
Mountains of Opportunity

Picture by Susan Eustis

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Computer assisted coding of medical information uses natural language solutions to link the physician notes in an electronic patient record to the codes used for billing Medicare, Medicaid, and private insurance companies.
Natural language processing is used to determine the links to codes. 88% of the coding can occur automatically without human review. Computer assisted coding is used in all parts of the healthcare delivery system. The coding systems work well to implement automated coding process.

Physicians think about patient conditions in terms of words. Software is configured to achieve working with physicians who are more comfortable describing a patient treatment in words than codes. The electronic patient record, created using physician dictation, is used to form the base for the coding. Natural language solutions implement computer coding to identify key words and patterns of language. The physician dictation can be done using regular language that the software recognizes and translates into billing codes.

Properly designed natural language processing (NLP) solutions do not require physicians to change the way they work. They can dictate in a free-flowing fashion, consistent with the way they think, and are not limited to structured inputs that may or may not fully capture the unique circumstances of each patient encounter.

Matching codes generated from physician notes to standard treatment protocols promises to improve health care delivery. Accompanying that type of physician patient management against best practice promises to revolutionize health care delivery. The ability to further check as to whether the recommendations for follow up made by radiologists and matching the commendations with the actual follow up heralds’ significant promise of vastly improved health care delivery.

Computer assisted coding applications depend on the development of production quality natural language processing (NLP)-based computer assisted coding applications. This requires a process-driven approach to software development and quality assurance.

A well-defined software engineering process consists of requirements analysis, preliminary design, detailed design, implementation, unit testing, system testing and deployment. NLP complex technology defines the key features of a computer assisted coding (CAC) application.

Automation of process will revolutionize health care delivery. In addition to automating the insurance, billing, and transaction systems, streamlined care delivery is an added benefit. The ability to look at workflow and compare actual care to best practice is fundamental to automated business process.

The ability to link diagnostic patient information to treatment regimes and drug prescriptions is central to improving medical care delivery. Once a physician can see what conditions need to be followed, and see that appropriate care has been prescribed 100% of the time, care delivery improves dramatically. Diagnosis of conditions using radiology frequently results in detection of events that need follow-up.
According to Susan Eustis, lead author of the team that prepared the study, “Growing acceptance of computer assisted coding for physician offices represents a shift to cloud computing and billing by the procedure coded. Because SaaS based CAC provides an improvement over current coding techniques the value is being recognized. Administrators are realizing the benefits to quality of care. Patients feel better after robotic surgery and the surgeries are more likely to be successful.”

The worldwide market for Computer Assisted Coding is $898 million in 2016, anticipated to reach $2.5 billion by 2023. The complete report provides a comprehensive analysis of Computer Assisted Coding in different categories, illustrating the diversity of software market segments. A complete procedure analysis is done, looking at numbers of procedures and doing penetration analysis.

Major health plans report a smooth transition to ICD-10. This is due to rigorous testing for six years. ICD-10 has had a positive impact on reimbursement. ICD-10 coding system requires use of 72,000 procedure codes and 68,000 CM codes, as opposed to the 4,000 and 14,000 in the ICD-9 system. Managing high volume of codes requires automation. Healthcare providers and payers use complex coding systems, which drives demand for technologically advanced CAC systems.

The market for computer-assisted coding grows because it provides management of workflow process value by encouraging increasing efficiency in care delivery for large Professional Physician Practice and Ambulatory Clinical Facility. By making more granular demarcation of diagnoses and care provided for each diagnosis, greater visibility into the care delivery system is provided. Greater visibility brings more ability to adapt the system to successful treatments.

WinterGreen Research is an independent research organization funded by the sale of market research studies all over the world and by the implementation of ROI models that are used to calculate the total cost of ownership of equipment, services, and software. The company has 35 distributors worldwide, including Global Information Info Shop, Market Research.com, Research and Markets, electronics.ca, and Thompson Financial. It conducts its business with integrity.

The increasingly global nature of science, technology and engineering is a reflection of the implementation of the globally integrated enterprise. Customers trust wintergreen research to work alongside them to ensure the success of the participation in a particular market segment.

WinterGreen Research supports various market segment programs; provides trusted technical services to the marketing departments. It carries out accurate market share and forecast analysis services for a range of commercial and government customers globally. These are all vital market research support solutions requiring trust and integrity.

Key words: Natural language coding, NLC, Computer assisted coding, CAC, Rules based coding technology, Medical coding, Medical necessity, Electronic medical record, Electronic medical coding, Natural language solutions, Computerized medical workflow,
Claims scrubbers, Tessi® (terminology supported semantic indexing), Electronic coding for physicians, Medical necessity, Correct coding tools, Physician electronic medical record (EMR) systems, Language and computing, Ontology assisted solutions, Diagnosis codes, Procedure codes.

### Companies Profiled

#### Market Leaders

| 3M | Optum | Dolbey |

#### Selected Market Participants

| Artificial Medical Intelligence | Group One / CodeCorrect | Quest Diagnostics |
| Cerner | M*Modal | TruCode |
| Craneware | nThrive / Precyse | UnitedHealth Group / Optum |
| EPIC | Nuance | |

### Professional Physician Practice and Ambulatory Clinical Facility


### Report Methodology

This is the 693nd report in a series of primary market research reports that provide forecasts in communications, telecommunications, the Internet, computer, software, telephone equipment, health equipment, and energy. Automated process and significant growth potential are a priority in topic selection. The project leaders take direct responsibility for writing and preparing each report. They have significant experience preparing industry studies. They are supported by a team, each person with specific research tasks and proprietary automated process database analytics. Forecasts are based on primary research and proprietary data bases.
The primary research is conducted by talking to customers, distributors and companies. The survey data is not enough to make accurate assessment of market size, so WinterGreen Research looks at the value of shipments and the average price to achieve market assessments. Our track record in achieving accuracy is unsurpassed in the industry. We are known for being able to develop accurate market shares and projections. This is our specialty.

The analyst process is concentrated on getting good market numbers. This process involves looking at the markets from several different perspectives, including vendor shipments. The interview process is an essential aspect as well. We do have a lot of granular analysis of the different shipments by vendor in the study and addenda prepared after the study was published if that is appropriate.

Forecasts reflect analysis of the market trends in the segment and related segments. Unit and dollar shipments are analyzed through consideration of dollar volume of each market participant in the segment. Installed base analysis and unit analysis is based on interviews and an information search. Market share analysis includes conversations with key customers of products, industry segment leaders, marketing directors, distributors, leading market participants, opinion leaders, and companies seeking to develop measurable market share.

Over 200 in depth interviews are conducted for each report with a broad range of key participants and industry leaders in the market segment. We establish accurate market forecasts based on economic and market conditions as a base. Use input/output ratios, flow charts, and other economic methods to quantify data. Use in-house analysts who meet stringent quality standards.

Interviewing key industry participants, experts and end-users is a central part of the study. Our research includes access to large proprietary databases. Literature search includes analysis of trade publications, government reports, and corporate literature.

Findings and conclusions of this report are based on information gathered from industry sources, including manufacturers, distributors, partners, opinion leaders, and users. Interview data was combined with information gathered through an extensive review of internet and printed sources such as trade publications, trade associations, company literature, and online databases. The projections contained in this report are checked from top down and bottom up analysis to be sure there is congruence from that perspective.

The base year for analysis and projection is 2011. With 2011 and several years prior to that as a baseline, market projections were developed for 2012 through 2018. These projections are based on a combination of a
consensus among the opinion leader contacts interviewed combined with understanding of the key market drivers and their impact from a historical and analytical perspective.

The analytical methodologies used to generate the market estimates are based on penetration analyses, similar market analyses, and delta calculations to supplement independent and dependent variable analysis. All analyses are displaying selected descriptions of products and services.

This research includes reference to an ROI model that is part of a series that provides IT systems financial planners access to information that supports analysis of all the numbers that impact management of a product launch or large and complex data center. The methodology used in the models relates to having a sophisticated analytical technique for understanding the impact of workload on processor consumption and cost.

WinterGreen Research has looked at the metrics and independent research to develop assumptions that reflect the actual anticipated usage and cost of systems. Comparative analyses reflect the input of these values into models.

The variables and assumptions provided in the market research study and the ROI models are based on extensive experience in providing research to large enterprise organizations and data centers. The ROI models are useful for comparing products from different manufacturers, for example servers from different manufacturers, Systems z models from IBM, and labor costs by category around the world. This information has been developed from WinterGreen research proprietary data bases constructed as a result of preparing market research studies that address the software, energy, healthcare, telecommunications, and hardware businesses.
The study is designed to give a comprehensive overview of the Computer Assisted Coding market segment. Research represents a selection from the mountains of data available of the most relevant and cogent market materials, with selections made by the most senior analysts. Commentary on every aspect of the market from independent analysts creates an independent perspective in the evaluation of the market. In this manner the study presents a comprehensive overview of what is going on in this market, assisting managers with designing market strategies likely to succeed.
1.6.1  CAC Automates and Accelerates Auditing  55
1.7  Natural Language Solutions  55
1.7.1  State Of Language Technology Evaluation  56
1.8  Computerized Workflow System  58
1.8.1  Confidence Assessment Module  59
1.8.2  Researching Electronic Coding Products:  61

2. PROFESSIONAL COMPUTER ASSISTED CODING MARKET SHARES AND FORECASTS  62
2.1  Physician Practices With A Services Component Market Driving forces  63
2.1.1  Medical Best Practice Linking  66
2.1.3  CAC for Coders  67
2.1.4  Computer Assisted Coding Best Practice  70
2.1.5  Computer Assisted Coding Medical Information Solutions  71
2.1.6  Coding Solutions  71
2.1.7  Physician Computer Assisted Coding Services  74

2.2  Physician Office and Ambulatory Clinical Organizations Natural Language Computer Assisted Coding Market Shares  75
2.2.1  3M 83
2.2.2  3M 85
2.2.3  3M Merging Quality With Reimbursement  88
2.2.4  Optum  89
2.2.5  Optum Automated Code Identification  90
2.2.6  Optum  93
2.2.7  nThrive / Precyte  94
2.2.8  Dolby  94
2.2.9  McKesson  96
2.2.10  Cerner  98
2.2.11  TruCode  98

2.3  Natural Language Computer Assisted Coding of Medical Procedures Forecasts  98
2.3.1  CAC Market Software and Services Segmentation  102
2.3.2  CAC Hospitals and Facilities and Physicians Market Segment  104
2.3.3  Computer Assisted Coding Physician Market  106
2.3.4  Worldwide Computer Assisted Coding, Hospitals and Facilities and Physicians  108
2.3.5  CAC Software Market Hospital and Physician Segments  110
2.3.6  CAC Services Market Segment  111
2.3.7  US Computer Assisted Coding Physician Software License / Maintenance and Cloud SaaS Services 112
2.3.8  Physicians Computer Assisted Coding  115
2.3.9  US Computer Assisted Coding Software Units  118
2.3.10  US Computer Assisted Coding Software / Cloud Services for Independent Radiology Clinics Market Forecasts 120
2.3.11  US Independent Radiology Imaging Centers  121
2.3.12  Erroneous Selection of Principal Diagnoses Impacting Reimbursement  122
2.3.13  Growth of the U.S. Healthcare Industry  126

2.4  Worldwide, Number of Patients and Procedures  128
2.5  Making The Shift To The Modern ICD-10 Requirements  132
2.6  Computer Assisted Coding Prices  133
2.7  Computer Assisted Coding Regional Analysis  134
2.7.1  3M 360 Encompass System  137

3. COMPUTER ASSISTED CODING PRODUCT DESCRIPTION  138
3.1  3M 138
3.1.1  3M 360 Encompass System  139
3.1.2  3M 3M CodeAssist System  141
3.1.3  3M APR DRG Solutions Aspects  147
3.1.4  3M Merging Quality With Reimbursement  148
3.1.5  3M™ APR DRG Software  150
3.1.6  3 M Classification System For Patients  150
3.1.7  3M APR DRG Software Features:  153
3.1.8  3M Coding Technology  155
3.1.9  3M Computer-Assisted Coding Solutions  156
3.1.10  3M Medical Coding Tools Streamline Processes  156
### 3.1 WinterGreen Research, INC. Analysis

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.1.11 CodeAssist Automating the Medical Coding Process</td>
<td>157</td>
</tr>
<tr>
<td>3.1.12 3M CodeComplete Outsource Solution for Medical Coding</td>
<td>158</td>
</tr>
<tr>
<td>3.1.13 3M DataScout Clinical Data Extraction and Identification</td>
<td>158</td>
</tr>
<tr>
<td>3.1.14 3M and American Academy of Professional Coders (AAPC)</td>
<td>160</td>
</tr>
<tr>
<td>3.1.15 3M Data Mining Technology</td>
<td>161</td>
</tr>
<tr>
<td>3.1.16 3M Systems for Overcoming Documentation Shortfalls</td>
<td>162</td>
</tr>
<tr>
<td>3.1.17 3M Solutions for a Changing Healthcare Landscape</td>
<td>166</td>
</tr>
<tr>
<td>3.1.18 3M Web-Based Coding Software Return on Investment</td>
<td>179</td>
</tr>
<tr>
<td>3.1.19 3M Coding Software Functions</td>
<td>181</td>
</tr>
<tr>
<td>3.1.20 3M Computer-Assisted Coding Solutions Targeted to Specialty Areas</td>
<td>183</td>
</tr>
<tr>
<td>3.1.21 3M CodeAssist Functions</td>
<td>184</td>
</tr>
<tr>
<td>3.1.22 3M CodeComplete Business Process Management</td>
<td>185</td>
</tr>
<tr>
<td>3.2 Dolbey</td>
<td>187</td>
</tr>
<tr>
<td>3.2.1 Dolbey Coding Productivity Management</td>
<td>189</td>
</tr>
<tr>
<td>3.2.2 Dolby Fusion Suite Modules</td>
<td>191</td>
</tr>
<tr>
<td>3.3 Optum Coding Service</td>
<td>195</td>
</tr>
<tr>
<td>3.3.1 Optum Coding</td>
<td>196</td>
</tr>
<tr>
<td>3.3.2 Optum CPT® Codes</td>
<td>197</td>
</tr>
<tr>
<td>3.3.3 Optum Medicare Fee Schedule</td>
<td>197</td>
</tr>
<tr>
<td>3.4 McKesson</td>
<td>199</td>
</tr>
<tr>
<td>3.4.1 McKesson Watching the Cash</td>
<td>200</td>
</tr>
<tr>
<td>3.4.2 McKesson Securing the Subsidy</td>
<td>201</td>
</tr>
<tr>
<td>3.4.3 McKesson Quality Control And Process Improvement</td>
<td>203</td>
</tr>
<tr>
<td>3.5 Cerner Computer Assisted Coding</td>
<td>204</td>
</tr>
<tr>
<td>3.6 Platocode® Computer-Assisted Coding</td>
<td>207</td>
</tr>
<tr>
<td>3.6.1 Platocode ICD 10</td>
<td>210</td>
</tr>
<tr>
<td>3.6.2 Platocode® Solution For Ambulatory Surgery</td>
<td>210</td>
</tr>
<tr>
<td>3.6.3 Platocode® API</td>
<td>211</td>
</tr>
<tr>
<td>3.6.4 Communication Between 3rd-Party Applications And A Platocode Server</td>
<td>211</td>
</tr>
<tr>
<td>3.7 Nuance Computer Assisted Coding</td>
<td>211</td>
</tr>
<tr>
<td>3.7.1 Nuance Clinical Documentation Review</td>
<td>212</td>
</tr>
<tr>
<td>3.7.2 Nuance Clinical Documentation Compliance</td>
<td>213</td>
</tr>
<tr>
<td>3.7.3 Nuance Clintegrity Computer Assisted Coding (CAC)</td>
<td>213</td>
</tr>
<tr>
<td>3.7.4 Nuance Clintegrity Computer Assisted Coding (CAC) Key Features</td>
<td>216</td>
</tr>
<tr>
<td>3.7.5 Nuance Clintegrity Facility Coding Solutions for Healthcare</td>
<td>216</td>
</tr>
<tr>
<td>3.7.6 Nuance Clintegrity Facility Coding</td>
<td>218</td>
</tr>
<tr>
<td>3.7.7 Nuance Clintegrity Computer Assisted Coding (CAC) Features</td>
<td>219</td>
</tr>
<tr>
<td>3.7.8 Nuance Clintegrity Physician Coding</td>
<td>220</td>
</tr>
<tr>
<td>3.7.9 Nuance Clinician Reimbursement Calculation</td>
<td>222</td>
</tr>
<tr>
<td>3.7.10 Nuance Cliniternity Compliance &amp; ICD-10 Transition</td>
<td>223</td>
</tr>
<tr>
<td>3.7.11 Nuance Clintegrity Facility Coding</td>
<td>224</td>
</tr>
<tr>
<td>3.7.12 Nuance Clintegrity Abstracting</td>
<td>224</td>
</tr>
<tr>
<td>3.7.13 Nuance Clintegrity ICD-10 Education Services</td>
<td>226</td>
</tr>
<tr>
<td>3.7.14 Nuance Automated Coding</td>
<td>229</td>
</tr>
<tr>
<td>3.7.15 Nuance Natural Language Processing</td>
<td>230</td>
</tr>
<tr>
<td>3.7.16 Nuance Natural Language Understanding</td>
<td>230</td>
</tr>
<tr>
<td>3.7.17 Nuance Mapping and Modeling Disparate Controlled Medical Vocabularies (CMVs);</td>
<td>231</td>
</tr>
<tr>
<td>3.8 Artificial Medical Intelligence EmScribe CAC</td>
<td>231</td>
</tr>
<tr>
<td>3.8.1 Artificial Medical Intelligence EmScribe Dynamic Search</td>
<td>233</td>
</tr>
<tr>
<td>3.8.2 Artificial Medical Intelligence EmScribe Encoder</td>
<td>234</td>
</tr>
<tr>
<td>3.8.3 AMI EmScribe® Dynamic Medical Term And Coding Search Tool</td>
<td>235</td>
</tr>
<tr>
<td>3.8.4 Artificial Medical Intelligence Autonomous Coding</td>
<td>236</td>
</tr>
<tr>
<td>3.8.5 Artificial Medical Intelligence (AMI) EmScribe Dx</td>
<td>237</td>
</tr>
<tr>
<td>3.9 CodeCorrect</td>
<td>240</td>
</tr>
<tr>
<td>3.9.1 CodeCorrect Capture Revenue and Maintain Compliance</td>
<td>240</td>
</tr>
<tr>
<td>3.9.2 CodeCorrect Knowledge</td>
<td>240</td>
</tr>
<tr>
<td>3.9.3 CodeCorrect Medical Necessity Verification and APC Performance Tools</td>
<td>241</td>
</tr>
<tr>
<td>3.9.4 QuadraMed</td>
<td>242</td>
</tr>
</tbody>
</table>

**REPORT # SH26935197**

301 PAGES  110 TABLES AND FIGURES  2017

$4,200 SINGLE COPY   --   $8,400 WEB SITE POSTING
3.10 M*Modal Coding 242
3.10.1 M*Modal Workflow 244
3.10.2 M*Modal Management Tools 244
3.10.3 M*Modal Single Platform 244
3.11 nThrive / MedAssets-Precyse and Equation 245
3.11.1 Precyse Medical Coding and Computer Assisted Coding 245

4. COMPUTER ASSISTED CODING RESEARCH AND TECHNOLOGY 248
4.1 Computer-Assisted Coding Technology 248
4.2 Hybrid Technology 252
4.2.1 Computer Assisted Coding Engine 252
4.3 Optum Computer Assisted Coding Technology 254
4.4 Preventable Medical Conditions 255
4.5 Natural Language Processing (NLP) Medical Coding 256
4.5.1 Rules Based Approaches 256
4.5.2 Reports Based On Statistics 256
4.5.3 Normalize the Data 257
4.6 Reports Must Be In Some Kind Of Electronic Format 257
4.6.1 NLP Software Statistical Analysis 258
4.6.2 Workflow 258
4.6.3 Feedback for Machine Learning 258
4.6.4 Coding 259
4.6.5 Accuracy And Specificity Of Retrieval 260
4.6.6 Natural Language Programming (NLP) Vocabulary Processor 260
4.6.7 Robust Underlying Terminological Model And A Component Architecture 261
4.7 TeSSI® (Terminology Supported Semantic Indexing) 262
4.7.1 L&C’s LinkBase® Medical Ontology 262
4.7.2 Semantic Indexing With The TeSSI® Indexing Engine 263
4.7.3 Semantic Indexing Solution Automates The Indexing Process 264
4.7.4 Information Extraction with TeSSI® Extraction Engine 267
4.7.5 Semantic Search with TeSSI® Search Engine 268

5. COMPUTER ASSISTED CODING COMPANY PROFILES 269
5.1 CAC Key Market Players 269
5.2 3M 270
5.2.1 3M Business 271
5.2.2 3M Health Care Segment 274
5.2.3 3M Electronics and Energy Business 275
5.2.4 3M Health Information Systems 275
5.3 Artificial Medical Intelligence 279
5.4 Cerner 279
5.4.1 Cerner Business 280
5.4.2 Cerner Acquired Siemens Health Services 281
5.4.3 Cerner 2016 Fourth Quarter and Full-Year Highlights: 281
5.5 Craneware 281
5.6 Dolbey 282
5.7 EPIC 282
5.8 Group One / CodeCorrect 283
5.9 M*Modal 284
5.10 nThrive 285
5.10.1 nThrive / Precyse 285
5.11 Nuance 286
5.11.1 Nuance Healthcare 287
5.11.2 Nuance Business Description 287
5.11.3 Nuance Key Metrics 288
5.11.4 Nuance Healthcare Trends 289
5.12 Quest Diagnostics 290
5.13 TruCode 291
Figure 19. CAC Workstation Coder Benefits
Figure 20. CAC Management Tools
Figure 21. ELECTRONIC CODING SOLUTION MARKET DRIVING FORCES
Figure 22. ELECTRONIC CODING PRODUCT ISSUES
Figure 23. Large Physician Practice Computer Assisted Coding Software and Services Market Shares, Dollars, 2016
Figure 24. Radiology and Ambulatory Clinic Computer Assisted Coding Software and Services Market Shares, Dollars, 2016
Figure 25. Worldwide Computer Assisted Coding Facilities and Physicians Market Shares, Dollars, 2016
Figure 26. Computer Assisted Coding Software and Services Market Shares, Dollars, 2016
Figure 27. Worldwide Computer Assisted Coding License Shipments and Cloud Services Market Shares, Dollars, 2016
Figure 28. 3M CAC Research Areas
Figure 29. 3M Core of NLP Computer Assisted Coding
Figure 30. Optum CAC Key Benefits:
Figure 31. Optum LifeCode®, CAC Functions
Figure 32. Optum LifeCode®, CAC Reconciliation Functions
Figure 33. Optum CAC Reconciliation Module Functions:
Figure 34. Platocode® Computer Assisted Coding Solution Benefits
Figure 35. Computer Assisted Coding Market Forecast, Dollars, Worldwide, 2017-2024
Figure 36. Computer Assisted Coding CAC Market Forecasts, Dollars, 2017 to 2023
Figure 37. CAC Market Segments Software and Services Key Topics
Figure 38. Worldwide Computer Assisted Coding Hospitals and Facilities and Physicians Market Shares, Dollars, 2016
Figure 39. Worldwide Computer Assisted Coding: Large Teaching Hospitals, Mid-Size and Small Hospitals, and Clinical Facilities, Market Shares, Units, 2016

REPORT # SH26935197  301 PAGES  110 TABLES AND FIGURES  2017
$4,200 SINGLE COPY  --  $8,400 WEB SITE POSTING
Figure 40. Worldwide Computer Assisted Coding, Hospitals and Facilities and Physicians, Market Shares, Units, 2016

Figure 41. Worldwide Computer Assisted Coding, License Shipments, Services, and Cloud Services

Figure 42. Worldwide and US Computer Assisted Coding Number of Large Physician Practices, CAC Installed Base, Market Forecasts, Number, 2017-2023

Figure 43. Worldwide and US Computer Assisted Coding Software and Cloud Services CAC Market Forecasts, Dollars, 2017-2023

Figure 44. Worldwide and US Computer Assisted Coding for Physicians CAC Market Forecasts, Dollars, 2017-2023

Figure 45. US Computer Assisted Coding Physician Software License / Maintenance and Cloud SaaS Services, CAC Market Forecasts, Dollars, 2017-2023

Figure 46. US Computer Assisted Coding Software License / Maintenance and Cloud SaaS Services CAC For Large Independent Physician Practices Market Forecasts, Dollars, 2017-2023

Figure 47. US Computer Assisted Coding Software Units Retired CAC For Large Independent Physician Practices Market Forecasts, 2017-2023

Figure 48. US Computer Assisted Coding Software Units Retired CAC For Large Independent Physician Practices Market Forecasts, 2017-2023

Figure 49. US Computer Assisted Coding Software and Cloud SaaS Services CAC For Independent Radiology Clinics Market Forecasts, Dollars, 2017-2023

Figure 50. US Computer Assisted Coding CAC Software License / Maintenance and Cloud SaaS Percent Penetration For Independent Radiology Clinics Market Forecasts, Dollars, 2017-2023

Figure 51. US Outpatient Procedures Forecasts, Number of Procedures, 2016-2023

Figure 52. US Computer Assisted Coding Outpatient Procedure Market Penetration Forecasts, % Penetration, 2017-2023

Figure 53. 3M™ APR DRG Software Functions: 2.5 Making The Shift To The Modern ICD-10 Requirements

Figure 54. Computer Assisted Coding Regional Market Segments Dollars, Worldwide, 2016

Figure 55. Computer Assisted Coding Regional Market Segments Dollars, Worldwide, 2016

Figure 56. 3M 360 Encompass 1,500 Hospitals And Healthcare User Organizations

REPORT # SH26935197 301 PAGES 110 TABLES AND FIGURES 2017

$4,200 SINGLE COPY  --  $8,400 WEB SITE POSTING
Figure 57. 3M 360 Encompass 1,500 Hospitals And Healthcare User Organizations 139
Figure 58. 3M 3M CodeAssist System Features 141
Figure 59. 3M Codefinder Functions 143
Figure 60. 3M Codefinder Features 144
Figure 61. 3M Codefinder Intelligent Functions 146
Figure 62. 3M APR DRG Solutions Aspects 147
Figure 63. 3M Applications For Severity- And Risk-Adjusted Data 149
Figure 64. 3M Classification System 152
Figure 65. 3M APR DRG Software Features 153
Figure 66. 3M Medical Coding Tools 157
Figure 67. 3M DataScout Functions 159
Figure 68. 3M Clinical Information Extraction Functions 160
Figure 69. 3M Systems For Overcoming Documentation Shortfalls Focus 163
Figure 70. 3M Systems Topics 164
Figure 71. 3M Systems Metrics Included For Computerized Coding 165
Figure 72. 3M Web-Based Coding Software Return On Investment Metrics 179
Figure 73. 3M Web-Based Coding Software Key Benefits 180
Figure 74. 3M Coding Software Functions 181
Figure 75. 3M Coding Software Features 181
Figure 76. 3M Internet-Based Computer-Assisted Medical Coding Target Markets 183
Figure 77. 3M CodeAssist Functions 185
Figure 78. 3M CodeComplete Functions 186
Figure 79. Dolbey Fusion CAC Benefits 188
Figure 80. Dolbey Computer-Assisted Coding Solution Features 190
Figure 81. Dolby Computer Assisted Coding CAC Fusion Suite Modules
Figure 82. Optum Computer-Assisted Coding (CAC) Intelligent CAC Functions:
Figure 83. Optum Coding Service
Figure 84. Optum Medicare Fee Schedule
Figure 85. McKesson Practice Management Priorities
Figure 86. Cerner Discern nCode Functions
Figure 87. Cerner Discern nCode Key Features
Figure 88. Platocode Process
Figure 89. PlatoCode Code Set Filters
Figure 90. Nuance Personnel Impacted by Transition to ICD-10
Figure 91. ICD-10 Critical Business Concerns:
Figure 92. Nuance Clintegrity Facility Coding Healthcare Solutions Platform Functions
Figure 93. Nuance Clintegrity Facility Coding Healthcare Solution Functions
Figure 94. Nuance Clintegrity Computer Assisted Coding (CAC) Professional Fee Coding Functions
Figure 95. Nuance Clintegrity Clinician Coding Features
Figure 96. Nuance Clintegrity Facility Coding Features
Figure 97. Nuance Clintegrity Platform Modules
Figure 98. Nuance Clintegrity Platform, Modules Customizable Data Collection Fields Features
Figure 99. Nuance Advantages Of Automating Coding With Clintegrity
Figure 100. Nuance Coding Algorithms
Figure 101. Nuance Mapping And Modeling Disparate Controlled Medical Vocabulary Functions
Figure 102. Artificial Medical Intelligence EMscribe CAC
Figure 103. Artificial Medical Intelligence EMscribe Dynamic Search
Figure 104. Artificial Medical Intelligence (Ami) Emscribe™ Dx Benefits
### ABOUT THE COMPANY

**WinterGreen Research**, research strategy relates to identifying market trends through reading and interviewing opinion leaders. By using analysis of published materials, interview material, private research, detailed research, social network materials, blogs, and electronic analytics, the market size, shares, and trends are identified. Analysis of the published materials and interviews permits WinterGreen Research senior analysts to learn a lot more about markets. Discovering, tracking, and thinking about market trends is a high priority at WinterGreen Research. As with all research, the value proposition for competitive analysis comes from intellectual input.

**WinterGreen Research**, founded in 1985, provides strategic market assessments in telecommunications, communications equipment, health care, Software, Internet, Energy Generation, Energy Storage, Renewable energy, and advanced computer technology. Industry reports focus on opportunities that expand existing markets or develop major new markets. The reports access new product and service positioning strategies, new and evolving technologies, and technological impact on products, services, and markets. Innovation that drives markets is explored. Market shares are provided. Leading market participants are profiled, and their marketing strategies, acquisitions, and strategic alliances are discussed. The principals of WinterGreen Research have been involved in analysis and forecasting of international business opportunities in telecommunications and advanced computer technology markets for over 30 years.

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**Figure 105.** Precyse Coding Services 246
**Figure 106.** PrecyseCode™ CAC Coding Functions 247
**Figure 107.** Computer Assisted Technology Functions 249
**Figure 108.** How ICD-9 and ICD-10 Are Different 253
**Figure 109.** ICD-9 and ICD-10 Different Formats 254
**Figure 110.** Semantic Indexing for Medical Ontology 265
**Figure 111.** Semantic Process Flow Index Component Medical Ontology 266
**Figure 112.** Information Extraction With Tessi® Extraction Engine Functions 267
**Figure 113.** 3M 360 Encompass 1,500 Hospitals And Healthcare User Organizations 278
**Figure 114.** Current EPIC Computer Assisted Coding CAC Integrations 282
The studies provide primary analytical insight about the market participants. By publishing material relevant to the positioning of each company, readers can look at the basis for analysis. By providing descriptions of each major participant in the market, the reader is not dependent on analyst assumptions, the information backing the assumptions is provided, permitting readers to examine the basis for the conclusions.

WinterGreen Research is positioned to help customers facing challenges that define the modern enterprises. The increasingly global nature of science, technology and engineering is a reflection of the implementation of the globally integrated enterprise. Customers trust wintergreen research to work alongside them to ensure the success of the participation in a particular market segment.

WinterGreen Research supports various market segment programs; provides trusted technical services to the marketing departments. It carries out accurate market share and forecast analysis services for a range of commercial and government customers globally. These are all vital market research support solutions requiring trust and integrity.

ABOUT THE PRINCIPAL AUTHOR

Susan Eustis, President, co-founder of WinterGreen Research is a senior analyst. She has done research in healthcare, communications and computer markets and applications. She has written about computer assisted coding and participated in the research on that topic for the past seven years. She holds several patents in microcomputing and parallel processing. She has the original patents in electronic voting machines. She has new patent applications in format varying, multil-processing, and electronic voting. She is the author of recent studies of the Internet, Mega Data Centers, Cloud computing, Surgical Robots, drones, Agricultural robots, Industrial robots, Solar Renewable Energy, Wind Energy, Thin Film Batteries, Business Process Management marketing strategies, Internet equipment, biometrics, a study of Internet Equipment, Worldwide Telecommunications Equipment, Top Ten Telecommunications, Digital Loop Carrier, Web Hosting, Web Services, and Application Integration markets. The company wrote the first Internet study. They are experts in oxygen markets. Ms. Eustis is a graduate of Barnard College. Worldwide Who’s Who named her Top Female CEO of 2012, 2013, 2014, 2015, 2016.

About the WinterGreen Research Team: The WinterGreen Research Team is comprised of senior analysts that prepare the market research and analysis that is offered to the client and developed using an iterative process to achieve a final study. Typical projects include providing market/viability research. The team can look at how drones can be applied to critical infrastructures safety, including: type of market existing, Barriers, Forecast demand and competitors, SWOT and competitive advantages, Price Analysis, product design recommendations, and marketing considerations are typical topics covered.