FROST & SULLIVAN

BEST PRACTICES AWARDS

2020 GLOBAL IIOT-BASED ASSET MANAGEMENT AND OPTIMIZATION CUSTOMER VALUE LEADERSHIP AWARD

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Industry Challenges

Today, the Industrial Internet of Things (IIoT) integrates next-generation technologies to enable industrial enterprises—e.g., oil and gas companies, energy providers, utilities, and manufacturers—to transform existing assets into digitally agile, robust, and reactive resources. By way of illustration, advanced sensing capabilities and edge intelligence eliminate the need for additional data processing while Big Data helps solve patterns and, subsequently, leverages process optimization. Edge intelligence further gives rise to digital capabilities, such as predictive analysis and maintenance, remote monitoring, and end-to-end automation of an asset's operation. Augmented reality helps the user to experience the current reality more effectively, while virtual reality exposes the user to a reality that differs entirely from his or her present position. Therefore, a digital transformation strategy is imperative to mitigate risks and optimize the business processes of industrial enterprises to strengthen these service providers' market positions. However, the digital strategy must be scalable, and once implemented, the utility or manufacturer should conduct a complete performance monitoring analysis.

Currently, utilities with assets in power generation face particular technical and business challenges, such as decreasing economic return due to a decline in orders for conventional generation turbines, a flourishment of renewable energy across the globe, technological innovations in power generation, transmission, and distribution, and the enforcement of environmental regulations. Hence, the need for digitally agile, flexible, and highly efficient power plants is paramount. As such, the capacity of connected devices to monitor and analyze data continuously allows plant operators to address operational and maintenance issues by simplifying and streamlining the overall process through a control architecture and operating platform designed and developed based on artificial intelligence. In the case of transmission and distribution lines, the deployment of IIoT-based solutions for continuous monitoring reduces manual intervention and increases efficiency gains considerably. The case for improving grid infrastructure and the focus on reducing non-technical losses is apparent. Smart metering also means that the consumer's consumption data can be tracked and leveraged on as fit, which is a key positive. Therefore, Frost & Sullivan analysts expect smart metering and smart grid initiatives to proliferate as the retail energy landscape continues to evolve. As a result, the importance of grid intelligence becomes a fundamental focal point to utilities as they need to manage the distribution system and identify opportunity areas.

Despite the fast uptake of IIoT-based solutions in the sector, Frost & Sullivan believes that a vigorous framework is necessary to ascertain maximum value. Firstly, technical metrics —e.g., power plant management data and controls as well as overall portfolio data—are critical for analytical monitoring. Secondly, managers need to assess the criticality of plant metrics relevant to the portfolio to determine the impact of station metrics on the overall portfolio—i.e., the contribution aspect. Thirdly, by evaluating the economic value of plant actions, managers should use action-to-cost factors, combined with priority and timing responses, to clarify which optimization actions result in overall value increase.

Frost & Sullivan believes that a focus on key grid solution features will strengthen efforts to achieve optimal results:

- **Network visibility** enables operators to view the key points of the network, including critical operational characteristics, such as energy, frequency, and reactive power control data, together with key supply and demand points.
- **Energy management** implies the ability to manage the distributed energy resources in the grid and provide overall network support.
- **Operational characteristics** refer to current and future supply and demand, network lines performance, and real-time infrastructure.
- **Cybersecurity** encompasses a clear-cut approach that will protect against internal and external threats and ensure consumer indemnity.

According to Frost & Sullivan's estimates in 2018, the potential revenue opportunity for IIoT in power generation was $0.94 billion. Shifting the current analog equipment monitoring trends to a digital-based approach remains one of the critical priorities for utilities in the power generation market, prompted by the need for flexible assets, recovering investment costs, and saving unwanted maintenance costs. Thus, Frost & Sullivan expects the potential revenue opportunity to rise to $2.87 billion by 2025, owing to an increase in the adoption rate.[1] However, Frost & Sullivan recognizes that the COVID-19 pandemic provides an unprecedented opportunity for businesses within mission-critical industries to put their crisis response tactics and long-term strategies to the test.

Customer Impact and Business Impact of General Electric Digital

Since 2015, General Electric Digital (GE Digital)—a wholly-owned division of General Electric—provides industrial companies with software and advisory services around operational technology and infrastructure to speed up and scale clients' digital transformation activities. Using Predix, its edge-to-cloud platform with superior security capabilities for industrial applications, GE Digital delivers software solutions that help customers to operate, analyze, and optimize their assets better and improve their business processes. With a heritage covering three decades of skilled knowledge in industrial software for manufacturing and water industries, as well as extensive expertise in delivering digital twins of electrical grids, GE Digital differentiates itself through its rich domain experience. As one of the largest industrial software companies in the market (reporting more than $1 billion in annual revenues), this software provider is an essential catalyst for growth for the multinational conglomerate—also in non-GE sectors.

[1] *Utility 4.0—Impact of Industrial Internet of Things (IIoT) on the Global Power Industry, 2019* (Frost & Sullivan, May 2019)

Navigating Innovation with a Customer-centric Compass

GE Digital purposefully puts the customer first in every pursuit, from marketing to product development. At the same time, it leverages industrial data to solve some of its customers' toughest challenges, such as enabling more renewable energy on the grid, reducing emissions, increasing plant productivity, adapting to demand, and keeping their teams safe.

GE Digital's software is pivotal in achieving these goals. Also, the workforce's hard-won insights in power generation, utilities, manufacturing, and oil and gas bolster power generation, utilities, manufacturing, and oil and gas bolster team efforts to understand customers better. To cultivate innovation, GE Digital dynamically partners with its customers through its channel engagement initiative. This approach operates on multiple levels and formats to ensure that customers' voice is an integral part of GE Digital's product planning and strategy evolution. Most importantly, it allows teams to develop exceptional outcomes faster than its competitors. For example, GE Digital's grid business runs executive exchange forums for the C-suite, quarterly working groups, and special interest groups (hosted by a customer and a GE Digital employee) to foster best practice sharing, customer collaboration, and an outside-in perspective to product roadmaps. Lastly, the company's internal 'global research center' also drives specific investment areas as part of a yearly innovation cycle.

Apart from the people, GE Digital also depends on improved processes and proven technology to shape up industries by simplifying complexities at unparalleled speed and scale. Customer business process mapping sessions, interactive user experience design workshops, and show-and-tell webinars are all vital components of GE Digital's customer engagement initiatives. Through the changing market landscape, these customer sessions have evolved from product lines specific to collaboration across transmission, distribution, and technologies. For instance, GE Digital makes it easier than ever before to buy off-the-shelf digital twins for critical assets—as simple as buying a new book on Amazon—and lowers the barriers to configure those solutions.

Frost & Sullivan lauds GE Digital for embracing an innovation strategy that comes from a deep customer immersion, scrutinizing clients' critical business priorities as well as understanding their technical and process barriers. Furthermore, by handling innovation as a process—i.e., starting with a prototype and not a rock-solid product—GE Digital cements its leadership position in an era of uncertainty.

A Comprehensive Customer Support Framework Secures Successful Outcomes

GE Digital offers standardized services packages, managed by a global services product management function. All of the provided services fit into a defined Program Success Framework (PSF). In the form of on-time deployment services, GE Digital yields all the support needed for the technical and functional set up of asset performance management (APM) products, industrial subject matter expertise, training, coaching, change management, and adoption consultancy.

Ongoing subscription services offer several tiers of outcome-driven managed service

products, aligned to the customer's choice, pace, and path. In the Results Tier, the highest level, GE Digital uses APM on behalf of the customer to ensure outcomes. In the Enablement Tier, GE Digital collaborates with the customer on APM usage. The Guidance Tier provides regular expert input on usage, including ongoing configuration changes. Customers may start with a higher tier with more substantial GE support and move to a less assertive service. These tiered abilities help the customer drive digital transformation outcomes.

GE Digital's customer-centric PSF for APM consists of five elements, each supported by three sub-elements. Regardless of whether the company provides the service or in-sources activities, PSF defines all aspects the APM customer needs to transform operations successfully and derive value from APM—both as a practice and a solution.

GE Digital also avails Customer Success Managers (CSMs) that liaise with customers to ensure maximum value creation and the overall health of their solution. A CSM will collaborate with the customer to provide experienced escalation management, to create release readiness plans and to establish user adoption, education, asset alignment, outcomes readiness, and realization plans. The customer success team supports clients in a variety of ways, from a lighter 'Tech Touch' account health approach on one end, to having a dedicated CSM resource for more complex or top-tiered accounts. Whether customers prefer delivery services, managed services, or customer success management, all of GE Digital's service packages follow the same PSF.

Faster Time-to-value through a Lean Management Approach

Working hard to build a lean culture, GE Digital already sees promising results as its teams begin to use lean principles as part of their daily management. In 2020, GE Digital assigned Betsy Bingham to lead Lean Transformation and Operations activities across the business. Along with the broader leadership team, she brings excellent skills from her previous experience working with Honeywell, Philips, and Danaher.

GE Digital perceives the potential of lean management in three areas:

- Using lean methodologies to improve the company's operational performance continuously
- Using a lean framework to enhance customer experience, from enhancing project execution to ensuring product innovation aligns to customer needs
- Integrating lean principles—e.g., visual management, value stream mapping, and digital Kaizen—into its technologies to help customers improve outcomes

The company is already seeing significant results. At a recent Kaizen event for its grid software teams, GE Digital focused on defining how to reduce project cycle time while ensuring the solution delivers value to its customers faster and with higher quality. The primary goal was to cut one specific project timeline by 163 days, which translates to a ten percent reduction. At the end of the four days, the Kaizen event outcomes were exceeded, and the team identified how they could remove 265 days from the target project. Most importantly, GE Digital defined a blueprint for how the team could apply this

insight to all projects going forward, benefitting its customers with faster time-to-value.

Accelerated Growth through Rapid Response to the COVID-19 Crisis

Currently, GE Digital experiences high growth in the food and beverage and the consumer-packaged-goods industries, which correlates with the robustness of these sectors (despite the current crisis). The company supports many of the top firms in these segments with a selection from its product portfolio, specifically its manufacturing execution system, manufacturing data cloud, and operations hub that enables bottleneck reduction and lean manufacturing while also providing visibility across the value chain.

Ignited by utilities' need to transform digitally in response to the rapid rise of renewables and associated active grid complexity, GE Digital sees considerable growth potential across all its product lines covering the transmission and distribution segment. To manage Distributed Energy Resources (DER) capabilities optimally, GE Digital offers DER-enabled asset and operational software with advanced artificial intelligence/machine learning-based analytics. This solution delivers full closed-loop optimization; as such, it empowers customers to execute integrated operations across the grid.

The global COVID-19 pandemic created a new challenge for GE Digital, as the company serves customers in the power generation, oil and gas, electric and water utilities, and manufacturing sectors. How do they cope with disrupted workforces and help understaffed and distributed teams to keep safe while still getting the job done? Moreover, supply chains are also disrupted. To cope with big swings in demand, extraordinary efforts need to focus on resilience and adaptability.

GE Digital responded in practical ways that make a real difference. Free remote monitoring licenses for the company's manufacturing and water and electric utility customers helped reduce the number of onsite employees while keeping the enterprises connected to their most critical operational systems. Just over 60 companies immediately accepted the offer. This service provides a sense of security at mission-critical industrial sites, for instance, the City of Haverhill water utility in the United States. The site, which usually operates with ten staff, can now reduce onsite teams down to just one person by using GE Digital's remote-work solution for their operations software. Factories, power stations, and electrical grids are now doing the same thing that would have been unimaginable a few years ago. Other customers benefitting from this initiative include Ameren, SIPCHEM, and SPE. GE Digital's teams have remained fully engaged in supporting customers with remote managed services and deployment support. On the back of its success, GE Digital even moved its education services and factory acceptance testing/site acceptance testing online.

Conclusion

The Industrial Internet of Things (IIoT) integrates next-generation technologies, enabling industrial enterprises to transform existing assets into digitally agile, robust, and reactive resources. Edge intelligence further gives rise to digital capabilities, such as predictive analysis and maintenance, remote monitoring, and end-to-end automation of an asset's operation. Hence, a scalable digital transformation strategy would allow utilities to address some technical and business challenges, for example, the decreasing economic return due to a decline in orders for conventional generation turbines, a flourishment of renewable energy across the globe, technological innovations in power generation, transmission, and distribution, and the enforcement of environmental regulations.

General Electric Digital's (GE Digital) platform strategy and industrial software portfolio help customers to solve their toughest challenges. The company's remote operations capabilities, coupled with its talent and technologies, ensure that mission-critical customers can continue to operate. In challenging times, GE Digital enables customers around the globe to work remotely to keep serving their consumers. Notably, GE Digital manages 40% of the world's electricity through its software. Moreover, entire cities apply GE Digital's software to manage their water supplies. The software also sits at the heart of some major manufacturers' operations. Correspondingly, GE Digital's dedicated teams and visionary executives sustain and support the extensive range of mission-critical industries and customers they serve.

With its customer-centric approach served by its robust, innovative technology, and leadership excellence, GE Digital earns Frost & Sullivan's 2020 Customer Value Leadership Award in the global IIoT-based asset management and optimization market.

Significance of Customer Value Leadership

Ultimately, growth in any organization depends on customers purchasing from a company and then making the decision to return time and again. Satisfying customers is the cornerstone of any successful growth strategy. To achieve this, an organization must be best in class in 3 key areas: understanding demand, nurturing the brand, and differentiating from the competition.

Understanding Customer Value Leadership

Customer Value Leadership is defined and measured by 2 macro-level categories: Customer Impact and Business Impact. These two sides work together to make customers feel valued and confident in their products' quality and performance. This dual satisfaction translates into repeat purchases and a lifetime of customer value.

Key Benchmarking Criteria

For the Customer Value Leadership Award, Frost & Sullivan analysts independently evaluated Customer Impact and Business Impact according to the criteria identified below.

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

Business Impact

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

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.

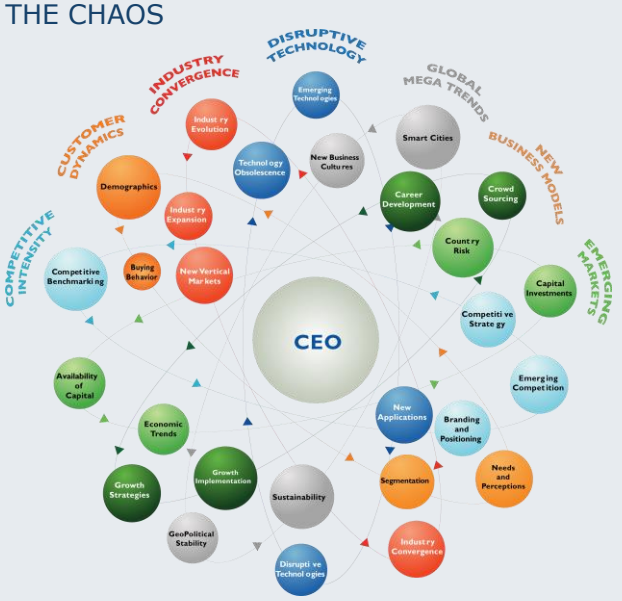
	STEP	OBJECTIVE	KEY ACTIVITIES	OUTPUT
1	**Monitor, target, and screen**	Identify Award recipient candidates from around the globe	• Conduct in-depth industry research • Identify emerging sectors • Scan multiple geographies	Pipeline of candidates who potentially meet all best-practice criteria
2	**Perform 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



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