FROST & SULLIVAN

BEST PRACTICES AWARDS

SIEMENS

2020 GLOBAL DIGITAL TRANSFORMATION MARKET LEADERSHIP AWARD

Contents

Background and Company Performance

Industry Challenges

Digitalization is changing every aspect of manufacturing. Enterprises are forced to either react and become digital organizations or cede to their competitors that are rapidly adopting digital technologies. The dynamic transformation witnessed in a shifting global economy, intensified by increasing globalization and commodity costs, has created a highly competitive industrial environment in which manufacturers are pressed to maximize productivity and improve efficiency. Additionally, manufacturers are expected to innovate their product designs and engineering approaches to cater to consumers' changing preferences. To effectively meet these objectives, manufacturers must streamline all design, engineering, and production activities.

Globally, manufacturers face the challenge of trying to reduce costs and comply with regulations while efficiently producing quality products that serve market needs. For instance, the COVID-19 pandemic forced medical device manufacturers to meet unprecedented demand for their products, which challenges them to achieve error-proof processes, compensate for paper-based documentation, and manage manual record keeping. To survive, manufacturers adopt product lifecycle management (PLM) solutions, with a wide array of dedicated software suites for different functions, as an ideal platform for improving efficiency and maximizing productivity.

PLM is a comprehensive approach to product strategy that includes managing the entire lifecycle of a product, from design to disposal. The main aim when adopting a PLM platform is for manufacturers to fine-tune new product design and development. However, the global PLM market is highly fragmented, making it challenging for customers to choose the right solution for their specific requirements. The market has more than 50 major vendors spread across various product segments, such as computer-aided design (CAD), engineering simulation, digital twin, and cloud and digital platforms. Adding to the existing supplier list is the proliferation of systems integrators (SIs) and indigenous suppliers that offer low-cost PLM applications, albeit with limited functional capabilities. The high level of fragmentation in the global PLM market creates heavy competition by triggering price wars among suppliers, which results in lower profit margins.

Manufacturers in developing economies beset with cost constraints are among those delivering home-grown PLM applications with limited functional capabilities. These solutions are usually customized to end-user requirements. This trend is especially prevalent among small and medium-sized enterprises (SMEs) in the automotive supply chain. End users adopt home-grown PLM tools because they are a cheaper alternative to third-party PLM solutions, but they do not enable manufacturers to achieve high levels of productivity and profitability. Thus, a wave of such indigenous alternatives obliterates the opportunity available for dedicated PLM vendors. This trend is more prominent now because of the COVID-19 pandemic, when many manufacturers are stifled with weak consumer demand and low capital for investments.

Market Leadership of Siemens Digital Industries Software

Growth Strategy Excellence

The US-based global software provider Siemens Digital Industries Software (Siemens) has developed a unique portfolio called Xcelerator that integrates a wide range of software components, services, and applications to meet the industry-specific needs of customers that are on a path to become digital enterprises. Although market competitors offer stand-alone software to handle different industrial activities, such as design, engineering, and manufacturing, Siemens identified that this approach negatively impacts the cost, quality, and time to market for a new product. With Xcelerator, Siemens combined its existing portfolio of software tools and services to give customers a pathway that unifies their product lifecycle and associated processes. The Xcelerator portfolio is comprised of Siemens' flagship solutions, including NX, Teamcenter, Simcenter, Opcenter, Tecnomatix, MindSphere, Capital, Xpedition, a host of Electronic Design Automation solutions, underpinned by cloud applications services including the Mendix low-code application development and integration platform. This diverse line of applications offered from a single provider makes Xcelerator a game-changing solution for companies of all sizes.

Siemens' customer-centric approach empowers customers to use their existing infrastructure when implementing Xcelerator; in contrast, its competitors require numerous alterations to existing frameworks, such as on the manufacturing floor. Thus, the Xcelerator portfolio, which comprises embedded tools and databases, integrates across the existing information technology (IT), operational technology (OT), and engineering technology (ET) infrastructure, without disrupting the workflow. The differentiating factor here is that the embedded tools and databases, such as its Capital software, a comprehensive suite for electrical design, documentation, validation and diagnostics, is embedded into Siemens' NX software. NX is an integrated design solution that enables users across engineering disciplines to develop new products and solutions collaboratively. Another unique feature of the Xcelerator portfolio is that it allows users to build personalized applications that can, among a myriad of functions, record performance data and share the insights with design and manufacturing teams.

Moreover, Siemens' Opcenter, a manufacturing operations management (MOM) solution has been integrated with Valor software, an end-to end software solution for printed circuit board (PCB) manufacturing, to strengthen the digital thread throughout the product lifecycle and offer continual quality improvement.

As another example, while competitors' simulation solutions allow automotive customers to work only at the component level or at an individual physical aspect of the product, Siemens' PAVE360 delivers a closed-loop simulation to test every aspect across the product lifecycle, from silicon development to full vehicle analysis. The key differentiator here is that PAVE360 democratizes the chip design. Ultimately, this means that the different value chain participants, such as automotive OEMs, semiconductor manufacturers, Tier I suppliers, software vendors, and other third-party vendors, can collaborate during the design and development of for-purpose silicon devices in vehicles.

With its game-changing Xcelerator solution set, Siemens has not only grown at a rate faster than the industry average, but also delivers to its customers the promise of becoming a digital enterprise regardless of industrial vertical.

Product Quality and Product Differentiation

Also at its core Siemens' Xcelerator can include Teamcenter, PLM software that integrates people and processes and eliminates functional siloes across the design=make-service continuum of a business. While competitors in this space offer PLM in both on-premises and cloud models, flexibility is minimal in terms of how a customer can deploy and pay for the service. To help customers overcome these issues, in June 2020, Siemens launched Teamcenter X, a cloud-based SaaS solution, as an extension of the Xcelerator portfolio.

Fig.1 Benefits of Xcelerator Portfolio

Image Source: Siemens Digital Industries Software

Teamcenter X is built on the Mendix cloud platform, a multi-experience application development and integration platform that Siemens acquired in 2018. The Mendix platform provides an artificial intelligence-based visual development model that enables customers to develop customized applications, even with zero programming knowledge, and make greater use of data analytics to make the enterprise smarter. Siemens has designed Teamcenter X to give users utmost convenience in choosing from a wide range of preconfigured engineering and business solutions that offer quick value; users can add more features as the business grows. As Teamcenter X is completely cloud-based, customers have the advantage to pay as they go for just the services they need. While competitors' PLM solutions rely on third-party software for tools such as design and simulation, Teamcenter X can leverage Siemens' own wide portfolio of software tools for the digital enterprise. Hence, customers can easily connect to NX software for design,

Capital and Xpedition for electronic design, and Polarion X for application lifecycle management (ALM). Teamcenter X generates a multi-domain bill of materials (BOM) that offers complete access to the digital twin, including mechanical, electrical, and software aspects. In contrast to competitors' PLM solutions, where customers must be trained to create tools such as engineering change or release management, Teamcenter X includes all of these tools preconfigured and the artificial intelligence based Teamcenter Assistant helps new users make their way through the tool easily. This best-in-class feature provides Siemens' Xcelerator a major advantage for its customers over competing solutions.

Technology Leverage

Enterprises have long faced the challenge of silos separating different functional groups, such as engineering and business disciplines, which decelerates the development of customer-centric products. As organizations design and manufacture smarter products, the ability to capture real-time data across networks is essential. Thus, to provide a comprehensive approach to the customer's digital transformation, in July 2020, Siemens forged a strategic partnership with SAP SE, a leading provider of enterprise application software. This partnership will deliver an integrated end-to-end software solution across product lifecycle, supply chain, and asset management to eliminate all siloes and become one the only end-to-end solution provider for all Industry 4.0 requirements. No other combination of solution providers has this comprehensive a vision and approach. As part of this partnership, SAP offers Siemens' Teamcenter software to enhance product lifecycle collaboration, and Siemens offers SAP's Intelligent Asset Management and Project and Portfolio Management solutions to enhance business value for industrial enterprises. The partnership is also intended to create integrated applications for customers to obtain a true digital thread that enhances their overall business performance and provides foundational competitive differentiation in the digital economy.

Implementation Excellence

Historically, times of crisis have driven rapid development of innovative technology. The current COVID-19 pandemic has caused a crisis for all end-user industries that are trying to adapt by rethinking their traditional approach to product development. For instance, automotive original equipment manufacturers (OEMs) are producing medical ventilators instead of vehicles, and other manufacturers are producing protective gear for healthcare personnel instead of their own products. The key factor that enables rapid adaptation to the current crisis is the agile digital posture of industries. With the launch of Xcelerator, Siemens wants to promote human-centered innovation and be a catalyst for the digital transformation of enterprises during this global crisis. Xcelerator focuses on three main areas of digital transformation: comprehensive digital twin, open ecosystem, and personalized and adaptable solutions. These technologies help customers move beyond the current crisis, which illustrates that Siemens keeps up with the ever-changing needs of its global customer base.

Using a comprehensive digital twin, enterprises can plan to restart their manufacturing facility safely. Some of the key benefits customers gain from a digital twin capability are real-time actionable insights, faster time to market, a merged engineering sector across the lifecycle, and accelerated new business models.

Siemens' allows customers to create an accurate virtual representation of a real-world object or process, which can then be simulated, analyzed, and optimized. The digital twin is composed of multiple models for different features of physical behavior that need to be handled across the product lifecycle. A unique feature of Siemens' comprehensive digital twin is that it offers a closed-loop capability that allows bi-directional connectivity and control between the physical object and the virtual representation.

Frost & Sullivan's analysis clearly shows that Siemens is uniquely positioned in the digital twin space because its portfolio caters to the needs of both the virtual world and the physical world, making it the most comprehensive digital twin available in the market. In the virtual world, Siemens offers mechanical, software and electrical design solutions, a simulation platform for design and manufacturing systems, and virtual commissioning. In the physical world, Siemens' portfolio includes R&D and prototype testing, automations and controls, and commissioning of manufacturing systems, as well has a complete Inudstrial Intenert as a Service solution. Thus, Siemens is strong in the complete lifecycle of the closed-loop digital twin, from design to manufacture and service.

Performance Value

Industrial Internet of Things (IIoT) platforms play a critical role as the nerve center for modern factories by performing multiple tasks such as data integration, storage, analysis, computation, visualization and control. The current IIoT platforms market is populated by a mix of vendors from both OT and ICT backgrounds. Despite the presence of so many competing platforms, customers are struggling to understand which one would suit their requirements best. Furthermore, competitors' platforms do not offer a robust capability for customers to integrate the ERP and PLM software already running in their factories. Hence, as a part of the Xcelerator solutions portfolio, Siemens is offering MindSphere, its flagship IIoT as a service solution that combines all the business needs of an industrial enterprise without compromising on the critical data from other software suites, such as ERP and PLM. As a cloud-based service, MindSphere works in conjunction with Siemens' Mendix, a low-code application development platform, from which both Siemens and its customers can create robust IoT apps and edge device management. Furthermore, MindSphere acts as a platform that connects products, factories, assets, and enterprise applications. For example, Volkswagen group has embarked on such a use of MindSphere.

To strengthen MindSphere's edge analytics capability, in 2019, Siemens acquired Pixeom, the provider of an edge computing platform. While competitors' platforms rely on third-party edge analytics solutions, Siemens now offers a fully integrated edge ecosystem, from which customers can create and manage edge apps. One of Pixeom's key differentiations is that it can package, set up, and manage cloud applications on commodity hardware through containerization, thereby offering customers the ability to

deploy applications at the edge without the need for any special hardware configuration. These features represent the best value to customers when compared to similar offerings from competitors.

Conclusion

To help industrial customers overcome the issues caused by functional siloes and to accelerate their digital transformation journey, Siemens integrated its flagship products to work as the Xcelerator portfolio. Now customers can consolidate around an environment to easily manage the different areas that affect a product lifecycle, including design, simulation, PLM, MOM, IIoT, and Cloud. The diverse capabilities offered from one platform make Xcelerator a game-changing strategic solution for companies of all sizes.

Siemens has built the Xcelerator strategy on the cloud-based, Mendix low-code application platform, which enables industrial customers to create and deploy apps specific to their requirement across product lifecycle, engineering, or supply chain. For example Teamcenter X itself leverages Mendix to create applications for the product lifecycle management process. With MindSphere, customers can connect people, processes, and assets as well as manage edge devices. Siemens' human-centered innovation helps industrial customers adapt to the current global COVID-19 pandemic and accelerate their journey towards digital transformation and becoming a digital enterprise.

With its strong overall performance, the company has achieved a leadership position in the Integrated Digital Platform for Industrial Enterprises market, capturing share of approximately 20%. Frost & Sullivan is proud to bestow its 2020 Market Leadership Award to Siemens Digital Industries Software.

Significance of Market Leadership

Ultimately, growth in any organization depends on customers purchasing from a company, and then making the decision to return time and again. Loyal customers become brand advocates, brand advocates recruit new customers, and the company grows, and then attains market leadership. To achieve and maintain market leadership, an organization must strive to be best in class in 3 key areas: understanding demand, nurturing the brand, and differentiating from the competition.

Understanding Market Leadership

Driving demand, strengthening the brand, and differentiating from the competition all play critical roles in a company's path to market leadership. This three-fold focus, however, is only the beginning of the journey and must be complemented by an equally rigorous focus on the customer experience. Organizations that demonstrate best practices, therefore, commit to the customer at each stage of the buying cycle and continue to nurture the relationship once the customer has made a purchase. In this way, they build a loyal, ever-growing customer base and methodically add to their market share.

Key Performance Criteria

For the Market Leadership Award, Frost & Sullivan Analysts focused on specific criteria to determine the areas of performance excellence that led to the company's leadership position. The criteria include (although are not limited to) the following:

Criterion	Requirement
Growth Strategy Excellence	There is a demonstrated ability to consistently identify, prioritize, and pursue emerging growth opportunities.
Implementation Excellence	Processes support the efficient and consistent implementation of tactics designed to support the strategy.
Brand Strength	The brand is respected, recognized, and remembered.
Product Quality	The product or service receives high marks for performance, functionality, and reliability at every stage of the life cycle.
Product Differentiation	The product or service has carved out a market niche, whether based on price, quality, or uniqueness of offering (or some combination of the three) that another company cannot easily duplicate.
Technology Leverage	There is a commitment to incorporating leading-edge technologies into product offerings for greater product performance and value.
Price/Performance Value	Products or services offer the best value for the price, compared to similar offerings in the market.
Customer Purchase Experience	Customers feel they are buying the optimal solution that addresses both their unique needs and their unique constraints.
Customer Ownership Experience	Customers are proud to own the company's product or service, and have a positive experience throughout the life of the product or service.
Customer Service Experience	Customer service is accessible, fast, stress-free, and of high quality.

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 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	• Conduct in-depth industry research • Identify emerging industries • Scan multiple regions	Pipeline of candidates that potentially meet all best practices 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 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	• 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	• 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	• 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 practices award recipient	• 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 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 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 the 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.