FROST & SULLIVAN

BEST PRACTICES
AWARDS

FROST & SULLIVAN

2020 BEST PRACTICES AWARD

CANDELIS™

2020 GLOBAL
BREAST IMAGING WORKSTATION
NEW PRODUCT INNOVATION AWARD

Contents

Background and Company Performance

Industry Challenges

According to the World Health Organization (WHO), breast cancer impacts 2.1 million people each year and causes the highest number of cancer-related deaths among women. In 2018, WHO estimated that 627,000 women died from breast cancer—approximately 15% of all cancer deaths among women.[1] Early detection impacts the patient's overall survival. The relative 5-year survival rate for localized breast cancer is 99%, steeply dropping as it progresses; 27% when metastatic.[2] International campaigns, programs, and initiatives increased public awareness over the last several decades.[3]

Regular breast cancer screening is critical to early detection and timely intervention. Screening mammography is the most used method worldwide. Standard 2D mammography does not detect small tissue abnormalities, mainly hidden in patients with more dense breasts, which account for more than 50% of all women. Over the years, digital technology innovations increased diagnostic accuracy, sensitivity, and patient safety by reducing ionizing radiation exposure. Scanning modalities such as 3D ultrasound, ultrasound, automated breast ultrasound, and 3D mammography (tomosynthesis) realized an increased market adoption. Nonetheless, as the industry shifts towards value-based care, radiologists still struggle to reach high-level radiology objectives—timely, precise diagnostics for definitive treatment.

With medical image review workstations confined to one or few imaging modalities, radiologists do not have access to holistic patient views.[4] Furthermore, the astronomical data file sizes from advanced breast imaging modalities result in long and inefficient study transfers. A single breast examination can result in one to five gigabytes of data depending on the technology. Sending scans across PACS systems at peak business hours places an enormous strain on hospital networks, leading to long wait times for the data to reach the radiologist's workstation. Also, radiologists must view previous breast scans to gain patient-specific context and determine if a particular tissue area is of concern. As a result, a single patient's breast examination consult can result in up to 15 gigabytes of data transfer, the equivalence to 15 full-length movies per patient.

Furthermore, large imaging institutions have multiple satellite locations, giving patients scheduling, availability, and location options for greater convenience. However, satellite locations sometimes assign different medical record numbers to a patient. As radiologists use these numbers to access patient's exams, this multiplicity can cause data confusion. Various patients within the enterprise can have the same medical record number. Conversely, a single patient may have several medical record numbers under their name. Additionally, if a woman changes her name after marriage, radiologists can also miss breast exams identified with her maiden name. Regardless of the scenario, radiologists may only have access to part of a patient's medical history.

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[1] www.who.int/cancer/prevention/diagnosis-screening/breast-cancer/en/
[2] https://www.cancer.org/cancer/breast-cancer/understanding-a-breast-cancer-diagnosis/breast-cancer-survival-rates.html
[3] https://www.sciencedaily.com/releases/2019/01/190108101203.htm
[4] *Imaging Innovations for Breast Cancer Diagnosis* (Frost & Sullivan, December 2019)

New Product Attributes and Customer Impact of Candelis

Established in 2007, and headquartered in Newport Beach, California, Candelis, Inc. (Candelis) is a medical imaging informatics solution provider for hospitals, clinics, and imaging centers. Candelis' information technology (IT) portfolio spans across breast imaging, radiation therapy, oncology, and radiology.

Knowledge and Technology Convergence Spark Innovation

With its foundational focus on data management, storage, and PACS solutions, Candelis expanded its portfolio by developing a mammography solution to enhance the breast imaging solutions of the leading mammography original equipment manufacturers (OEMs), including GE, Hologic, Siemens, Fujifilm, and Planmed. At the same time, the company harnessed extensive expertise, bringing market-specific innovative and cost-effective solutions addressing breast imaging's unique complexities, e.g., multi-modality and multi-vendor systems and massive data sets.

In September 2019, Candelis launched the Advanced Breast Imaging Enterprise Viewer with its flagship ImageGrid™ platform, an exceptional solution. With unmatched speed, multi-modality connectivity, and multi-vendor viewing, the Advanced Breast Imaging Enterprise solution displays past and present mammography and tomosynthesis patient images from leading OEMs, without waiting, regardless of scan format.

Advanced Breast Imaging Enterprise Viewer

Candelis' Advanced Breast Imaging Enterprise Viewer leverages image transfer speed, tag-morphing, and multi-vendor, multi-modal PACS capabilities to enable comprehensive image visualization and analysis at the point-of-care, empowering a quick, accurate diagnostic interpretation.

Pre-fetching: Optimized Data Movement

The viewer transfers data from image acquisition to any reading location at unprecedented speed. With enhanced pre-fetching capabilities, hospitals can move all mammography and tomosynthesis exams, 5 to 10 years of previous images, to any radiologist workstation. With transfers set at a prescheduled time, radiologists have all the necessary information before the patient comes in for a breast examination.

Tag Morphing: Patient-centric Care

The Advanced Breast Imaging Enterprise Viewer incorporates conditional tag morphing capabilities, ensuring identified exams match the patient. The technique manipulates DICOM header information associated with each image to identify all the scans connected to a single patient, providing radiologists with a full mammogram and tomosynthesis history.

Multi-modal: Full Screening History

Breast imaging relies on a range of imaging scan types (including 2D mammography, 3D breast ultrasound, MRI, CT, and tomosynthesis) all of which may make up a single patient's scanning history.

Powered by its best-in-class ImageGrid™ platform, Candelis' Advanced Breast Imaging Enterprise Viewer enables the quick routing of data movement, integrating the viewer with an entire set of PACS tools to support multi-modal viewing and analysis. Thus, radiologists can view, annotate, and read any scan performed throughout the patient's screening history on the Advanced Breast Imaging Enterprise Viewer.

Aligned with Value-based Breast Imaging Goals

Candelis' Advanced Breast Imaging Enterprise Viewer automatically transports the data typically the day before the patient's visit during off-business hours, lessening the strain on the hospital's IT network during peak usage hours. The only data transmission occurring during business hours is the ongoing breast scan. Moreover, the viewer pre-renders images for viewing, preparing relevant images during off-hours. Thus, pre-fetching and pre-rendering entire image files during off-hours streamline the radiology workflow the following day; i.e., radiologists have access to all the information needed for comprehensive interpretation and diagnosis the moment they read the new scans.

Radiologists have access to the patient's entire diagnostic picture immediately after completing the screening tests, allowing for precise interpretation of the rendered images while the patient is still in the clinic. If there is an area of concern requiring further examinations, radiologists can direct patients for an ultrasound or biopsy on that same visit. Providers optimize clinical resources and assets and avoid additional operational costs, e.g., calling back patients for a subsequent visit, while delivering quality care. For instance, the Riverside Medical Clinic in Riverside, California, reports realizing huge time optimizations and overall return on investment. The healthcare organization indicates doubling patient-per-day breast imaging workloads with Candelis' Advanced Breast Imaging Enterprise Viewer.

Likewise, streamlined, optimized workflows enhance the patient experience (e.g., scans and results on the same day) and convenience (i.e., both travel time savings and costs related to taking off additional time from work).

Customer-focused Services, Customer-driven Innovation

Candelis supports its customers entirely whenever and wherever needed. The company manufactures all its products in its Southern California research and development facility. It employs field-support staff throughout the United States (US), and in Western Europe (EU), for onsite customer services. Additionally, the company offers 24 hours a day, 7 days a week, customer assistance, regardless of location and time zone, via phone-support teams in Southern California and Western EU.

Beyond high-quality support services, Candelis commits to tailoring innovation to match industry needs. The company partners with a set of luminary customers within the breast imaging space to identify optimization gaps and continuously improve its products. Candelis implements an agile innovation process, developing product prototype advancements deployed by its key partners in an alpha-type form. The company evaluates the feedback for product updates and additional features before a full product launch. Candelis tailors its innovations directly to the market needs to deliver the highest possible customer value in its end-to-end breast imaging IT platform.

Long-term, Sustained Success

Candelis has built leading expertise within the IT data movement workflow area and remains at the innovation forefront. Unlike competitors, the company leverages a "thin" client viewing model. Candelis' Advanced Breast Imaging Enterprise Viewer moves the data only once to the ImageGrid™ PACS system, allowing information access from the workstation used at a particular location, and minimizing data duplication sent through the network. Conversely, many competing mammography solutions are "thick" client workstations that require transferring data to each workstation, multiplying the strain upon hospital IT networks based on the number of radiologist workstations an enterprise integrates.

With a breast mammography viewer already on the market for around 10 years, Candelis has earned a sterling reputation. The company currently has 3,500 customers worldwide from its ImageGrid™ System and has experienced high interest in its Advanced Breast Imaging Enterprise Viewer. Candelis anticipates wide adoption due to the increasing market shift towards leveraging tomosynthesis, and, thereby, recognizes the need to move large images quickly. As a result, the company projects 20% to 30% year-over-year customer volume growth. Despite the COVID-19 pandemic affecting annual elective screenings, Candelis estimates a boost in screening exams as social distancing relaxes due to pent up testing from women who put elective exams off during the pandemic.

The US comprises about 90% of Candelis' customer base due to annual screening exam recommendations versus every 2 to 3 years in most of the world. The company also has installations in Latin America, Southeast Asia, Western EU, and Canada. Candelis is actively working with the Brazilian and Japanese governments to gain approval in these regions, empowering future expansion. Finally, the company expects to see broader adoption in the EU as it approves reimbursement for tomosynthesis.

Conclusion

With the growing shift towards tomosynthesis and 3D mammography, hospital IT networks are under extreme data transmission strain due to the vast exam and image sizes. The massive data files, coupled with previous scans and multi-modality breast imaging, impact access to the patient's full clinical history and data transmission times to the radiologist workstation for scan reading; thus, hinders value-based breast imaging.

As a leader in data management and storage within PACS systems, Candelis' Advanced Breast Imaging Enterprises Viewer overcomes mammography's challenges. Its breast imaging workstation incorporates unique optimization techniques automatically streamlining clinical workflows, enabling patient-centric direct scan visualization and interpretation, and enhancing the patient experience with immediate results. Pre-fetching, tag morphing, and multi-modal capabilities provide for unmatched data movement and routing speeds, allowing radiologists access to all the information needed for a timely, accurate read.

For its strong overall performance, Candelis Inc. is recognized with Frost & Sullivan's 2020 Global New Product Innovation Award in breast imaging workstations.

Significance of New Product Innovation

Ultimately, growth in any organization depends upon continually introducing new products to the market and successfully commercializing those products. For these dual goals to occur, a company must be best-in-class in three key areas: understanding demand, nurturing the brand, and differentiating from the competition.

- Acquire competitors' customers
- Increase renewal rates
- Increase upsell rates
- Build a reputation for value
- Increase market penetration

- Earn customer loyalty
- Foster strong corporate identity
- Improve brand recall
- Inspire customers
- Build a reputation for creativity

DEMAND

BRAND

New Product Innovation Leadership

COMPETITIVE POSITIONING

- Stake out a unique market position
- Promise superior value to customers
- Implement strategy successfully
- Deliver on the promised value proposition
- Balance price and value

Understanding New Product Innovation

Innovation is about finding a productive outlet for creativity—for consistently translating ideas into high-quality products that have a profound impact on the customer.

Key Benchmarking Criteria

For the New Product Innovation Award, Frost & Sullivan analysts independently evaluated two key factors—New Product Attributes and Customer Impact—according to the criteria identified below.

New Product Attributes

Criterion 1: Match to Needs
Requirement: Customer needs directly influence and inspire the product's design and positioning.

Criterion 2: Reliability
Requirement: The product consistently meets or exceeds customer expectations for consistent performance during its entire life cycle.

Criterion 3: Quality
Requirement: Product offers best-in-class quality, with a full complement of features and functionalities.

Criterion 4: Positioning
Requirement: The product serves a unique, unmet need that competitors cannot easily replicate.

Criterion 5: Design
Requirement: The product features an innovative design, enhancing both visual appeal and ease of use.

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.

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	• 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	• 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	• 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	• 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	• 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	• 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	• 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	• 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	• Announce 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	• 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.

360-DEGREE RESEARCH: SEEING ORDER IN THE CHAOS

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.