8: Market Adoption 284
Appendix 2.9: General Description of EMC 285
Appendix 3: Self-Funding Transition Plan to Electronic Health Records 286
Appendix 3.1: The High Cost of Record Keeping 286
Appendix 3.2: The Enormous Challenge to Maintain Hospital Records 286
Appendix 3.3: The Plan Needed to Meet the Challenges 287
Appendix 3.4: Three Phases of Transition 287
Appendix 3.5: Developing a Self-Funding Transition Plan 288
Appendix 3.6: Designing the Pathway 288
Appendix 3.7: Measuring the Results 288
Appendix 4: The Health IT Workforce 290
Appendix 4.1: Quantities and Staffing Ratios 290
Appendix 4.2: Workforce Roles 291
Appendix 4.3: Growth and Gaps 292
Appendix 4.4: Leadership Qualifications 293
Appendix 4.5: Education and Competencies 293
Appendix 5: Glossary of Terms: PACS 295

INDEX OF FIGURES

Figure 3.1: Patient Work List and Image Display 27
Figure 3.2: Enterprise Level Web-based Image/Data EPR Server with Archive 29
Figure 4.1: Content-Based Medical Image Retrieval Using the IRMA Framework 31
Figure 4.2: Visualization of MRI (blue) and PET (ocher) Data Sets with Two Different 1D Transfer Functions 33
Figure 4.3: Components of a Picture Archive and Communications System 37
Figure 4.4: Schematic of “Before PACS” Processes 38
Figure 4.5: Schematic of “After PACS” Processes 38
Figure 4.6: PACS as part of the Electronic Health Record Architecture 39
Figure 5.1: Major Perceived Barriers to Adoption of Electronic Health Records (EHRs) 51
Figure 5.2: Perceived Facilitators of Adoption of Electronic-Records Systems 52
Figure 6.1: Global Market for Medical Imaging Equipment by Geography, 2010 55
Figure 6.2: Global Medical Imaging Market Share by Modality, 2010 56
Figure 6.3: Utilization Rates for X-Ray, CT and Ultrasound in the U.S. 57
Figure 6.4: Utilization Rate for CT in the U.S. 58
Figure 6.5: Utilization of MRI in the U.S., 2007-2010 59
Figure 6.6: Global PACS Market, 2010-2017 60
Figure 6.7: PACS Web Server Concept 68
Figure 6.8: U.S. Market for PACS, 2010-2017 75
Figure 6.9: U.S. Hospitals with PACS Installed 78
Figure 6.10: Total Number of Hospitals vs. Hospitals with PACS Installed 78
Figure 6.11: Replacement and New PACS Purchases in the U.S. Hospitals 79
Figure 6.12: PACS Installations by Bed-size in the U.S. Hospitals 79
Figure 6.13: PACS Modalities Installations in the U.S. Hospitals 80
Figure 6.14: PACS Company Market Share in the U.S. 81
Figure 6.15: PACS Image Distribution in Hospital Departments in the U.S. 82
Figure 6.16: PACS Image Accessibility by Physician in the U.S. 83
Figure 6.17: RIS and PACS Interface in the U.S. 83
Figure 6.18: PACS Market: Revenue Forecasts (Brazil), 2010-2015 89
Figure 6.19: PACS Market: Company Market Share by Revenues (Brazil), 2008 90
Figure 6.20: European PACS Market, 2010-2017 91
Figure 6.21: Major PACS in U.K. 91
Figure 6.22: European Radiology PACS Market, 2010-2017 92
Figure 6.23: European Cardio PACS Market, 2010-2017 93
Figure 6.24: RIS/PACS Market in India 99
Figure 6.25: Total PACS Market in India 99
Figure 7.1: Percent Revenue Spent on IT by Different Industries 100
Figure 7.2: HIT Adoption Rate 101
Figure 7.3: Primary Care Physicians Using Electronic Health Records (HER) 102
Figure 7.4: Global Market for HIT, 2010-2017 103
Figure 7.5: North American HIT Market, 2010 103
Figure 7.6: U.S. Market for HIS, 2009-2016 104
Figure 7.7: Percentage of U.S. Physicians Using EMRs/EHRs, 2001–2009 105
Figure 7.8: U.S. Changes in EHR Adoption Rate, 2008-2009 105
Figure 7.9: Increased IT Budgets in the U.S. Hospitals 109
Figure 7.10: PACS Utilization by Imaging Modality 110
Figure 7.11: CPOE Adoption in U.S. Hospitals 110
Figure 7.12: CPOE Adoption in Academic and Non-Academic U.S. Hospitals 111
Figure 7.13: EMR Adoption in U.S. Hospitals 112
Figure 7.14: Changes in Electronic Health Record (EHR) Adoption Rate from 2008 To 2009 113
Figure 7.15: Primary Driver for HER Implementation 116
Figure 7.16: HER Adoption Leaders 117
Figure 7.17: Distribution of Non-Profit and For-Profit Hospitals on Clinical HIT Sophistication Scale 122
Figure 7.18: HIT Adoption by AHA Hospital Bed Size Category 124
Figure 7.19: Clinical HIT Adoption in Hospitals of Medicare and Medicaid Discharges 125
Figure 7.20: HIT Adoption by the Size of Hospital’s System and in Stand-Alone Hospitals 126
Figure 7.21: EMR Adoption in Contract-Managed Hospitals 126
Figure 7.22: Adoption in Systems and Hospitals with a Primary Care Department 127
Figure 7.23: Adoption of EMR in Ambulatory Practices by Size 128
Figure 7.24: HER Functions and Communication Capabilities 129
Figure 7.25: Sample Connection Points between EHR and Other Systems within the Hospital 130
Figure 7.26: Percentage of Hospitals that Have Implemented Select Electronic Capabilities, 2009 131
Figure 7.27: Percentage of Hospitals that Have Implemented Medication Safety Alerts, 2009 131
Figure 7.28: Percentage of Hospitals that Use Bar Codes to Identify Patients and Medications, 2009 132
Figure 7.29: Percentage of Hospitals that Expect to Incur a Financial Penalty for Failing to Demonstrate Meaningful Use by 2015 132
Figure 7.30: Sample EHR Implementation Process 133
Figure 7.31: Sample Workflow Process for Medication Order before Redesign 134
Figure 7.32: Sample Workflow Process for Medication Order after Redesign 135
Figure 7.33: Percentage of Hospitals Reporting Change in Access to Tax-exempt Bonds, January 2009 136
Figure 7.34: Percentage of Hospitals Reporting Change in Ability to Access Capital Since December 2008 137
Figure 7.35: IT Budget as % of Total Hospital Budget per Country in Europe 142
Figure 7.36: Expected Evolution of Hospitals’ IT Budget, 2008-2012 143
Figure 7.37: Anticipated Growth of Hospital IT Budget, 2008-2012 143
Figure 7.38: Perceived Impact of Economic Downturn in Europe 144
Figure 7.39: Hospital IT Market by Market Segment in Europe, 2008 145
Figure 7.40: Use of EHR Systems by Primary-care Physicians, 2009 146
Figure 7.41: EMR Adoption and Use in Industrialized Countries 149
Figure 7.42: Growth Rate of Chinese HIT Market Investment 157
Figure 7.43: Investment Structure of Chinese HIT Market 158
Figure 7.44: Singapore’s HIS Market 159
Figure 7.45: Australia’s Health IT Market 160
Figure 7.46: Key Australian Health IT Players 160
Figure 7.47: Implication on India HIT market by U.S. Service Providing Penetration 161
Figure 7.48: Indian IT Market in Healthcare Sector, 2010-2017 162
Figure App. 2.1: Atmos High-Level Service Oriented Architecture 285
Figure App. 3.1: The Three Phases of Transition 287

INDEX OF TABLES

Table 4.1: Examples of Large Medical Image Data 34
Table 5.1: Examples of Health Information Technology for Hospitals and Physicians 41
Table 5.2: HIMSS Definitions of Health Information Technology Applications 43
Table 5.3: Selected Electronic Functionalities and Their Level of Implementation in U.S. Hospitals 48
Table 5.4: Electronic Requirements for Classification of Hospitals as Having a Comprehensive or Basic Electronic-Records System 49
Table 5.5: Adoption of Comprehensive and Basic Electronic-Records Systems According to Hospital Characteristics 50
Table 5.6: The Difference between EMR and HER 53
Table 5.7: Top Ten eMAR Installed and Contracted Systems, 2009 53
Table 6.1: Display Resolution Comparison in PACS Image Viewing 70
Table 6.2: PACS Radiology Workstation Tools for Image Manipulation 72
Table 6.3: PACS Radiology Workstation Tools for Image Measurement 73
Table 6.4: PACS Radiology Workstation Tools for Advanced Visualization 73
Table 6.5: Hospital Adoption Timing/Incentive Payout 86
Table 6.6: Medicare Incentives for Physicians 87
Table 6.7: Impact of Top Four Industry Challenges (Brazil), 2010-2015 88
Table 6.8: Market Drivers Ranked in Order of Impact (Brazil), 2010-2015 89
Table 6.9: Market Restraints Ranked in Order of Impact (Brazil), 2010-2015 89
Table 6.10: PACS Ownership in the National Health Service 94
Table 6.11: PACS Installation by Geographical Area 95
Table 6.12: Level of PACS Integration 95
Table 6.13: Strategies for the Future 96
Table 7.1: U.S. HIT Market Size, 2009 106
Table 7.2: Selected EHR Functions and Implementation in U.S. Hospitals In 2009 113
Table 7.15: Hospitals That Adopted 1–9 “Core” Meaningful-Use Objectives, 2009 114
Table 7.3: Potential Savings from Clinical HIT Applications in Major Cost Categories 121
Table 7.4: Adoption of HIT Applications and Systems in For-Profit and Non-Profit Hospitals 123
Table 7.5: Clinical HIT Adoption in Acute Care Hospitals of Various Types 123
Table 7.6: HIT Adoption by Location 125
Table 7.7: EMR Adoption Model Trends, 2008-2009 140
Table 7.8: EMR/SEHR Adoption Model Scores, 2009 140
Table 7.9: Hospital IT Market Size in Europe 141
Table 7.10: Main Media for Storing and Archiving Medical Records in Europe 144
Table 7.11: Areas Where Hospital IT Systems are in Place in Europe 146
Table 7.12: Challenges for HIT Adoption in China 153
Table 7.13: Computerization of Chinese Medical Institutions 154
Table 7.14: Current Hospital MIS Situation Statistics in China 154
Table 7.15: Hospital MIS Implementation Situation Statistics in China 155
Table 7.16: Annual Average Investment in Computerization of Chinese Hospitals as a % of Revenue 156
Table 7.17: Key E-Health Players in Malaysia 158
Table 7.18: Key E-Health Players in Malaysia 159
Table 7.20: Key Contributors of Telemedicine in India 161
Table App. 3.1: Operational Costs Reduced Through Transition Planning 289
1. Overview

1.1 Statement of Report

Globally, healthcare organizations are experiencing constant pressure to manage, transport, store and process an increasing amount of patient data. A larger part of this data originates from two applications that are bringing healthcare to a digital environment: Picture Archiving and Communication Systems (PACS) and Electronic Medical Records (EMR). PACS is primarily used as an application to manage digital images, while EMR is the principal application interface for gathering patient data from multiple ancillary applications. These digital technologies enhance patient care with more timely, more secure and easier access to patient data. U.S., Europe and Japan are the largest markets for PACS. In terms of PACS utilization in medical imaging procedures, the U.S. leads the global market. In Asia-Pacific, growth in demand for PACS is catching up in the emerging markets such as China and India, where cost efficient initiatives are being implemented by the hospitals in the region. Leaders in the PACS market comprise GE Healthcare, Philips Healthcare, Siemens Healthcare, Agfa-Gevaert, Fujifilm, Carestream Health, McKesson and others.

1.2 About This Report

PACS was enabled by the development of standards by the American College of Radiology/National Electrical Manufacturers Association (ACR/NEMA) called the Digital Imaging and Communications in Medicine (DICOM) protocol. Other key regulations and standards that impact this space and are also examined are the U.S. Health Insurance Portability and Accountability Act (HIPAA) and the health level seven (HL7) guidelines. In this report, the trends, key vendors and market drivers are examined and abundant graphs and tables detailing important aspects of the space are provided.

By purchasing this study, the reader will have:

- An understanding of the most exciting PACS market segments.
- The latest information on leading products and R&D initiatives.
- Familiarity with recent developments and their effects on selected markets.
- Knowledge of the PACS market as an area of growth, research and investment.
- An extensive review of the PACS hardware, software and radiopharmaceuticals markets leading companies.

Key questions answered in this review are:

- How can PACS tools and technologies facilitate improved patient care?
- What are the main types of PACS technologies that are currently available?
- Who are the current key players in this marketplace?
- What is the current state of the PACS market?
- What are the major trends in PACS solutions?
- What is the impact of regulatory changes on the PACS markets?

Additionally, this examination contains:

- In-depth profiles of the leading companies with PACS tools and technologies.
- Detailed analysis of the trends in the PACS marketplace.
- Views on the PACS industry from leading industry experts.
- Analysis of new PACS applications.
- The latest news and M&A developments in the PACS marketplace.
Analysis includes charts and graphs measuring product growth and trends within the marketplace. Company-specific information, including sales figures, product pipeline status and R&D trends, is provided. The study will help the reader to:

- Evaluate the effect of strategic factors such as technology driven change and industry consolidation.
- Investigate how cost-constraints and technological advances are driving change in the PACS markets.
- Review the main participants in each sector and plan an entry strategy in line with the strengths and weaknesses of the competition.

1.3 Scope of the Report

This analysis primarily focuses on PACS and RIS (radiology information systems). It discusses products, trends, new developments and compensation issues that are currently affecting or are likely to affect the market soon. Detailed analyses are provided for each of the key companies in the major and minor market segments. More comprehensive information is provided for those companies that are in the major market segments. The reader should consult other TriMark reports at http://www.trimarkpublications.com for a detailed discussion of the important individual market segments that are related to the medical imaging sector.

1.4 Objectives

Discussions of the key products for PACS market are presented here. The analysis goes on to discuss the trends that have developed and are stimulating this market. A survey of all of the significant, active companies known to be marketing, manufacturing or developing instruments and agents in the areas selected as leading PACS markets in the U.S. is included in this study.

1.5 Methodology

The author of this report has an M.D. with a specialty in clinical radiology. The editor is a retired college professor with three decades of experience in teaching biochemistry, biotechnology and pharmacology. Company-specific information is obtained mainly from industry trade publications, academic journals, news and research articles, press releases and corporate websites, as well as annual reports for publicly-held firms. Additional sources of information include HIMSS Analytics, DiagnosticImaging, OECD Health Policy Studies, Journal of Health Informatics in Developing Countries, Journal of Digital Imaging, Next Generation Healthcare (NGH), Health Informatics Research Series, American Radiological Nurses Association, Agency for Healthcare Research and Quality (AHRQ), American Hospital Association (AHA), The New England Journal of Medicine, The Dorenfest Institute for Health Information, Columbia University of Science and Technology Ventures, Milken Institute, Journal of Digital Imaging, Journal of Health Informatics in Developed Countries, Biomedical Imaging and Intervention Journal, China Hospital Information Management Association (CHIMA) and OECD Health Policy Studies.

Some of the statistical information was taken from Biotechnology Associates’ databases and from TriMark’s private data stores. The information in this study was obtained from sources that TriMark believes to be reliable, but do not guarantee the accuracy, adequacy or completeness of any information or omission or for the results obtained by the use of such information. Key information from the business literature was used as a basis to conduct dialogue with and obtain expert opinion from market professionals regarding commercial potential and market sizes. Senior managers from major company players were interviewed for part of the information in this report.
Primary Sources

TriMark collects information from hundreds of Database Tables and many comprehensive multi-client research projects, as well as Sector Snapshots that are published annually. TriMark extracts relevant data and analytics from TriMark’s research as part of this data collection.

Secondary Sources

TriMark uses research publications, journals, magazines, newspapers, newsletters, industry reports, investment research reports, trade and industry association reports, government-affiliated trade releases and other published information as part of its secondary research materials. The information is then analyzed and translated by the Industry Research Group into a TriMark study. The Editorial Group reviews the complete package with product and market forecasts, critical industry trends, threats and opportunities, competitive strategies and market share determinations.

TriMark Publications Report Research and Data Acquisition Structure

The general sequence of research and analysis activity prior to the publication of every report includes the following items:

- Completing an extensive secondary research effort on an important market sector, including gathering all relevant information from corporate reporting, publicly available databases, proprietary databases, direct meetings and personal interviews with key personnel.

- Formulating a study outline with the assigned writer, including important items:
  - Market and product segment grouping and evaluating their relative significance.
  - Key competitors’ evaluations, including their relative positions in the business and other relevant facts to prioritize diligence levels and assist in designing a primary research strategy.
  - End-user research to evaluate analytical significance in market estimation.
  - Supply-chain research and analysis to identify any factors affecting the market.
  - New technology platforms and cutting-edge applications.

- Identifying the key technology and market trends that drive or affect these markets. Assessing the regional significance for each product and market segment for proper emphasis of further regional/national primary and secondary research.

- Launching a combination of primary research activities, including two levels of questionnaires, executive-direct focused, company-specific and region-specific communications to qualified and experienced senior executives worldwide.

- Completing a confirmatory primary research assessment of the report’s findings with the assistance of Expert Panel Partners from the industry being analyzed.

1.6 Executive Summary

In medical imaging PACS is a synthesis of hardware and software meant for the short and long term storage, retrieval, management, distribution and presentation of images. Electronic images and reports are transported digitally via PACS and this eliminates the need to manually file, retrieve, or transport film jackets. PACS find their applications in imaging modalities such as CT, MRI, X-ray and ultrasound. There are increasing indications of work-flow efficiencies, improved quality of care and cost savings being realized in a number of hospitals, which in turn, has generated interest in the adoption of PACS among general physicians and private practitioners. Today, PACS has almost become indispensable in a digital radiology environment.
Innovation in technology for clinical utilizations such as oncology PACS and surgical PACS is going to propel greater adoption of PACS outside the radiology department over the next several years. A lot of technological improvements, in both clinical applications and work-flow management tools have been introduced that have changed the functionality of PACS from a viewing and storage solution for images, to a crucial decision support system. The compelling need for integrated and improved diagnostic and visualization tools for non-radiology departments such as orthopedics, cardiology, oncology and mammography will catalyze technological innovation in the PACS market.

Globally, PACS has expanded from offering independent imaging solutions to an integrated platform catering all modalities across all departments. Historically, PACS is being employed by big hospitals and large university institutions and now new segments such as smaller community hospitals, outpatient imaging centers and physicians’ offices are digitizing their operations with the help of PACS. The global growth in PACS market will be fueled by the increasing adoption of PACS systems, in community hospitals and non-affiliated imaging centers. Additionally, sales of replacement units and system upgrades will propel market growth. TriMark’s research indicates that the global market for PACS was worth about $2.73 billion in 2010 and this is anticipated to grow and reach $6.11 billion in 2017.

According to CapSite, in the U.S. nearly 52% of the Radiology PACS systems in use within hospitals are more than five years old. In contrast, 70% of the Cardiology PACS systems are less than five years old. In addition, there is a steady increase in Cardiology PACS adoption curve over the past seven years, with 17% showing nearly twice the adoption as in 2009. According to IMV Medical Information Division, replacement has become the primary motivation for purchasing new systems in 2010, with 13% of the planned purchases of complete systems being replacement systems, compared to 10% for first buyers. In hospitals with over 100 beds, the adoption of PACS has clearly reached the mature stage, with very few ‘first buyers’ of PACS systems. Moreover, the purchase of first buyer and replacement systems is a small portion of future PACS investments, comprising only 13% of the planned expenditures from now through 2012, while 75% of the expenditures are for expanding and upgrading their present PACS systems. TriMark estimates that the PACS market in the U.S. was worth about $1.42 billion in 2010 and anticipates this figure to reach $2.93 billion in 2017.

In the U.S. acute-care facilities give priority to technology than the cost and most of them consider DR Systems, McKesson and Fujifilm as excellent systems with great support. Community hospitals are burdened with limited IT and financial resources and their decisions are based more on simple care. The community hospital providers generally choose a web-based PACS, such as NovaRad, Infinitt, GE PACSIW, Fuji, and Philips. The other vendors in the U.S. market are Agfa, Aspyra, Avreo, BRIT, Carestream, Cerner, Sectra and Siemens.

The adoption of PACS in European hospitals is 80%, but the modern RIS that drives PACS has only reached an adoption level of about 41%. Traditional RIS modules still dominates the market and many hospitals are disinclined to install a new RIS due to complications associated with training a large group of staff as well as concerns over data migration and security. But, with the third generation of PACS installations, hospitals have recognized the importance of investing in a modern RIS. More than that, they are also realizing the need to purchase RIS and PACS from the same vendor to minimize operational costs. The regulatory initiatives of DICOM and HL7 are likely to make the traditional RIS solution outmoded, thereby expanding RIS installations from leading vendors. Installation of modern PACS will force hospitals to have a modern RIS system that will drive more installations of these PACS. TriMark’s research indicate that the European PACS market in 2010 was worth about $648.5 million and we estimate that this will reach about $927.8 million in 2017.

Agfa-Gaevert N.V, Siemens Healthcare and Philips Healthcare are the leaders in Europe’s PACS market. These three companies have a share of about 47% of the market share. Other leaders are Carestream Health, Detonator and GE Healthcare. Many local players are also in the race, with Ferrania and Esaote in Italy, Vepro and GWI in Germany, Sectra in Sweden and the U.K. The market leaders are offering competitively priced, feature-rich products to attract more customers in a saturated market.