

F R O S T & S U L L I V A N

FROST & SULLIVAN BEST PRACTICES AWARD

WOMEN'S HEALTH IMAGING - GLOBAL

Product Line Strategy Leadership
2019

SIEMENS
Healthineers

FROST & SULLIVAN

2019

BEST
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AWARD

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Background and Company Performance

Industry Challenges

According to the World Health Organization and World Cancer Research Fund, breast cancer is the world's second most common form of cancer; in 2018, an estimated 2.0 million new cases were diagnosed, and 627,000 lives were lost globally. Breast cancer accounts for 15% of all cancer deaths among women, and the economic burden associated with the disease is estimated to be more than \$50 billion annually, according to the Harvard School of Public Health.

Frost & Sullivan's independent research into the global X-ray mammography market estimates that 40 million procedures involve mammography equipment each year in the United States, with 30 million in Europe and 15 million in the Asia-Pacific region. X-ray mammography has been the gold standard and the most widely used examination for decreasing the overall breast cancer mortality (about 30% globally) rate. As such, population-based screening programs have been initiated by countries for more than 2 decades to aid in early diagnosis; however, X-ray mammography fails to provide a satisfactory level of early cancer detection in women with dense breast tissues. An estimated 30 to 50% of women aged 40 to 74 have dense breast tissues, and classification of tumor lesions poses a clear challenge.

To improve diagnostic accuracy, software solutions have been increasingly integrated with existing mammography systems. Historically, 2D computer-aided design (CAD) was used along with analog mammography systems. Today, 2D and 3D CAD in conjunction with digital mammography systems are utilized to detect invasive breast cancers and ductal carcinoma in situ. In addition, the introduction of digital breast tomosynthesis (DBT), which provides a 3D view of the breast, is another game-changer in the breast cancer detection imaging space. Typically, interpretation time for a 3d mammogram is under 2 minutes. 3D CAD used in conjunction with DBT can reduce reading time by approximately 40%. Globally, an estimated 50% of the women eligible for breast cancer screening skip or postpone the procedure due to anxiety and unpleasant, painful experiences during breast compression. Manufacturers have introduced breast paddles that optimize compression, adjusted to the individual breast so as to reduce pain and discomfort, and concurrently offer personalized care and simplified workflow.

Additionally, in order to address imaging issues related to dense breast tissue, ultrasound systems are used for supplemental screening. Beyond the conventional ultrasound systems, promising technologies like automated breast ultrasound reduce scan time, provide consistent acquisition and offers increased sensitivity especially in women with dense breast tissue.

Frost & Sullivan notes that the breast imaging industry is gradually shifting its focus to breast density measurement and incorporating this approach into most screening programs in the quest for technological or system-based advancements that will help reduce mortality and improve clinical outcomes.

Product Line Strength and Customer Impact

Product Positioning and Match to Needs: Features and Technology Leverage

Siemens Healthineers (Siemens) specializes in the development of new technologies that offer comprehensive breast imaging solutions. Frost & Sullivan observes how the company has been instrumental in introducing innovative technologies and products, essentially spearheading the evolving breast-imaging landscape. The company's innovative technology developed for improving both mammography and ultrasound outcomes has increased Siemens' value proposition, as combination of two complementary technologies lead to more confident decisions in early breast cancer diagnosis. The company's top breast imaging products and features are discussed below.

MAMMOMAT Revelation, 50° wide-angle tomosynthesis system: MAMMOMAT Revelation, Siemens' cutting-edge product, (obtained FDA approval in 2018) is capable of assessing breast density measurement at the point of examination. The system encompasses a 50-degree 3D HD breast tomosynthesis, which features the widest scan angle available in the market, providing the highest depth resolution and quality images with industry-leading diagnostic accuracy. Another significant advantage of this system is the patient centric design.

In 2014, the company had introduced its initial 3D tomosynthesis, but the latest version of MAMMOMAT Revelation offers an HD Breast Biopsy solution capable of targeting suspicious regions within the breast with a plus-or-minus 1mm accuracy. In addition, Revelations integrates specimen imaging at the gantry. Biopsy samples can visualized with seconds at the technologist workstation, improving workflow efficiency and reducing the time a patient is under compression dramatically. . During the RSNA 2018 tradeshow, Ms. Pam Cumming, Women's Health Product Portfolio lead at Siemens, stated, "The combination of HD breast tomosynthesis and InSpect integrated specimen imaging provides one-click targeting of suspicious areas and the ability to assess biopsy samples in real time right at the point of care." The technologist never leaves the patient's side reducing anxiety. Another emerging trend is contrast enhanced mammography. Some difficult cases required additional diagnostic information for confident decision making. One possible adjunct is MRI. However, it is time consuming, cost effective and not always well tolerated. MammoMat Revelation offers integrated Titanium Contrast Enhanced Mammography as a cost effective diagnostic alternative, reducing scheduling conflicts and providing immediate results.

Partnership with ScreenPoint Medical for AI-based applications: Siemens has entered into a strategic partnership with ScreenPoint to integrate ScreenPoint Transpara™ software with Siemens' 2D and DBT mammography systems, as well as to co-develop solutions designed to enhance image quality and provide interactivity for radiologists. Transpara uses advanced deep learning solutions and machine learning applications for breast analysis and decision support for suspicious areas, CAD, and exam selection for pre-screening.

ACUSON S2000 Automated Breast Volume Scanner (ABVS) 3D total breast ultrasound: Siemens' addition of 3D volumetric breast imaging creates a higher field of view (FOV) volume at 15 x 17 cm. The ultrasound is equipped with a breast imaging reporting and data system (BI-RADS) for the assessment of scans.

Frost & Sullivan recognizes how Siemens strives to improve and strengthen its products and services in women's health imaging - as well as its technological expertise year-on-year - when compared to its other competitors. Frost & Sullivan believes that the unique selling points of the company's industry-leading mammography and ultrasound solutions are their overall system design, intuitive and efficient workflow, and precise diagnosis.

Product Line Strength: Breadth and Scalability

Siemens' MAMMOMAT digital mammography with integrated stereotactic biopsy (launched in 2010) was the company's flagship product line in the women's health segment. It obtained approval in 2015 for 3D mammography and for ABVS in 2014. Delighted with the launch of 3D technology in mammography and ultrasound, the company has been constantly upgrading its technology to best cater to end-user requirements. As such, within a span of 3 to 5 years since its first launch, Siemens evolved as a strong competitor in the ABVS systems market in Europe and Asia-Pacific; currently, it is working towards obtaining substantial market share in the DBT mammography systems market.

Siemens maintains a leading position in the medical imaging space by offering an integrated approach — a true one-stop-shop — in providing consistent, high-quality products and processes, as well as by improving its upstream and downstream activities that aid in delivering efficient workflow with its complete range of breast cancer detection products.

Frost & Sullivan's independent analysis and recent coverage of the global mammography and breast ultrasound market find that Siemens' women's health imaging product attributes are among the industry's best in prioritization of software and hardware features, with the intent of offering high-quality breast imaging services with a focus on advancing precision medicine (to improve diagnostic accuracy). As a leading medical imaging company, Siemens is committed to sustaining its position in breast cancer detection through value and innovation. For instance, the company boasts proprietary technologies such as PRIME, which reduces radiation dose by up to 30% in mammography screening and without compromising the highest diagnostic capability. Given its expertise in understanding the breast cancer imaging industry, Siemens continually invests in technologies (upstream and downstream processes) and capabilities to keep ahead of the competition while meeting the growing needs in women's health imaging. This is best demonstrated by its clinical trial and studies carried out at Malmö University, which tested the significant breast cancer detection capability using 40% less compression, 15% lower dose and fewer views as the MAMMOMAT Revelation detected 43% more invasive cancers ; These results confirm it outperformed other competitors.

Participating in the largest radiology events, such as Radiological Society of North America (RSNA) and European Congress of Radiology (ECR), Siemens continually showcases its

latest generation of women's health systems that feature newer technology upgrades in its MAMMOMAT/ABVS/Syngo breast care series.

Customer Purchase Experience and New Customer Gains

In its bid to offer customers the best value across the globe, Siemens ensures that its product line of women's health system for breast cancer detection delivers industry-leading performance. The company has fulfilled its commitment to deliver a superior value proposition to its customers. For instance, considering that globally an estimated 45% of women eligible for breast cancer screening skip the test due to discomfort and anxiety, Siemens introduced the following product features.

OpComp: Personalized compression force is optimized for every woman's unique anatomy, without compromising image quality. Compression force automatically stops when optimal compression is reached, reducing anxiety and discomfort.

OpDose: Based on a patient's breast characteristics, the filter automatically selects the required dose of radiation exposure.

SoftComp paddles: The paddles are designed to provide higher patient comfort and easy positioning, with soft edges and a breast-optimized shape.

In addition, from the technologist's perspective, the equipment is easy to use. The biopsy table included in the equipment is light weight (less than 5 kilos) for easy set-up. The system's ergonomic design reduces repetitive motion injury and allows the technologist to focus her time on the patient.

Frost & Sullivan is impressed that Siemens invests in providing a positive patient experience that delivers the complete screening and diagnostic workups from one machine (image acquisition, targeting, biopsy, and specimen scan), including patient comfort and well-being design features.

Moreover, Siemens' work with ScreenPoint in deep learning and machine learning algorithm applications for breast analysis represents a strong industry partnership for advancing artificial intelligence in women's health, backed by 8 years of investigative studies with Radbound University Medical Center. Significant improvement in sensitivity, specificity, and accuracy in clinical decisions and interactive decision support with the overall system's design translate into high diagnostic value with unmatched speed, precise diagnostics, and image acquisition in breast cancer detection. This makes Siemens' women's health imaging system a preferred choice among customers.

Conclusion

Frost & Sullivan independent analysis identifies that Siemens Healthineers' range of products makes the company a clear trendsetter in women's health imaging. For breast cancer imaging in particular, its comprehensive system portfolio of cutting-edge technologies that reduce radiation dose and procedural time is quite impressive. In addition, a focus on patient ease and comfort is unique to Siemens and truly differentiates it from other competitors, providing a distinct competitive advantage globally.

With its engineering expertise and extended global services, the company fulfills its motto of “Shaping the future of Healthcare”, particularly through a clear focus on women’s health. Supported by its stellar reputation in medical imaging modalities, Siemens’ recent launch of MAMMOMAT Revelation and its ACUSON S2000™ are expected to experience wide adoption as premier diagnostic and screening tools for breast cancer detection. Meanwhile, the company has efforts well underway for developing additional technology in data, artificial intelligence, machine learning, and deep learning to accelerate clinical decisions.

For its strong overall performance, Siemens Healthineers has earned the 2019 Frost & Sullivan Global Product Line Strategy Leadership Award.

Significance of Product Line Strategy Leadership

Ultimately, growth in any organization depends upon customers purchasing from a company and then making the decision to return time and again. A full, comprehensive product line that addresses numerous customer needs and preferences is, therefore, a critical ingredient to any company's long-term retention efforts. To achieve these dual goals (customer value and product line strength), an organization must be best-in-class in three key areas: understanding demand, nurturing the brand, and differentiating from the competition.



Understanding Product Line Strategy Leadership

Driving demand, strengthening brand, and differentiating from the competition all play a critical role in delivering unique value to customers. This three-fold focus, however, must ideally be complemented by an equally rigorous focus on building a superior and comprehensive product line.

Key Benchmarking Criteria

For the Global Product Line Strategy Leadership Award, Frost & Sullivan analysts independently evaluated two key factors—Product Line Strength and Customer Impact—according to the criteria identified below.

Product Line Strength

- Criterion 1: Breadth
- Criterion 2: Scalability
- Criterion 3: Technology Leverage
- Criterion 4: Features
- Criterion 5: Supply Chain Reliability

Customer Impact

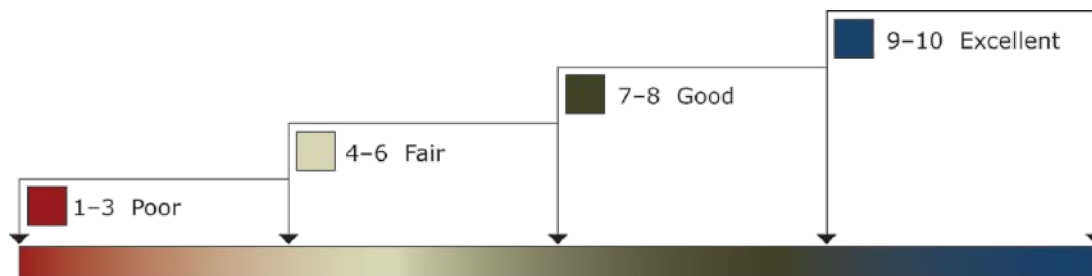
- Criterion 1: Price/Performance Value
- Criterion 2: Customer Purchase Experience
- Criterion 3: Customer Ownership Experience
- Criterion 4: Customer Service Experience
- Criterion 5: Brand Equity

Best Practices Award Analysis for Siemens Healthineers

Decision Support Scorecard

To support its evaluation of best practices across multiple business performance categories, Frost & Sullivan employs a customized Decision Support Scorecard. This tool allows our research and consulting teams to objectively analyze performance, according to the key benchmarking criteria listed in the previous section, 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.

RATINGS GUIDELINES



The Decision Support Scorecard is organized by Product Line Strength and Customer Impact (i.e., These are the overarching categories for all 10 benchmarking criteria; the definitions for each criterion are provided beneath the scorecard.). The research team confirms the veracity of this weighted scorecard through sensitivity analysis, which confirms 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.

The results of this analysis are shown below. To remain unbiased and to protect the interests of all organizations reviewed, we have chosen to refer to the other key participants as Competitor 2 and Competitor 3.

<i>Measurement of 1-10 (1 = poor; 10 = excellent)</i>			
Product Line Strategy	Product Strength	Line	Customer Impact
			Average Rating
Siemens Healthineers	9.5		9.50
Competitor 2	9.0		9.00
Competitor 3	9.0		8.75

Product Line Strength

Criterion 1: Breadth

Requirement: Product line addresses the full range of customer needs and applications.

Criterion 2: Scalability

Requirement: Product line offers products at a variety of price points and functionality levels.

Criterion 3: Technology Leverage

Requirement: Demonstrated commitment to incorporating leading-edge technologies into product offerings results in greater product performance and value.

Criterion 4: Features

Requirement: Products offer a comprehensive suite of features to serve customers at multiple levels of functionality, ease of use, and applications.

Criterion 5: Supply Chain Reliability

Requirement: There is sufficient control over the supply chain to ensure availability of key components and thereby the availability of products in the product line.

Customer Impact

Criterion 1: Price/Performance Value

Requirement: Products or services offer the best value for the price, compared to similar offerings in the market.

Criterion 2: Customer Purchase Experience

Requirement: Customers feel they are buying the most optimal solution that addresses both their unique needs and their unique constraints.

Criterion 3: Customer Ownership Experience

Requirement: Customers are proud to own the company’s product or service and have a positive experience throughout the life of the product or service.

Criterion 4: Customer Service Experience

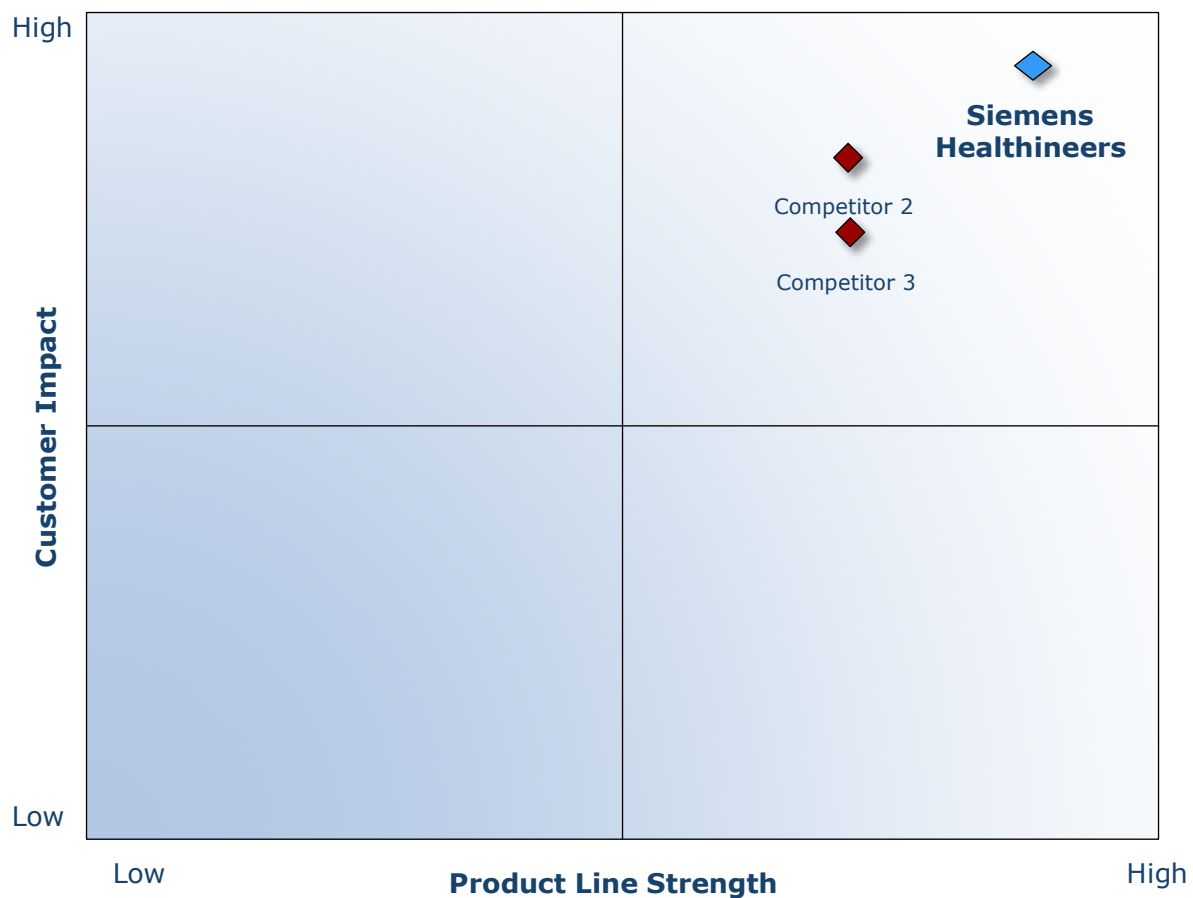
Requirement: Customer service is accessible, fast, stress-free, and of high quality.

Criterion 5: Brand Equity

Requirement: Customers have a positive view of the brand and exhibit high brand loyalty.

Decision Support Matrix

Once all companies have been evaluated according to the Decision Support Scorecard, analysts then position the candidates on the matrix shown below, enabling them to visualize which companies are truly breakthrough and which ones are not yet operating at best-in-class levels.



Best Practices Recognition: 10 Steps to Researching, Identifying, and Recognizing Best Practices

Frost & Sullivan analysts follow a 10-step process to evaluate Award candidates and assess their fit with select best practice criteria. The reputation and integrity of the Awards are based on close adherence to this process.

STEP	OBJECTIVE	KEY ACTIVITIES	OUTPUT
1 Monitor, target, and screen	Identify Award recipient candidates from around the globe	<ul style="list-style-type: none"> • Conduct in-depth industry research • Identify emerging sectors • Scan multiple geographies 	Pipeline of candidates who potentially meet all best-practice criteria
2 Perform 360-degree research	Perform comprehensive, 360-degree research on all candidates in the pipeline	<ul style="list-style-type: none"> • Interview thought leaders and industry practitioners • Assess candidates' fit with best-practice criteria • Rank all candidates 	Matrix positioning of all candidates' performance relative to one another
3 Invite thought leadership in best practices	Perform in-depth examination of all candidates	<ul style="list-style-type: none"> • Confirm best-practice criteria • Examine eligibility of all candidates • Identify any information gaps 	Detailed profiles of all ranked candidates
4 Initiate research director review	Conduct an unbiased evaluation of all candidate profiles	<ul style="list-style-type: none"> • Brainstorm ranking options • Invite multiple perspectives on candidates' performance • Update candidate profiles 	Final prioritization of all eligible candidates and companion best-practice positioning paper
5 Assemble panel of industry experts	Present findings to an expert panel of industry thought leaders	<ul style="list-style-type: none"> • Share findings • Strengthen cases for candidate eligibility • Prioritize candidates 	Refined list of prioritized Award candidates
6 Conduct global industry review	Build consensus on Award candidates' eligibility	<ul style="list-style-type: none"> • Hold global team meeting to review all candidates • Pressure-test fit with criteria • Confirm inclusion of all eligible candidates 	Final list of eligible Award candidates, representing success stories worldwide
7 Perform quality check	Develop official Award consideration materials	<ul style="list-style-type: none"> • Perform final performance benchmarking activities • Write nominations • Perform quality review 	High-quality, accurate, and creative presentation of nominees' successes
8 Reconnect with panel of industry experts	Finalize the selection of the best-practice Award recipient	<ul style="list-style-type: none"> • Review analysis with panel • Build consensus • Select recipient 	Decision on which company performs best against all best-practice criteria
9 Communicate recognition	Inform Award recipient of Award recognition	<ul style="list-style-type: none"> • Present Award to the CEO • Inspire the organization for continued success • Celebrate the recipient's performance 	Announcement of Award and plan for how recipient can use the Award to enhance the brand
10 Take strategic action	Upon licensing, company is able to share Award news with stakeholders and customers	<ul style="list-style-type: none"> • Coordinate media outreach • Design a marketing plan • Assess Award's role in future strategic planning 	Widespread awareness of recipient's Award status among investors, media personnel, and employees

The Intersection between 360-Degree Research and Best Practices Awards

Research Methodology

Frost & Sullivan's 360-degree research methodology represents the analytical rigor of our research process. It offers a 360-degree-view of industry challenges, trends, and issues by integrating all 7 of Frost & Sullivan's research methodologies. Too often companies make important growth decisions based on a narrow understanding of their environment, leading to errors of both omission and commission. Successful growth strategies are founded on a thorough understanding of market, technical, economic, financial, customer, best practices, and demographic analyses. The integration of these research disciplines into the 360-degree research methodology provides an evaluation platform for benchmarking industry participants and for identifying those performing at best-in-class levels.



About Frost & Sullivan

Frost & Sullivan, the Growth Partnership Company, enables clients to accelerate growth and achieve best-in-class positions in growth, innovation and leadership. The company's Growth Partnership Service provides the CEO and the CEO's Growth Team with disciplined research and best practice models to drive the generation, evaluation, and implementation of powerful growth strategies. Frost & Sullivan leverages more than 50 years of experience in partnering with Global 1000 companies, emerging, businesses and the investment community from 45 offices on six continents. To join our Growth Partnership, please visit <http://www.frost.com>.