FROST & SULLIVAN

CODONICS

2014 North American Medication Management Solutions Customer Value Leadership Award

FROST & SULLIVAN

50 Years of Growth, Innovation & Leadership

Background and Company Performance
Industry Challenges

Medication errors identified in hospitals are both common and extremely serious, as acknowledged by the Health and Human Service American Recovery and Reinvestment Act of 2009 (ARRA). To address these issues, healthcare providers have been forced to improve patient health outside the traditional healthcare setting. According to the World Health Organization (WHO) and the recent federal Drug Quality and Security Act, medication errors harm an estimated 1.5 million people in the United States alone, resulting in up to $3.5 billion in added medical costs every year. Frost & Sullivan believes that medication-focused solutions are critical in the ongoing effort to improve clinical efficiencies and save money.

Despite a host of best practices and accreditation standards, professional association standards, pharmacy-driven standards, hospital standards, and internationally recognized guidance on medication preparation and use practices, errors that cost the healthcare industry millions of dollars still occur every day. The industry has tried to address this challenge through different types of medication management and adherence programs, patient education, etc. In spite of that, currently available medication management solutions fail to generate meaningful improvements in patient safety because of a lack of additional interfaces and software capabilities.

The need for increased value offerings in the medication management market is quite high. With high rates of adverse drug events (ADE) and medication errors, strategies such as electronic medical records (EMR), computerized physician order entry (CPOE), bar code medication administration (BCMA), dose error reduction systems (DERS), and pharmacy information systems primarily used by clinical facilities, are being implemented to reduce medication errors. With the changing dynamics in the overall healthcare market, including third-party payers, changes in government programs, economic pressures, and market challenges, companies must provide products that can bring new value, benefits, and innovative solutions in order to be in the best possible position for future growth. Any company that can provide maximum value to patients by contributing a significant portion of its revenue to the development of new medication management devices, while still maintaining clear goals and keeping the product easy to use, can expect to see considerable success in this high-growth market.

Customer Value and Implementation Excellence

Total Customer Experience:

The Safe Label System (SLS), a prescription medical device introduced by Codonics in 2011, consolidates of all best practices of pharmacy and hospital policy in a single technologically advanced, easily manageable, and point-of-care deployable, user-friendly unit. SLS is an award-winning, truly innovative Food and Drug Administration (FDA)-approved Class II medical device solution to enhance patient safety and accuracy of medication management,

integrating worldwide recognized best practices and international standards such as International Organization for Standardization (ISO) and ARRA. The SLS functionality and workflow provide the healthcare professional with a "practice natural" means to reduce errors and consistently meet safety and healthcare objectives to ensure best practice quality and cost reduction in a seamless manner. Because both technology and cultural change are required to achieve measurable improvement, SLS' innovative software and technology is presented in an intuitive, user-friendly device at the point of care that enables the healthcare professional to take control of a myriad issues that hitherto have been nearly impossible. The innovative features found in SLS tackle these issues through its easy-to-use design and point-of-patient-care appliance interface that ensures accreditation and regulatory compliance, consistent with best practice standards and adherence to hospital rules. SLS prompts medication preparation by the clinician with rules, alerts, and warnings every step of the way, ultimately improving safety and quality while facilitating greater focus on the patient.

SLS enhances identification, mixing, single dose robotic preparation, and "smart" batch labeling to ensure efficiency with the same effectiveness, safety, and consistency to established procedures, expiration time/date, and use policies that are deployed at every medication preparation location. In the management of costly and limited commercially pre-filled syringes (especially for pediatric-specific concentrations and doses), SLS permits hospital control of ordered medications with consistency, compliancy, and cost reduction. Compliant, "smart" color labels with all required content assure that each medication is complete with 1D and 2D barcodes for Barcode-enabled Point of Care technology (BPOC) or Barcode medication administration (BCMA) pre-use and delivery processing for accurate records and cost accountability.

Users from pharmacy, anesthesiology, the emergency room, procedural, intensive care, and general floor environments have heralded SLS as a major improvement to healthcare delivery. In terms of reduction of preventable medication errors and their associated costs to the healthcare system, while fostering a new era of cooperation between pharmacy and medical staff, SLS is truly an innovative solution that seamlessly integrates into the healthcare system workflow without encumbrance. Advancing communication related to medication preparation and scoring in real-time, the elegant design and integration of hardware and software elements provides solutions never before available to clinicians, administrators, and pharmacists.

In the actual clinical use of SLS, end users report improved efficiency (20-30%), reduced errors (95%), improvements in compliancy and related safety in connection with reduced near misses, and cost avoidance associated with over-use of pre-filled and prepped but not used medications. Enterprise networked status with communication regarding drugs not found, back-order, new drug sources, use by clinician, and system operative status fluidly available through the Administration Tool (AT) also includes innovative email/mobile device notification allowing immediate access and attention.

Product Service/Value:

Efficient medication management is the most critical healthcare challenge today, given the dramatic amount of preventable health care events that occur in this setting. Unfortunately, it is also among the most underserved needs in healthcare, largely due to unclear customer needs and value propositions offered to those customers. Codonics took a different approach to this market need by first identifying a specific patient sector and designing a solution that fit its specific needs. With this, Codonics designed SLS 500i. One of the most significant issues with medication management and reporting in high-risk or research environments is the lack of accurate or reliable data concerning the adherence to medication. Currently patients self-report this information, but that information can be unreliable, and automating this process can be costly or otherwise impractical. SLS is designed to address the most commonly occurring errors made in operating rooms (ORs) in the course of preparation and administration of injectable and intravenous medications, thus preventing vial and ampoule swaps, mislabeling, and syringe swaps. The system uses barcode technology to take the information from a drug container and electronically verify it against the pharmacy's hospital-approved drug database to reduce medication errors.

SLS can be easily integrated with the existing healthcare workflow, including the ORs, intensive care unit (ICUs), post-anesthesia care unit (PACU), patient floors, and pharmacy. "Smart" color medication labels complete with 1D and 2D barcodes can be seamlessly integrated with EMRs via BPOC/BCMA systems for bedside and OR barcode validation to enhance patient safety and drug order verification. The system aligns with ARRA, ISO, ASTM, and APSF initiatives and adheres to Joint Commission (TJC) requirements and American Society of Anesthesiology (ASA) guidelines, enabling the application of best practices and achievement of quality, safety and cost reduction central to healthcare in the US and globally.

This unprecedented system is comprised of two main elements, the SLS Administration Tool (AT), a management software that allows a pharmacist to create and control drug a formulary without the pharmacist's physical presence at point-of-site, and an SLS 500i Point of care station (PCS) that acts as an invaluable tool for clinicians by providing medication safety checks while increasing productivity and assuring compliance. More than 60% of the most common drug errors that occur in the operating room are diligently addressed by Codonics through SLS. The optimization of various steps ensures that the medication is delivered to guarantee maximum patient safety and accuracy, thereby significantly reducing the medication errors and preventable hospitalizations, significantly improving patient outcomes. Codonics is continuously developing new products and introducing enhancements to its existing products in the areas of hardware, electrical, software, and workflow management engineering. Codonics invests more than 5% of its revenue in research and development and product development, annually.

Purchase Experience:

Codonics offers the best possible purchase experience to its customers by enhancing workflow, ensuring patient safety and accuracy, as well as complying with Joint Commission Standards. A unique solution with no direct competition in the marketplace, the Codonics' SLS solution is gradually creating a niche for itself in the medium and long term.

In a truly first-of-a-kind approach, the company provides innovative design and integration that improves medication preparation, consistency, and safety by consolidating preparation confirmations. The product features include approved standard and non-standard concentrations, dilutions, and total dose/total volume configurations carried through to a compliant "smart" medication label that includes a 2D barcode. The serial workflow that SLS provides takes a clinician through the medication preparation process and ultimately ensures a properly prepared and compliant medication that enables verification for pre-use and documentation at use. No other system provides such a comprehensive approach to remove human error and ensure best practice compliance, as demonstrated by SLS. These are among the reasons that SLS is a first of its class medical device (Class 2) as reviewed and approved by the FDA.

Service Experience:

In the broader spectrum of healthcare, issues with medication management and reporting medication adherence are some of the most significant in this industry. Unfortunately, generating value for customers in this market is both confusing and difficult, as many times even the most basic questions of value and proper target customer are unclear. Codonics has not only recognized where the greatest needs are in this market, but it has also targeted several key customer channels to truly capitalize on the significant market opportunity in the medication management market. By focusing on designing a sophisticated and effective solution that directly addresses the specific needs of its customers, Codonics has created a cutting-edge medication management solution. As a result, Frost & Sullivan finds that Codonics offers superior customer value in a market that is currently in desperate need of more effective solutions for its increasingly defined customer base.

For over 30 years, Codonics has served the needs of original equipment manufacturers (OEMs) and end users with innovative solutions to meet and exceed global healthcare needs and expectations. Codonics exports 70% of its products to over 120 countries. First and foremost, end user demand is analyzed in conjunction with design input to ensure that the solution matches market expectations. Packaging, fit and function, user interface, and target bill of material costs must be in line with market channel and end user pricing. At the same time, product design and functionality cannot fail to meet intended use and input requirement objectives. Materials must be durable and reliable, and Codonics has always looked to innovative means of producing appealing, easy-to-use, precision medical devices at or below the target production cost, which have been prime aspects of the Codonics best practice approach to medical device design.

Vision Alignment:

Since 1982, Codonics has been a company focused on the development and sales of peripheral devices used in diagnostic imaging. For nearly 30 years, Codonics has worked closely with the radiology community and diagnostic imaging system manufacturers to produce leading-edge imaging storage and distribution devices. With the development of the SLS PCS and associated AT, Codonics entered the realm of patient safety-oriented systems and expanded into the areas of anesthesia, operating room, ICU, patient floors, and pharmacy. Codonics' collaborative relationship with the SIMS Lab and Partner's Healthcare at Massachusetts General Hospital has broadened the company's perspectives to focus on products, such as SLS, and the worldwide need for improved medication safety practices. Even in countries where specific standards or governmental oversight does not yet exist, this new focus has caused Codonics to develop and implement the best practice approach to documented problems in a user-friendly system to provide improved safety solutions. By communicating and working with Ministry of Health (MOH) agencies all over the world, Codonics is augmenting awareness of problems, introducing best practices and applicable standards, and providing solutions for hitherto unrecognized needs. The Patient Safety Movement Foundation is confronting this large-scale problem by connecting people, ideas, and technology to dramatically improve patient safety and help eradicate preventable patient deaths. This initiative will help in achieving zero preventable patient deaths caused by medication errors in US hospitals by 2020. Codonics continues to focus on and commit to the ongoing movement by working with organizations such as the Emily Jerry Foundation and Anesthesia Patient Safety Foundation (APSF).

Process Design:

Because Codonics is an FDA medical device establishment, all product and service processes are designed in compliance with ISO 13485 standards and FDA QSR practices. Each product or feature revision consideration starts with a market trend analysis and an end user need assessment to develop and confirm input requirements. Codonics' openness to OEM needs, its discussion with international channels, and its focus on gathering input from healthcare professionals are strategic to ensuring the development of unique and highly satisfying products. Innovation at Codonics is iterative; the company has a feedback mechanism in place for its end users, at the beginning and also at every step of product development to ensure the delivery of high quality products and permit greater focus on the patient. This has been a key to the company's success.

Every Codonics product, including the Horizon Multimedia Dry Imager, Virtua Medical Disc Publisher, Integrity Medical Disc Importer, Infinity Medical Imager Storage Server, and the SLS, has been designed to address customer needs that remained unaddressed by other competing products in the marketplace. Each were and are products ahead of their time that were developed to meet trends and emerging requirements. In each case, game-changing technology in a new workflow created a paradigm shift as the solution to unique problems was presented.

Common Failure Mode and Effects Analysis (FMEA) and verification/validation (V&V) practices applied to input requirements, design stages, and production have allowed Codonics to achieve impressive acceptance and deployment of its products worldwide. Codonics began in the medical imaging market space where Computed Tomography (CT), Ultrasound (US), Nuclear Medicine (NM), Positron Emission Tomography PET), Computed and Digital Radiography (CR/DR), and Magnetic Resonance Imaging (MRI) require the management, storage, and distribution of digital image hardcopies. In this area, Codonics is known worldwide for its unique, high-quality system solutions; OEMs and end users continue to choose Codonics as a partner in healthcare. The best practices mentioned previously are key to Codonics' ability to refine products and provide unique solutions. The strategy to expand product lines and bottom line profits has resulted from the company's willingness to enhance existing products and expand into new markets such as medication safety management. Using its unmatched ability to analyze problems and skills, Codonics collaborated with Massachusetts General Hospital (MGH) to develop the SLS Point of Care and Formulary Management products. Ongoing efforts by Codonics are expected to drive the SLS sales anywhere medication preparation demands increased safety. For applications where proliferation of medication vial bar-coding has not yet become mainstream, Codonics focuses on providing drug vial identification in order to enable the features and functions of SLS to impact safety and improve healthcare practices worldwide. The sales potential for the application of these products and technologies across the healthcare industry is virtually unlimited.

Operational Efficiency:

Codonics conducts activities such as development, manufacturing, marketing, and general administration in the United States and maintains sales and service management operations in 7 international locations. ISO Quality Manual (QM)/ Quality Procedures (QP) with consistent work instructions are implemented to ensure consistency and quality at all stages of sales, service, and manufacturing. Operational efficiency is important for the company, and Codonics has staff at each location to maximize effectiveness. Codonics is a highly intranet-centric company where email, texting, and intranet management are key elements to coordinate the many aspects of day-to-day engineering, support, quality, and sales activities. Specialized "localized" order entry and accounting management systems have been developed and are maintained for the company's operations located in China, Portugal, and Japan. Sales and technical support management create and manage prospect pipelines and end user feedback through online systems to achieve the most effective input as well as to ensure timely processing of customer queries. Analysis of service and technical issues through the use of Codonics' Technical Services Input System (TSIS) provides diagnostic, instructional, and support trends to ensure fast and accurate customer technical support and feedback to production and suppliers for improved efficiency.

Continuous supplier audits and incoming inspection data enhances purchasing and engineering ability to select and maintain the best components and design aspects of Codonics' products. The Director of Operations and other management team members are

constantly enhancing processes and seeking the means and procedures to sustain quality and apply best practices to improve daily and overall operations. Through alignment with local engineering and business management colleges and universities, the Codonics Cooperative (COOP) program for students provides a continuous pathway for new technologies, applications, and strategies for excellence in development and business growth.

Codonics executes quality audits of its suppliers and it generates instant reports and analysis, in terms of the quality of the parts that are used in its products across every stage of the product development process. This program has improved the effectiveness of suppliers and the efficiency of the product development process based on the quality specifications set by the company for its product parts. The TSIS, Epicore, and Forth Shift ERP systems allow Codonics to forecast and react in near real-time to demands affecting almost every aspect of the company's operation. In-house development and management of the company internet and intranet resources permit timely and accurate corporate communication and information exchange (among company employees, Codonics channels and end users). Marketing communications and product/marketing graphic arts creation is managed by in-house specialists to allow Codonics to react and respond quickly to marketing and consumer needs. Electronically distributed work instructions and updates to procedures are available at every location for efficient management of the production workflow. The inventory and finished goods required for smooth, effective response to orders is a combination of ERP and dynamic communication managed by the systems in place at Codonics.

Conclusion

Codonics has an impressive strategic vision and an impactful offering in medical imaging and information management devices, specifically concerning medication management and patient-reported outcomes. Codonics continues to show exceptional insight within medication management and patient reported outcomes by understanding the complex needs of this market and designing cutting-edge solutions for these needs. Based on Frost & Sullivan's independent analysis of the North American Medication Management Solutions market, Codonics is recognized with the 2014 Customer Value Leadership Award.

Understanding the Total Customer Experience

Demand forecasting, branding, and differentiation all play a critical role in delivering unique value to customers. This three-fold focus, however, is only the beginning of the journey and must be complemented by an equally rigorous focus on the customer experience. Best-practice organizations therefore commit to the customer at each stage of the buying cycle and continue to nurture the relationship once the customer has made a purchase.

During the buying cycle, successful companies identify prospects, engage them through resonant communications, and manage to a successful close through superior service and targeted incentives to buy. Once the purchase is complete, customer-focused organizations continue to nurture relationships with ongoing service, transparency, and integrity. In this way, they build a loyal customer base with low attrition rates and high lifetime value. This ongoing, cyclical dynamic is further illustrated below.

Key Benchmarking Criteria

For the Customer Value Leadership Award, we evaluated the total client experience and strategy implementation excellence according to the criteria detailed below.
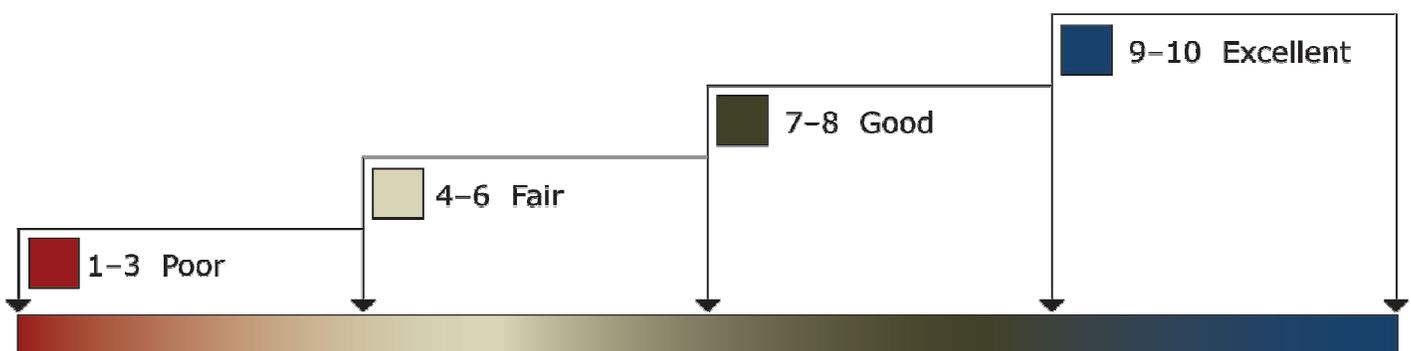
Customer Value Excellence
  Criterion 1: Total Customer Experience
  Criterion 2: Product/Service Value
  Criterion 3: Purchase Experience
  Criterion 4: Ownership Experience
  Criterion 5: Service Experience

Implementation Excellence
  Criterion 1: Vision Alignment
  Criterion 2: Process Design
  Criterion 3: Operational Efficiency
  Criterion 4: Technological Sophistication
  Criterion 5: Company Culture

Decision Support Scorecard and Matrix

To support its evaluation of best practices across multiple business performance categories, Frost & Sullivan employs a customized Decision Support Scorecard and Matrix. This analytical tool compares companies' performance relative to each other. It features criteria unique to each award category and ranks importance by assigning weights to each criterion. The relative weighting reflects current market conditions and illustrates the associated importance of each criterion according to Frost & Sullivan. This tool allows our research and consulting teams to objectively analyze performance, according to each criterion, and to assign ratings on that basis. The tool follows a 10-point scale that allows for nuances in performance evaluation; ratings guidelines are illustrated below.

9-10 Excellent

7-8 Good

4-6 Fair

1-3 Poor

Best Practice Award Analysis for Codonics.
Decision Support Scorecard: Customer Value Excellence

The Decision Support Scorecard, shown below, includes all performance criteria and illustrates the relative importance of each criterion and the ratings for each company under evaluation for the Customer Value Leadership Award. The research team confirms the veracity of the model by ensuring that small changes to the ratings for a specific criterion do not lead to a significant change in the overall relative rankings of the companies.

Finally, to remain unbiased and to protect the interests of all organizations reviewed, we have chosen to refer to the other key players in as Company 2 and Company 3.

DECISION SUPPORT SCORECARD FOR CUSTOMER VALUE LEADERSHIP AWARD (ILLUSTRATIVE): CUSTOMER VALUE EXCELLENCE

Measurement of 1–10 (1 = poor; 10 = excellent)	Award Criteria					
Customer Value Excellence	Total Customer Experience	Product/Service Value	Purchase Experience	Ownership Experience	Service Experience	Weighted Rating
Relative Weight (%)	**20%**	**20%**	**20%**	**20%**	**20%**	**100%**
Codonics	10.0	9.0	9.0	9.0	10.0	9.4
Company 2	8.0	9.0	8.0	8.0	8.0	8.2
Company 3	7.0	5.0	6.0	7.0	5.0	6.0

Criterion 1: Total Customer Experience
Requirement: Customers receive exceptional impression at every stage of the purchase cycle
Criterion 2: Product/Service Value
Requirement: Products or services offer the best value for the price, compared to similar offerings in the market
Criterion 3: Purchase Experience
Requirement: It is as simple for salespeople to sell the product or service as it is for the customer to buy the product or service
Criterion 4: Ownership Experience
Requirement: Customers are proud to own and use the company's product or service
Criterion 5: Service Experience
Requirement: Customer service is accessible, fast, and stress-free

Decision Support Scorecard: Implementation Excellence
DECISION SUPPORT SCORECARD FOR CUSTOMER VALUE LEADERSHIP AWARD
(ILLUSTRATIVE): IMPLEMENTATION EXCELLENCE

Measurement of 1–10 (1 = poor; 10 = excellent)	Award Criteria					
Implementation Excellence	Vision Alignment	Process Design	Operational Efficiency	Technological Sophistication	Company Culture	Weighted Rating
Relative Weight (%)	20%	20%	20%	20%	20%	100%
Codonics	10.0	10.0	10.0	8.0	10.0	9.6
Company 2	10.0	8.0	9.0	8.0	9.0	8.8
Company 3	5.0	8.0	5.0	5.0	6.0	5.8

Criterion 1: Vision Alignment
Requirement: The executive team is aligned on the organization's mission and vision
Criterion 2: Process Design
Requirement: Processes support the efficient and consistent implementation of tactics designed to implement the strategy
Criterion 3: Operational Efficiency
Requirement: Staff performs assigned tactics seamlessly, quickly, and to a high quality standard
Criterion 4: Technological Sophistication
Requirements: Systems enable companywide transparency, communication, and efficiency
Criterion 5: Company Culture
Requirement: The executive team sets the standard for commitment to customers, quality, and staff, which translates directly into front-line performance excellence

About Frost & Sullivan

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