FROST & SULLIVAN

2018 Global Hospital Command Centers Visionary Innovation Leadership Award

Background and Company Performance

Industry Challenges

Hospitals must operate in a regulated environment, ensure that patients realize the best outcomes in the shortest time possible, strive to improve patient experience, and prevent adverse events (such as hospital-acquired infections).

An aging population is putting additional stress on hospitals already struggling to meet demand; those operating near full capacity are facing longer wait times for admissions, which hampers care and the overall patient experience.

Frost & Sullivan observes how healthcare industry dynamics are making hospital operations even more complicated. In light of changing reimbursement regulations and the move from a fee-for-service model to a value-based care approach, hospitals must be able to manage faster recovery and reduce readmissions. This is dependent on underlying operations, such as room cleaning following a patient's discharge and assignment to the next waiting patient. Yet it is not as simple as just providing a room to the next person in line; in the emergency department, for example, the criticality of a patient's health determines position in the queue, along with other factors such as the availability of results from a diagnostic test or a specialist's opinion on the necessary level of care (e.g., a move to the intensive care unit). Other inflows of patients — from other hospitals or those planning elective procedures, for example — may involve other complex sets of decisions. Once admitted, patients may need to be moved through different hospital areas — radiology for medical imaging studies, an operating room for surgery, and back to a room for recovery. Frost & Sullivan notes that these areas, as well as the emergency department and the outpatient department, are likely to become bottlenecks when catering to higher demand and impede patient flow.

Frost & Sullivan independently tracks several automation technologies that have emerged to help hospitals better manage their operations, but properly adapting to these solutions can be difficult. Siloed implementations may reduce efficiency due to the need for manual interventions to make the solutions work. Problems are further compounded by the shortage of skilled healthcare personnel and decreasing margins. Hospitals desperately need improved and innovative solutions to improve efficiencies – all so they can remain viable in the long run.

Focus on the Future and Best Practices Implementation

GE Healthcare Partners offers clients a customized command center solution to optimize hospital operations and improve efficiency, and helps them continuously monitor the solution, improve it, and learn from their experiences.

"For GE, a command center or mission control serves caregivers with a special combination of co-located decision-makers empowered to make things happen, advanced analytics that focus action now, and mission controllers who apply their judgment to help

care teams. We don't deliver a technology, we deliver a new way of doing business," said Jeff Terry, CEO of Healthcare Command Centers for GE Healthcare Partners.

Pioneering Approach to 'True' Command Centers

The command center is like an air traffic control system, a goalie, and a coach.

"Command centers enable healthcare to take advantage of system engineering principles used by other complex industries such as airlines, aerospace, and air traffic control," said James Scheulen, Johns Hopkins Medicine's chief administrative officer for emergency medicine and capacity management.

While several other solutions on the market also claim to provide the "command center" experience, Frost & Sullivan finds that they only cater to specific objectives, including patient flow or bed and capacity management, or serve the needs of specific departments such as the emergency department alone, or blend these two approaches. GE's solution, however, is holistic and custom-fitted, encompassing the entire hospital or health system's operations and targeting multiple objectives based on the facility's needs. The GE approach is technology-agnostic, but relies on the data collected by various technologies implemented in the hospital. This approach makes the command center scalable, to be applied for patient access, patient throughput throughout the length of stay, clinical pathways, clinical imaging, patient discharge, and even beyond for telehealth and population health efforts.

Every hospital adopting the command center approach gets a customized version of the solution, with a "problem-backed design" targeting specific problems faced by the care teams at that hospital - rather than the theoretical problems affecting the entire industry.

Frost & Sullivan believes that the customized, holistic approach taken by GE Healthcare Partners in designing the command center concept as an enterprise-wide solution is the best possible approach to improving the efficiency of hospital operations.

Wall of Analytics and Decision Support Tiles

A command center's Wall of Analytics — essentially advanced analytics displayed on a video wall of large screens— allows users to view all of a hospital's operations in real time. The Judy Reitz Capacity Command Center at Johns Hopkins Hospital in Baltimore, where it was first implemented, features 22 screens that provide personnel with information from 14 IT system sources, including patients' electronic health records, operating room schedules, and hospital admissions, and presents it in the form of decision support tiles.

Tiles can provide customized information according to a hospital's needs and help to answer questions such as "which patient should get the next ICU bed?" or "which patient's urgent medicine order is delayed?" The tiles can be changed to deal with the task at hand — improving capacity, managing delays, improving patient experience, or enabling better coordination between departments and diagnostics — and are also available on individual

computers or mobile devices for even more convenient access.

GE Healthcare Partners' repository of decision support system knowledge can also be shared, so that other hospitals adopting the solution will benefit from best practices across the ecosystem.

"We can start predicting when things are going to deteriorate, and we can intervene. We're implementing these tiles now, and we'll have them working by the end of the year," said Peter Bak, the chief information officer for Humber River Hospital in Toronto.

Hospital's Digital Twin

One of the biggest differentiators for the command center concept is the use of advanced technologies. GE Healthcare Partners builds a digital twin of the hospital to simulate patient arrivals, discharges, and other parameters that can make predictions; for example, the number of ICU beds that will be available the next day.

The digital twin becomes part of the consulting "scenario service" that can help answer strategic questions for hospitals, based on changing paradigms. A second component is the "ongoing discovery service," where GE's team members brainstorm with the hospital's team to design and develop frameworks for the next challenges to be tackled and implemented. In this sense, the command center becomes a continuously evolving entity, instead of being a one-time deployment.

"GE's analytics engine ingests data and maintains a constantly live data model and analytic tiles, which apply artificial intelligence to the data model and present simple, well-organized, relevant information to command center staff. The [platform] automatically sifts through many signals to identify needles in the haystacks which merit attention by mission controllers," Terry said.

From a technology perspective, the command center is:

- Cross-system, drawing data from software and machines;
- Based on an integrated, real-time data model that fuses data from all sources;
- Enabled by artificial intelligence, including machine learning, natural language processing, computer vision, and other modes;
- Independent of any single transactional or source system;
- As predictive and prescriptive as possible;
- Simple enough for mission controllers to interpret in seconds; and
- Searchable retrospectively for continuous learning and improvement.

A Cultural Change

Frost & Sullivan understands that hospitals are notorious for departments that work in silos, and must undergo a cultural change to break them down. GE Healthcare Partners properly realizes that a hospital's people are truly part of the solution. Instead of staff members from different departments managing patients via fax, phone calls, or emails that often delay results and do not promote camaraderie, the command center groups decision makers in a single location. This co-location approach will also work for future technology adoption initiatives, such as tele-ICU, telehealth services, home health services, and even population health efforts — all of which are being tested or implemented at existing command centers.

One of the primary reasons for GE's command center concept success is the approach to never disrupt or second-guess the front-line care team members, but rather empower and support them in their daily duties. This has resulted in some of the initially skeptical clinician leaders to bring new challenges for the command center to tackle. GE believes that the success of the command center is the human and artificial intelligence combination that ultimately results in improved efficiency.

Frost & Sullivan applauds GE Healthcare Partners' one-team approach to bring clear value to a hospital's operations.

Stellar Results from an Impressive Client List

Johns Hopkins Hospital's command center became operational in February 2016.

Earlier this year, it reported gains in several areas:

- The ability to accept patient transfers from other regional and US hospitals has improved by 60%.
- Ambulances are now dispatched 63 minutes sooner to pick up patients.
- Patients in the emergency department are assigned a bed 30% faster.
- Post-operation transfer delays have been reduced by 70%.

Inside Johns Hopkins Hospital's command center. *Image source: Johns Hopkins Hospital*

- Some 21% more patients are discharged before noon.

"Opening the command center and having access to all of this incredible data was like shining a light on the institution. We were able to learn a lot more about how we operate and where we

can continue to improve," Johns Hopkins' Scheulen said.

Other hospitals have yet to declare specific results, but credit the command center with improved efficiency. One way of measuring results and a return on investment is to look at capacity: Johns Hopkins announced that it has created an additional virtual capacity of 16 beds; Humber River Hospital had an even better result, with virtual capacity increase of 56 beds. This essentially means that because of better bed capacity management, both hospitals can accommodate more patients efficiently and easily, without actually adding physical beds.

After achieving success with its first phase of improving patient flow, Humber River Hospital has made improving clinical safety and quality to reduce preventable patient safety incidents a goal for 2018, and leveraging the command center for community outreach and home monitoring a goal for 2019. Frost & Sullivan firmly believes that the command center approach will have a revolutionary effect on healthcare delivery.

GE Healthcare Partners also is working with Oregon Health Sciences University, Adventist Health (Florida Hospital), Tampa General Hospital, CHI Franciscan Health, Thomas Jefferson University Health, and Navicent. Several other hospitals are already working with GE Healthcare Partners on their custom command center designs. The business has noted interest from hospitals in the United Kingdom, Finland, the Middle East, and Australia.

Conclusion

Frost & Sullivan views GE Healthcare Partners' command center solution as an elegant implementation of a non-healthcare industry best practice adapted to the hospital environment. It leverages the most advanced technologies, including prescriptive and predictive analytics, machine learning, natural language processing, and computer vision. Actionable information presented on a Wall of Analytics allows hospital mission controllers to make more informed real-time decisions.

With its strong overall performance, GE Healthcare Partners has earned the 2018 Frost & Sullivan Visionary Innovation Leadership Award.

Significance of Visionary Innovation Leadership

A Visionary Innovation Leadership position enables a market participant to deliver highly competitive products and solutions that transform the way individuals and businesses perform their daily activities. Such products and solutions set new, long-lasting trends in how technologies are deployed and consumed by businesses and end users. Most important, they deliver unique and differentiated benefits that can greatly improve business performance as well as individuals' work and personal lives. These improvements are measured by customer demand, brand strength, and competitive positioning.

Understanding Visionary Innovation Leadership

Visionary Innovation is the ability to innovate today in the light of perceived changes and opportunities that will arise from Mega Trends in the future. It is the ability to scout and detect unmet (and as yet undefined) needs and proactively address them with disruptive solutions that cater to new and unique customers, lifestyles, technologies, and markets. At the heart of visionary innovation is a deep understanding of the implications and global ramifications of Mega Trends, leading to correct identification and ultimate capture of niche and white-space market opportunities in the future.

Key Benchmarking Criteria

For the Global Visionary Innovation Leadership Award, Frost & Sullivan analysts independently evaluated two key factors—Focus on the Future and Best Practices Implementation—according to the criteria identified below.

Focus on the Future

Criterion 1: Focus on Unmet Needs
Criterion 2: Visionary Scenarios through Mega Trends
Criterion 3: Growth Pipeline
Criterion 4: Blue Ocean Strategy
Criterion 5: Growth Performance

Best Practices Implementation

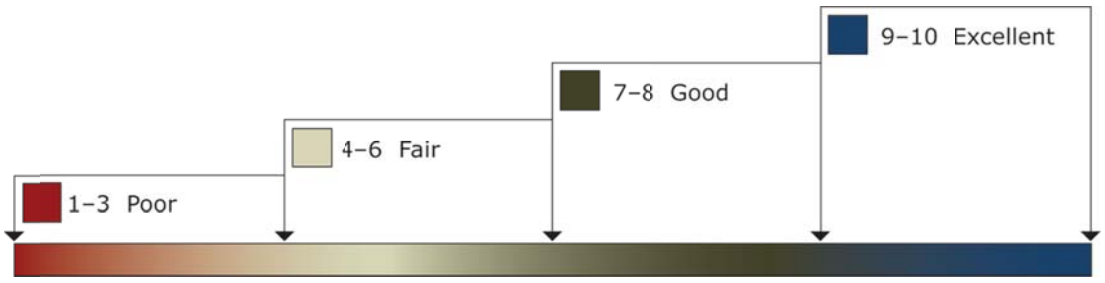
Criterion 1: Vision Alignment
Criterion 2: Process Design
Criterion 3: Operational Efficiency
Criterion 4: Technological Sophistication
Criterion 5: Company Culture

Best Practice Award Analysis for GE Healthcare Partners

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 Focus on the Future and Best Practices Implementation (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.

Measurement of 1–10 (1 = poor; 10 = excellent)			
Visionary Innovation Leadership	Focus on the Future	Best Practices Implementation	**Average Rating**
GE Healthcare Partners	**9.0**	**10.0**	**9.5**
Competitor 2	8.0	8.0	8.0
Competitor 3	8.0	7.0	7.5

Focus on the Future

Criterion 1: Focus on Unmet Needs

Requirement: Implementing a robust process to continuously unearth customers' unmet or under-served needs, and creating the products or solutions to address them effectively

Criterion 2: Visionary Scenarios through Mega Trends

Requirement: Incorporating long-range, macro-level scenarios into the innovation strategy, thereby enabling "first-to-market" growth opportunity solutions

Criterion 3: Growth Pipeline

Requirement: Best-in-class process to continuously identify and prioritize future growth opportunities leveraging both internal and external sources

Criterion 4: Blue Ocean Strategy

Requirement: Strategic focus on creating a leadership position in a potentially "uncontested" market space, manifested by stiff barriers to entry for competitors

Criterion 5: Growth Performance

Requirement: Growth success linked tangibly to new growth opportunities identified though visionary innovation

Best Practices Implementation

Criterion 1: Vision Alignment

Requirement: The executive team is aligned along the organization's mission, vision, strategy, and execution.

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

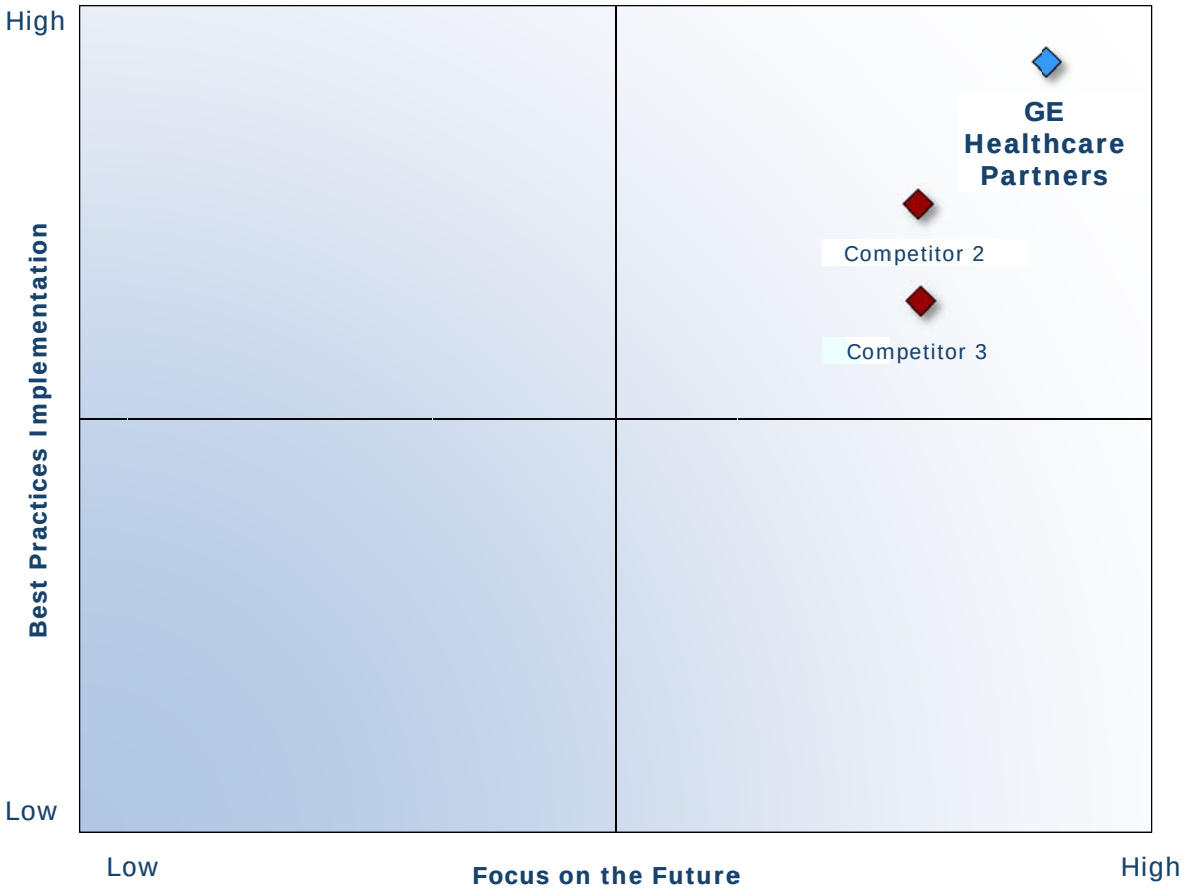
Requirements: Systems enable companywide transparency, communication, and efficiency.

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.

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 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 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	• 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	• 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 players 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.