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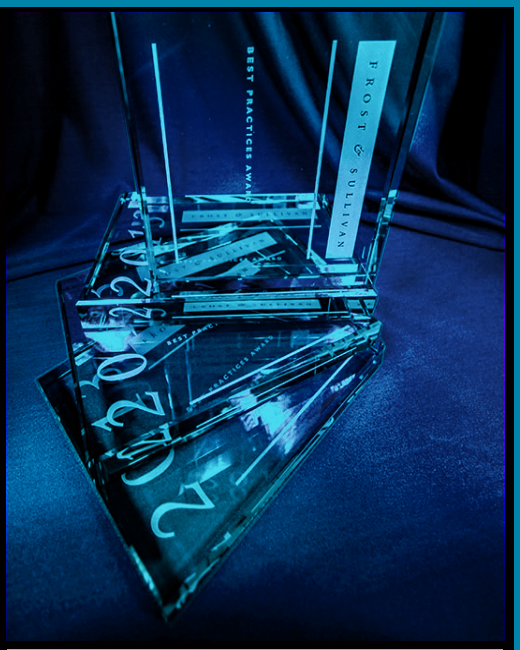
2016 Global Dose Management Solutions Product Leadership Award



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2016 BEST PRACTICES AWARD

GLOBAL DOSE MANAGEMENT SOLUTIONS
PRODUCT LEADERSHIP AWARD

2016
BEST PRACTICES
AWARDS

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Background and Company Performance

Industry Challenges

Frost & Sullivan research shows that despite the wide regulatory push on imaging providers to reduce, optimize, and record the exposure of patients to radiation dose, nearly four out of five hospitals in the United States (US) have not implemented an efficient paperless approach to radiation dose monitoring. The rising awareness of the harmful effects of radiation among providers and patients has led to multiple binding regulations in the US aimed at enforcing dose efficiency guidelines among imaging providers, including a comprehensive set of radiation safety and dose requirements implemented by the Joint Commission and reimbursement penalties, created by the Centers for Medicare and Medicaid Services, that will be imposed on imaging providers for CT studies acquired using non-compliant technology. Europe has seen a similar shift in focus; The European Society for Radiology (ESR) & EuroSafe Imaging developed the Call for Action plan, promoting the appropriateness of radiological imaging, maintenance of radiation doses within diagnostic reference levels, and the use of up-to-date equipment with built-in dose monitoring technology. The ESR is also developing a clinical support guide—iGuide—to provide a support system for imaging referral guidelines. These new regulations constitute important steps forward for provider alignment around imaging protocol review and standardization, radiation dose safety, and ALARA-focused (As Low As Reasonably Achievable) dose optimization. However, there is no uniformity in recommended guidelines or personalization of these guidelines based on a patient's age, weight, and specific symptoms.

In this context, industry focus has shifted to developing accurate and efficient dose management solutions that also have intelligence built-in to facilitate both customization and standardization. Frost & Sullivan research suggests that vendors whose offerings include smart analytics are poised to lead technology enablement in dose monitoring and play an active role in helping shape nation-wide implementations of dose-related initiatives.

Vendor offering diversification over the past few years is a clear indicator that there is no one-size-fits-all solution for dose management today that suits the varying demands and objectives of each facility type. Ranging from stand-alone community hospitals to multi-facility integrated delivery networks and ambulatory imaging chains, every customer seems to have their own vision of how to start and how to expand their dose management strategy. Further complicating an already complex framework, imaging enterprises tend to operate in a multi-modality, multi-vendor, and multi-facility environment, leading to a strong argument for an informatics-based, vendor-agnostic and patient-centric approach to dose management—rather than a scanner-centered approach.

With many indicators pointing to heightened market interest and accelerating market activity, it is no wonder that the vendor landscape around dose management continues to flourish. Two profiles of customers seem to emerge from the current marketplace, with a

roughly equal split between customers purchasing solutions merely to meet regulatory compliance requirements, and those purchasing these solutions as part of a strategic dose management program targeting performance improvement and quality of care.

Such quality improvement initiatives require a holistic view of radiation exposure across multi-facility, multi-modality, and multi-vendor imaging environments. Therefore, it is Frost & Sullivan's belief that dose management solution vendors need to empower providers to better assess, benchmark, and improve the dose performance of the healthcare enterprise as a whole, essentially supporting a full-fledged enterprise dose management program. This holistic approach to dose management is the key for vendors to remain competitive and thrive in this flourishing market space.

Product Family Attributes and Business Impact of GE Healthcare

Frost & Sullivan's research over the last several years shows that GE Healthcare maintains a commitment to providing dose management solutions customized to providers' specific needs. To accomplish this, the company deploys its dose management solution with a variety of customizable capabilities, enabling customers to tailor the solution based on their desired outcomes. These outcomes can be different for each provider and may include cultivating clinical excellence, enhancing patient satisfaction, improving operational efficiency, and refining capital planning. With many radiation-emitting imaging systems now having built-in image quality and radiation management features, the advanced DoseWatch program (one of GE Healthcare's Dose Management Solutions) complements these capabilities by enabling customers to track, integrate, and analyse dose-related information to empower dose optimization initiatives and realize customers' desired outcomes.

DoseWatch's Advanced and Customizable Capabilities

DoseWatch provides a vendor-neutral, multi-modality, and patient-centric dose management solution that can be deployed independently or bundled with the purchase of imaging equipment. Designed as a 'smart' program, it gathers dose indices from every imaging procedure conducted and integrates the information with a host of other relevant data including patient demographics, image quality, outlier status, contrast administration, cumulative dose, and so on. This integration is key to enabling advanced tracking of patient radiation dose and to utilizing this data to create standardized imaging protocols which are both diagnostic and of minimal risk to the patient.

The DoseWatch solution can be configured to immediately send e-mail alerts to staff when exam radiation dose indices (RDIs) exceed user-defined thresholds, identifying unusual cases or processes which may negatively impact health outcomes. Frost & Sullivan estimates that this advanced functionality is a best-in-class solution to enact enterprise-wide compliance with standardized protocols. As a prime example of large healthcare organizations relying on GE Healthcare's DoseWatch program to establish and maintain dose protocol standardization, Cullman Regional Medical Center reduced the number of CT exams that exceeded their established radiation dose threshold by 54% in only a five-month period. By doing so, the provider effectively boosted its patient safety and efficiency ratings

in record time. The University of Washington, also relies on dose alerting in cardiovascular and interventional imaging to identify high dose procedures and drive iteratively lower dose, their vigorous program uses both technique and technology to lower CT dose on many exams by 40-70 percent over the past three years.

"This immediate feedback has heightened awareness of dose overall and greatly enhances our efforts by enabling us to make quicker changes in protocols or documentation, even outside the radiology department." — Dr. Kalpana Kanal, University of Washington

Interface

The DoseWatch solution enables clinicians to track multiple dose management levels, from individual patient scans to department adherence and network-wide compliance. Clinicians can choose to view the individualized dose history of patients across the continuum of care, including previous procedures, cumulative dose levels, alerts generated, and image quality. While reviewing a patient's study, clinicians can choose to see a variety of details such as comparisons to similar prior studies, dose information and radiation parameters, size-specific dose estimates, use of mA modulation, contrast injection details, and adverse events.

From the same view, clinicians can add comments and justification of radiation levels on the exam conducted. Imaging department directors and a hospital network's management team can 'zoom out' from this individual patient view to analyse and track dose protocol compliance and standardizations from a variety of standpoints, including by department, hospital, or overall center—enabling hospital centers to identify any procedural weaknesses and quickly address the problem.

Integration

DoseWatch relies on an on-premise server that maintains patient-specific dose details from connected modalities, which is complemented by a web-based user interface that enables enterprise-wide connectivity. To provide advanced connection to its customer's healthcare network, DoseWatch has several integration and interfacing options that customers can utilize based on their IT infrastructure. DoseWatch has the capability to manage multiple patient IDs as well as send data where it is needed—from the HIS to the radiology dictation system to an external entity like the ACR Dose Index Registry. In doing so, DoseWatch ensures that patient dose data is available in a central repository and also to IT systems along the imaging workflow which may impact the delivery or reporting of single exam and cumulative radiation dose.

DoseWatch Explore

DoseWatch Explore is an introductory cloud-deployed, web-based solution for GE CT systems designed to give customers basic tools to see and investigate their dose performance. This application was designed to let customers easily experience a basic version of the DoseWatch system before purchasing it – without having to engage IT or

other hospital resources. The DoseWatch Explore helps clients understand current and potential dose problems, determine areas of focus, and use this information to budget for the full DoseWatch enterprise solution.

GE Healthcare's Commitment to Seamless Integration

GE Healthcare maintains a "whole solution" focus dedicated to providing a full solution to accomplish clinical outcomes desired by customers. In alignment with this approach, GE Healthcare works closely with hospitals to understand the primary outcomes that clinicians and hospital networks want to enact. After identifying these primary outcomes, GE Healthcare provides recommendations and helps to integrate the solution seamlessly into the hospital's workflow process. According to Dr. Jan Casselman, Chairman of Radiology at St John's Hospital in Bruges, Belgium, the facility has seen a 30 to 40% reduction in CT dose since implementing DoseWatch and creating specific dose protocols. To date, GE has implemented DoseWatch across 1,000 healthcare facilities with more than 4,000 modalities connected worldwide.

"We go beyond providing the data, it's all about providing the insights and intelligence to enable change management." —Melissa Priestley, Global Product Marketing Manager at GE Healthcare

Advanced Training Tailored to Customer's Specific Needs

GE Healthcare recognizes the variable understanding of radiation dose management and offers several levels of training—basic, advanced, and the Dose Excellence Program—to enable customers to choose training that best fits their needs. The basic and advanced trainings usually takes 2 to 3 days to fully train providers on how to use the DoseWatch application, while the Dose Excellence Program is a longer, more advanced consultation and training process. Regardless of the level customers choose, GE Healthcare customizes training based on the organization's size, modalities connected, and amount and type of clinicians undergoing training. Basic and advanced training is provided onsite by a Clinical Applications specialist, who will also have follow-up sessions with customers to review data to establish a baseline and guidance for the next steps to achieve standardization. The Dose Excellence Program is jointly delivered by change management and clinical professionals, ensuring the program is both relevant and impactful.

Dose Excellence Program

The Dose Excellence Program is a consulting and educational program focused on reducing variation between scans, streamlining radiation reporting, and managing the lowest dose recommendation rates while ensuring clinically viable images are captured. GE Healthcare's experts remain onsite and help image providers create a dose team and customize network-specific dose thresholds. In addition, this consulting program offers education regarding dose monitoring, data analytics, and helps create a plan to extend this education and implement dose thresholds enterprise-wide.

University of Wisconsin Dose-Optimized Protocols

Developing, optimizing and managing protocols can be a time-consuming and expensive task; which is why GE Healthcare looked to the clinical professionals at the University of Wisconsin-Madison School of Medicine and Public Health for protocols optimized for GE CT systems. Based on physicist and radiologist input and over 60,000 image quality assessments, the protocol collection spans multiple GE CT models and supports nearly all adult and pediatric clinical indications, with up to three patient-size-optimized protocols for each adult application and up to five for each pediatric application. This extensive set of protocols represents a potential cost savings to providers. A study presented at RSNA in 2011 estimated a cost exceeding $150,000.00 to optimize just 30 protocols[1]. The University of Wisconsin protocols ship with many new system installations and include recommendations for Dose Check settings.

Leveraging Customer Feedback at the Front-End

GE Healthcare's commitment to customer satisfaction and proven solutions led it to adopt new strategies that better integrate customer feedback into the product development process—from creation to post-installation. GE Healthcare's new customer-aligned development methodology, FastWorks, folds customer feedback into the development process from the very beginning, enabling engineers to iteratively design new generations of products which provide better health outcomes and lower cost. The company maintains a team of relationship managers to gather customer feedback regarding not only its solutions but also GE Healthcare's customer training and implementation processes—ensuring that it continues to provide industry-leading solutions and service to its customers.

Conclusion

Dose Management is about more than just low-dose devices. To deliver quality diagnostic case with the lowest possible radiation dose, GE Healthcare uses every possible resource - from technology to education to industry partnerships. GE Healthcare designed its dose management solution with a variety of customizable capabilities, enabling customers to tailor their solution to accomplish their specific desired clinical outcomes. GE Healthcare's Dose Management Solutions consist of: DoseWatch, DoseWatch Explore, Education & Training, Dose Excellence Program, University of Wisconsin Protocols, and low-dose medical devices. The multi-vendor, multi-modality, patient-centric DoseWatch program gathers data from each scan conducted to enable customers to develop, integrate, and maintain standardized imaging protocols with diagnostic quality at the lowest possible radiation dose. GE Healthcare's commitment to providing customers with 'complete' solutions has led to its development of the FastWorks alignment program that links customer feedback directly to the development process, enabling engineers to implement design and capability changes from the front-end of solution creation.

[1] Siegelman, Jenifer RQW, and Dustin A. Gress. "Radiology Stewardship and Quality Improvement: The Process and Costs of Implementing a CT Radiation Dose Optimization Committee in a Medium-Sized Community Hospital System." J Am Coll Radiol. 2013 Jun;10(6): 416-22.

Because of its dedication to providing customer-centered solutions, enacting procedural changes, and standardizing dose protocols, GE Healthcare is recognized with Frost & Sullivan's 2016 Global Product Leadership Award for dose management solutions.

Significance of Product Leadership

Ultimately, growth in any organization depends upon customers purchasing from your company, and then making the decision to return time and again. A comprehensive product line, filled with high-quality, value-driven options, is the key to building an engaged customer base. To achieve and maintain product excellence, an organization must strive to be best-in-class in three key areas: understanding demand, nurturing the brand, and differentiating from the competition.

Understanding Product Leadership

Demand forecasting, branding, and differentiation all play a critical role in finding growth opportunities for your product line. This three-fold focus, however, must be complemented by an equally rigorous focus on pursuing those opportunities to a best-in-class standard. Customer communications, customer feedback, pricing, and competitor actions must all be managed and monitored for ongoing success. If an organization can successfully parlay product excellence into positive business impact, increased market share will inevitably follow over time.

Key Benchmarking Criteria

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

Product Family Attributes

Criterion 1: Match to Needs
Criterion 2: Reliability and Quality
Criterion 3: Product/Service Value
Criterion 4: Positioning
Criterion 5: Design

Business Impact

Criterion 1: Financial Performance
Criterion 2: Customer Acquisition
Criterion 3: Operational Efficiency
Criterion 4: Growth Potential
Criterion 5: Human Capital

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 players and for identifying those performing at best-in-class levels.

360-DEGREE RESEARCH: SEEING ORDER IN THE CHAOS

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

Frost & Sullivan Awards 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 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 winner	Decision on which company performs best against all best-practice criteria
9	**Communicate recognition**	Inform award recipient of award recognition	• 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 may 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

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 almost 50 years of experience in partnering with Global 1000 companies, emerging businesses and the investment community from 31 offices on six continents. To join our Growth Partnership, please visit http://www.frost.com.