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BEST PRACTICES

AWARDS

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2020 BEST PRACTICES AWARD



2020 GLOBAL ENVIRONMENTAL MONITORING SYSTEMS ENABLING TECHNOLOGY LEADERSHIP AWARD

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Background and Company Performance

Industry Challenges

Mankind has strived to predict the weather accurately to allow humans to prepare for severe weather and natural disasters to protect property, resources, and human life. Early civilizations attempted to forecast the weather by monitoring and recording seasonal variations and observing real-time changes—e.g., cloud appearance and environmental phenomena. Over the centuries, humanity studied weather events to understand how to predict the weather through scientific observation, which eventually led to early designs of the hygrometer, thermometer, and barometer in the 15th, 16th, and 17th centuries, respectively. Such inventions were refined throughout the years and enabled mankind to predict the weather with more accuracy than ever, and in 1792, the first issue of the Farmer's Almanac was released. For more than 150 years, the agriculture industry relied on the Farmer's Almanac for long-range annual weather predictions; however, in 1950, computer advancements allowed meteorologists to calculate more precise short-term weather forecasts. In the last decade, technology companies developed artificial intelligence (AI)-powered analytics platforms that present weather-related data in a readable manner; however, many vendors cannot provide weather updates in near real time to make such information actionable.

In the United States (US) alone, natural disasters cost \$91 billion in 2018, according to the National Oceanic and Atmospheric Administration. These economic losses were due to various natural disasters, ranging from hurricanes to wildfires to winter storms. Unpredictable weather patterns have a massive negative impact on organizations across industry verticals, such as agriculture, aviation, critical infrastructure, public safety, supply chain, telecommunications, and transportation. For example, in the agriculture industry, weather prediction technologies aid farmers with reducing crop loss due to pests, droughts, and other environmental stressors that promote poor cultivation conditions. Furthermore, the aviation industry relies on up-to-the-minute accurate weather forecasting to increase flight safety for passengers and flight crews as well as determining ideal launch times for satellites and other spacecraft.

To overcome these industry challenges, technology companies have used satellites to monitor and predict the weather. However, many of these vendors use heavy-weighting traditional satellites, which are costly as they require larger rockets with greater thrust to launch into orbit. Conversely, cube satellites (CubeSats)—i.e., U-class spacecraft—are more cost-friendly as they need smaller rockets with less thrust to launch. Furthermore, due to the lighter weight of CubeSats, organizations can launch many more units into orbit with a single rocket, and thus, acquire additional data more frequently than a single large satellite. A vendor that can provide near real-time weather notifications, accurate forecasting, and superior capabilities, benefits, and value will prevail in the environmental monitoring system industry.

Technology Leverage and Customer Impact of Orbital Micro Systems

Founded in 2015, Colorado-headquartered Orbital Micro Systems (OMS) leverages deep expertise in the satellite, weather, and analytics industries to offer game-changing near real-time weather alerts. OMS's low Earth-orbiting CubeSat constellation enables it to provide near real-time weather updates to allow organizations to prepare for catastrophes (e.g., hurricanes), conduct research, develop financial models, and mitigate risks. OMS serves global clients in the agriculture, aviation, insurance, research, and transportation industries as well as government agencies.

Unmatched Global Environmental Monitoring System

OMS launched its first CubeSat in 2019 to gather and transmit atmospheric observation data that the company integrates with other weather-related satellite information from external sources' sensors such as radars. The company then sends all the compiled data to its cloud-based International Center for Earth Data platform for advanced analysis. Traditional weather companies base their forecasting primarily on atmospheric modeling, lacking the level of granularity needed to validate local weather accurately, which creates a sense of apprehension among users. OMS overcomes such challenges by rapidly collecting, combining, and analyzing a variety of data sets to give clients a comprehensive and precise view of weather conditions. The company will launch an additional 12 CubeSats by the end of 2021 and aims to have a 48-CubeSat constellation—Global Environmental Monitoring System (GEMS)—in space total. The company's goal is to provide weather tracking rapidly on a global scale, particularly for remote locations that do not have reliable or frequent weather monitoring data, including regions over Earth's oceans. Upon completion, OMS's GEMS constellation will be the first, only, and largest environmental monitoring constellation in existence, enabling organizations around the globe to conduct operations based on near real-time weather alerts and events.

OMS's equips each CubeSat with a D-band microwave radiometer operating between 112 and 125 gigahertz that measures thermal electromagnetic radiation emitted by atmospheric gases to provide accurate, near real-time weather conditions and forecasting. Notably, the company achieves a world's first by offering the only microwave radiometer data available to commercial industries, which allows the satellites to "see through" clouds and operate any time of day, including night when light levels are low. GEMS' CubeSats observe water and oxygen levels through a three-dimensional printed antenna. The satellites also measure temperature through an infrared camera and determine the normalized difference vegetation index through a filtered visible camera. OMS's CubeSats provide a 1,500-kilometer swath at 16-kilometer spatial resolution while achieving low latency. Moreover, the company's revolutionary "nowcasting" technology, WeatherRecord™, enables clients to receive weather updates every 15 minutes while competing solutions provide hours or days-old information and use that same information to create forecasts.

Delayed or inaccurate weather predictions can disrupt business operations, significantly reducing revenue and increasing capital expenditure as well as endangering lives or damaging property. A pilot that is out of air traffic control communications range can receive near real-time weather data through OMS's direct weather data stream feature, WeatherStream™, keeping them abreast of current weather patterns. The company's constellation proves invaluable to persons in remote locations. For instance, a storm could be moving south away from an airplane's trajectory as the aircraft departs from an airport. However, due to frequent and unpredictable shifts in weather patterns, the storm could change direction and later be directly in the airplane's path, giving the pilot only minutes or seconds to react. WeatherStream™ allows airplane pilots (and maritime helmsmen) to avoid storms in under-observed areas, increasing efficiency and safety for occupants. The platform enables airlines to achieve up to 10% in fuel savings, offering a high return on investment. Moreover, OMS' WeatherLock™ solution locks onto specific data in the atmosphere—e.g., cloud moisture volume—that competitors cannot provide as they lack sufficient information to make the data useful.

Impressive Partners and Customer-centric Business Model

OMS partners with world-renowned brands, such as AAC Clyde Space, GomSpace, and Lockheed Martin, to manufacture its CubeSats and the National Aeronautics and Space Administration to launch them. The company's client base consists of airlines, aviation analytics providers, the Federal Aviation Administration, the European Aviation Safety Agency, municipalities, and military organizations. Serving as a testament to the company's operational efficiency, innovative technology, and future success, the US Air Force was one of OMS's first customers, and OMS is currently fulfilling a customization request from the US Navy. Many young companies find it challenging to enter the government and military markets as they must meet specific criteria—e.g., advanced security and proven technology. OMS offers two pricing models: Subscription or pay-as-you-go, allowing any-sized organization to take advantage of the company's data for any weather information needs. For example, airlines choose the subscription option as they need weather data 24/7. In contrast, an aerospace company may only need to acquire weather data for the days surrounding a spacecraft launch window.

Conclusion

Hours' old weather alerts often leave organizations to face a host of challenges, including property and asset damage, as well as putting human lives at risk. Orbital Micro Systems equips clients with state-of-the-art near real-time weather monitoring and forecasting, enabling businesses to increase safety and efficiency significantly while decreasing operational expenditures. The company combines and analyzes weather data from its cube satellite constellation and various external satellite and ground weather sources to provide the world's most accurate, near real-time weather alerts and forecasting on a global scale.

With its innovative technology, future-facing approach, and strong overall performance, Orbital Micro Systems earns Frost & Sullivan's 2020 Global Enabling Technology Leadership Award in the environmental monitoring systems industry.

Significance of Enabling Technology Leadership

Ultimately, growth in any organization depends on customers purchasing from a company and then making the decision to return time and again. In a sense, then, everything is truly about the customer. Making customers happy is the cornerstone of any successful, long-term growth strategy. To achieve these goals through enabling technology leadership, an organization must be best in class in three key areas: understanding demand, nurturing the brand, and differentiating from the competition.



Understanding Enabling Technology Leadership

Product quality (driven by innovative technology) is the foundation of delivering customer value. When complemented by an equally rigorous focus on the customer, companies can begin to differentiate themselves from the competition. From awareness, to consideration, to purchase, to follow-up support, organizations that demonstrate best practices deliver a unique and enjoyable experience that gives customers confidence in the company, its products, and its integrity.

Key Benchmarking Criteria

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

Technology Leverage

- Criterion 1: Commitment to Innovation
- Criterion 2: Commitment to Creativity
- Criterion 3: Stage Gate Efficiency
- Criterion 4: Commercialization Success
- Criterion 5: Application Diversity

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 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.

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>.