

F R O S T & S U L L I V A N

BEST PRACTICES

AWARDS

F R O S T & S U L L I V A N

2020 BEST PRACTICES AWARD

AVEVA

2020 GLOBAL MANUFACTURING EXECUTION
SYSTEM FOR FOOD AND BEVERAGE
PRODUCT LEADERSHIP AWARD

Contents

Background and Company Performance	3
<i>Industry Challenges</i>	3
<i>Product Family Attributes and Business Impact</i>	4
<i>Conclusion</i>	8
Significance of Product Leadership.....	9
Understanding Product Leadership.....	9
<i>Key Benchmarking Criteria</i>	10
<i>Product Family Attributes</i>	10
<i>Business Impact</i>	10
Best Practices Recognition: 10 Steps to Researching, Identifying, and Recognizing Best Practices	11
The Intersection between 360-Degree Research and Best Practices Awards	12
<i>Research Methodology</i>	12
About Frost & Sullivan	12

Background and Company Performance

Industry Challenges

Plant operations have traditionally performed as diversified functional domains operated by individual teams, with a separate setup for inventory, production, quality, and maintenance activities. Even though many new software packages help customers handle the activities in these individual domains at both the plant and enterprise level, they never really enable a dynamic collaboration across functional domains (horizontal integration) and across business functions (vertical integration). For instance, many manufacturing companies have grown through mergers and acquisitions, becoming large multinational enterprises that must handle multiple production sites worldwide to produce similar or different product variations. These production sites are often structured based on a heterogeneous plant system landscape with varying practices for operational tasks and business targets. To overcome this issue, industries started using the manufacturing executing system (MES), which is a product scheduling and product/service tracking solution that is used to analyze and determine resource availability and status. In general, manufacturing plants that process livestock and agricultural products into goods for instant or final consumption are adopting the MES in the food and beverage (F&B) industry. The varied operations in the F&B industry, however, increase the level of difficulty for implementing an MES because this step causes major disruptions to existing operations; therefore, customers typically choose to proceed with current frameworks, especially in established verticals. This conservative mindset pervades the industry and has long been a restraining factor for the wide-scale implementation of the MES.

The MES is moving from a proprietary structure to a more open structure that requires communication over the Internet for data processing and retrieval. Industrial Internet of Things (IIoT)-based MES solutions implemented over connected platforms generate data that is vulnerable to hacking and misuse. Protocol standards are different for legacy and new-generation MES, and patching to enable a machine-to-machine connection or to form a connected factory is a challenging task. In addition, carrying out advanced complex MES operations in discrete industries increases the level of difficulty for the unskilled workforce; therefore, end users continue to use their existing infrastructure that is customized to meet their production line requirements.

Adopting MES solutions includes tangible (e.g., licensing and infrastructure) and intangible (e.g., training) costs. Small and medium-sized enterprises (SMEs) often face capital challenges because MES implementation involves considerable investments. Adopting an MES occurs in multiple steps designed to meet all business and manufacturing needs. The MES benefits customers by reducing operating costs, increasing productivity and yield, and shortening the decision time, and vendors offering a real-time, plant-wide platform that can be easily implemented in a wide-scale manner without causing any disruptions in existing operations will be best positioned to stay competitive in the dynamic MES market.

Product Family Attributes and Business Impact

AVEVA Group plc was formed from the merger of Schneider Electric's industrial software business and AVEVA's software business. AVEVA's portfolio includes its MES software and complementary manufacturing operations management (MOM) applications which have been combined into a common platform to deliver MES/MOM software capabilities. AVEVA's primary focus has been on continuous, batch, and hybrid manufacturing processes.

Product Value: Model-driven MES

Manufacturing enterprises are striving to transform their business processes digitally to deliver new products that increase profitability and revenue. F&B manufacturers are digitally transforming their manufacturing operations to achieve higher productivity and efficiency and enhanced manufacturing flexibility and quality while reducing the cost of compliance with internal and external regulations.

To help F&B manufacturers on their journey toward digital transformation, AVEVA offers a model-driven MES solution that combines the traditional advantages of an MES with a new digital workflow management approach to integrate people, processes, and businesses for enhanced efficiency and for capturing work procedures in digital workflows and relevant user experience models. In contrast to competitors in this space that provide only stand-alone MES software, AVEVA supports its MES capability with human-machine interface (HMI) and process control applications, device-agnostic manufacturing automation, and workflow management applications, thereby benefiting customers in terms of seamlessly integrating with their ongoing processes. AVEVA's customer-centric approach enables users to achieve the maximum level of automation, consistency of operational tasks, and collaboration across diverse teams. This collaboration among teams is achieved through a platform-neutral web interface and applications for mobile devices that keep the plant floor personnel connected with manufacturing processes. While competing MES solutions provide only a manual setup on a single mobile device, AVEVA's MES provides an automatic and active layout adoption and creates previews for multiple mobile and for desktop devices.

The unique selling point of AVEVA's MES is its out-of-the-box connectors for both plant and enterprise applications, which provide greater flexibility to customers in terms of integrating the MES into their entire business. While competing MES solutions can respond to events originating only in generic interfaces, AVEVA's MES can respond to events arising in the MS SQL server, XML messages, and web services. Furthermore, the ability to connect with automated manufacturing processes, through integration with asset performance management software or third-party applications allows customers to achieve end-to-end process management and to standardize processes across the enterprise.

Reliability and Quality: AVEVA System Platform

AVEVA's focus on providing customers with a reliable solution and best-in-class product quality can be illustrated by its seamless MES integration capabilities with the AVEVA

System Platform, a real-time operation control platform for supervisory, Enterprise SCADA, MES, and IIoT. While competitors' platforms are designed to integrate only with their proprietary systems, the AVEVA System Platform is vendor agnostic and works with any competitor's programmable logic controller (PLC), remote terminal unit (RTU), programmable automation controllers, IIoT devices and general IT applications. With the AVEVA System Platform, AVEVA offers an industry-first responsive Operations Management Interface (AVEVA OMI) that customers can access across different platforms. The differentiating factors include a definable asset model that binds content and unstructured data logically to enhance an operator's situational awareness, and that the developer does not have to learn complex scripting or programming language because this out-of-the-box solution can be deployed quickly. AVEVA has further enhanced the development experience by offering a pre-built automation library that includes a device object library, faceplates, trends, and symbols. This library is device agnostic and works seamlessly with any vendors' products, enabling engineers to speed up the process of assembling and deploying the applications. The AVEVA System Platform supports mixing on-premise and cloud-based applications, providing customers with the flexibility to have real-time control over their operations and to access actionable insights when necessary. In contrast to competing platforms that are minimally scalable, the AVEVA System Platform can run up to ten times more client sessions on a single server.

A key feature that provides AVEVA with a competitive advantage is its intelligent alarm system that supports operator productivity. The AVEVA System Platform uses machine learning capabilities to identify and filter out false alarms and classifies alarms based on their severity, allowing operators to respond only to true alarms and not become fatigued by responding to false alarms. In addition, the AVEVA System Platform exceeds customers' expectations in regards to performance increasing operator effectiveness by 40% through context, and reducing engineering by 80% to create applications based on its out-of-the-box content.

Positioning: Recipe Management and Formula Management

With F&B manufacturing relying on complex equipment and systems, managing the recipes involved in the system becomes increasingly critical. Ensuring that the right recipe is implemented in the right process is necessary, and having the accurate recipe information to achieve the desired performance and efficiency improvement is important. Recipe management is equipment and process specific, and manufacturers always seek to control who can modify the recipe and want to access the full history about recipe changes.

To enable customers to achieve scalability with recipe management, AVEVA provides the following two key features: Formula Management and Download and Recipe Management and Execution. Formula Management enables users to manage formulas and equipment for recipe parameter value transfer to equipment control systems. This feature provides a formula template approach with a set of parameters and a pre-defined set of default values that customers can use to generate formula variations easily. While competing solutions require customers to create formulas specific to their equipment, AVEVA's

Formula Management allows users to choose from a list of approved formula instances for download to a wide range of equipment. The Formula Download can be conducted through a web-based user interface and allows for an easy review of the assigned target values and integration into the automation system. With AVEVA's Formula Management feature, users can reduce the machine setup and changeover time by almost three times, compared to competing solutions.

Recipe Management and Execution allows users to create procedures that determine the order of equipment execution. AVEVA's Recipe Management is easy to use, and to implement a recipe, the user simply assigns a recipe to the equipment and starts the execution process. Both Formula Management and Recipe Management can be connected to any control system through the AVEVA System Platform or Open Platform Communications Unified Architecture (OPC UA). This unique approach enables customers to achieve recipe agility and product quality and to decrease the amount of equipment used for recipe management in the production floor. Moreover, with AVEVA's Recipe Management feature, users can standardize the recipe management and speed up the new product introduction process by two times, compared to other recipe management solutions in the market.

Operational Efficiency: AVEVA Connect

The advent of the cloud in the industrial space has given manufacturers the ability to gather, analyze, and continuously monitor equipment data that helps them manage equipment performance, thereby being preventive rather than reactive to equipment failures. To help F&B manufacturers achieve operational efficiency, AVEVA extended its MES capabilities with AVEVA Connect, which is cloud-based unified software that delivers an end-to-end integrated platform across the entire enterprise, such as design, engineering, supply chain, and production.

AVEVA Connect is highly scalable and benefits customers in the following ways:

- Connects different teams to create a unified workforce
- Connects industrial assets and operation value chains, thereby increasing the return on investment and profitability
- Connects existing operations with advanced capabilities, such as machine learning, data analytics, and predictive maintenance

Even though competitors' MES solutions enable customers to host the software on the cloud, they rely on third-party vendors for other cloud-based solutions, such as data analytics, remote monitoring, and digital twin. With AVEVA Connect, users can easily leverage all cloud-based solutions to augment their operational efficiency. Furthermore, AVEVA Connect offers a unique solution called Edge Management to manage industrial devices remotely from anywhere. While competitors' edge platforms allow for the individual management of disparate devices across multiple networks, AVEVA's Edge Management platform allows for edge device management from a central hub, thereby saving time and money and reducing the total cost of ownership.

Match to Needs

The advent of IIoT has pervaded the industrial landscape with new technologies, such as cloud, data analytics, and edge computing. This rapidly evolving landscape has pushed market participants to explore new business models in terms of industrial software licensing. More than 80% of MES vendors offer their software on a use-based subscription model; however, customers, especially small and medium-sized F&B manufacturers accustomed to the traditional perpetual licensing model, are hesitant to shift to a use-based subscription model, citing issues with cost inflexibility. To help customers overcome these issues, AVEVA launched a flexible subscription licensing model in 2019 called AVEVA Flex that offers tailored subscription options and allows customers to choose how to access AVEVA's comprehensive software portfolio. This flexibility benefits customers in the following ways:

- Technical flexibility: ability to access a variety of AVEVA's software solutions on-premise or in the cloud; flexibility to use the MES from a variety of platforms, such as web, mobile, and desktop; and ability to manage compliance with license entitlements
- Commercial flexibility: decreased upfront costs and capital expenditure
- Architectural flexibility: integration with a variety of open, hardware-agnostic solutions and the flexibility to deploy the architecture at any point in the project lifecycle
- Support flexibility: access to software version upgrades and training and software monitoring services

Unlike competitors that have a standard subscription cost, AVEVA offers the following three types of subscription options based on customers' needs:

- Subscription Access: à la carte access to the software and subscription for a one-, three-, or five-year term
- Flex Credits: consumable credits that can be redeemed for any subscription tier and available for a one-, three-, or five-year term, with the differentiating factor of customers interchanging software tiers and licenses as requirements evolve
- Enterprise Subscriptions: tailored subscriptions for multi-site enterprise deployments, with a subscription for three-to-five year terms

Growth Potential

The COVID-19 pandemic has negatively impacted many industries, forcing employees to work remotely and find new means to innovate. Digitalization is the only solution to overcome the issues, such as driving efficiency in complex manufacturing processes and enabling unmanned operations. In line with this, AVEVA has been accelerating its cloud deployment while investing more in cloud development to offer flexibility to customers in how they use the software. This strategy has increased AVEVA's subscription revenues, with its engineering business unit (BU) achieving approximately 25% growth, monitoring and control BU witnessing about 150% growth, and planning and operations BU

witnessing about 70% growth in subscription licenses. With an industry-leading cloud solution, AVEVA has five times the growth potential over the next one to two years, compared to other industry participants.

In August 2020, AVEVA announced an agreement to acquire OSIsoft for \$5 billion. This acquisition will enable AVEVA to integrate its products with OSIsoft's data management software and offer full-stack solutions to customers for plant and enterprise-based deployment models. Furthermore, this acquisition will drive AVEVA's growth and diversification strategies, especially the expansion of its footprint in existing and new markets and geographies.

In 2020, AVEVA launched the Discrete Lean Manufacturing software to help customers with their digital transformation in discrete industries. This new offering enhances operational efficiency by using digital technologies across lean work management for both manual and automatic production lines. With this software, customers can increase their productivity by 10% and increase their response time by 70% because of the automated escalation of production issues.

Frost & Sullivan expects AVEVA to continue strengthening its business model through subscriptions, increasing its recurring revenue, and accelerating cloud adoption, thus providing increased flexibility to customers and driving AVEVA's growth in the long term.

Conclusion

F&B manufacturers worldwide are striving to transform their operations and business processes digitally to increase profitability and production efficiency and achieve faster time to market for new products.

AVEVA's model-driven MES solution unified the traditional benefits of an MES with a new digital workflow management approach to integrate people, processes, and businesses. In contrast to competing offerings, AVEVA's unique solution supports the integration with process control applications, device-agnostic automation hardware, and workflow management applications, thereby benefiting users in terms seamlessly integrating with their ongoing processes. AVEVA's Formula Management and Download and Recipe Management and Execution enable customers to achieve scalability with recipe management and can be integrated with any control system through the AVEVA System Platform or OPC UA. AVEVA extended its MES capabilities with its cloud platform called AVEVA Connect, which delivers an end-to-end integrated solution for an organization's design, engineering, supply chain, and production teams. Over the last year, AVEVA has accelerated its revenue through software subscriptions and has increased its deployment of cloud solutions, providing increased flexibility to customers and strengthening its position in the F&B market.

For its strong overall performance, AVEVA Group plc is recognized with Frost & Sullivan's 2020 Product Leadership Award for its manufacturing execution system in the global F&B industry.

Significance of Product Leadership

Ultimately, growth in any organization depends on customers purchasing from a company and then making the decision to return time and again. A comprehensive product line filled with high-quality, value-driven options are 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 differentiating all play critical roles 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 communication, 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, market share will inevitably increase.

Key Benchmarking Criteria

For the Product Leadership Award, Frost & Sullivan analysts independently evaluated 2 key factors—Product Family Attributes and Business Impact—according to the criteria identified below.

Product Family Attributes

Criterion 1: Match to Needs

Requirement: Customer needs directly influence and inspire the design and positioning of the product family.

Criterion 2: Reliability and Quality

Requirement: Products consistently meet or exceed customer expectations for performance and length of service.

Criterion 3: Product/Service Value

Requirement: Products or services offer the best value for the price, compared to similar offerings in the market.

Criterion 4: Positioning

Requirement: Products or services address unique, unmet needs that competitors cannot easily replicate or replace.

Criterion 5: Design

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

Business Impact

Criterion 1: Financial Performance

Requirement: Overall financial performance is strong in terms of revenue, revenue growth, operating margin, and other key financial metrics.

Criterion 2: Customer Acquisition

Requirement: Product strength enables acquisition of new customers, even as it enhances retention of current customers.

Criterion 3: Operational Efficiency

Requirement: Staff is able to perform assigned tasks productively, quickly, and to a high quality standard.

Criterion 4: Growth Potential

Requirements: Product quality strengthens brand, reinforces customer loyalty, and enhances growth potential.

Criterion 5: Human Capital

Requirement: Company culture is characterized by a strong commitment to product quality and customer impact, which in turn enhances employee morale and retention.

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 practices 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 world	<ul style="list-style-type: none"> Conduct in-depth industry research Identify emerging industries Scan multiple regions 	Pipeline of candidates that 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 practices 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 practices 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 practices 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 practices 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 practices criteria
9	Communicate recognition	Inform award recipient of recognition	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> Coordinate media outreach Design a marketing plan Assess award's role in 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, resulting in 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, helps clients 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 practices models to drive the generation, evaluation, and implementation of powerful growth strategies. Frost & Sullivan leverages nearly 60 years of experience in partnering with Global 1000 companies, emerging businesses, and the investment community from 45 offices on 6 continents. To join Frost & Sullivan's Growth Partnership, visit <http://www.frost.com>.