Solutions to Leverage Digital Technologies for Product Realization

CIMdata Commentary

Key takeaways:

- *New digital technologies and processes are revolutionizing the way products and services are developed, and are also impacting workplaces, workforces, business channels, business models, and customers*
- *Social product development is beginning to show significant success in ideation, problem solving, and knowledge management, enabling companies to collaborate with suppliers, consumers, customers, and other interested parties to capture input for new products as well as for enhancements to existing products*
- *Using advanced analytics, Big Data technology and processes can transform data into actionable insights, which can help improve products and business processes, yielding improved business performance and customer satisfaction*
- *TCS' Digital Forces framework adds artificial intelligence (AI) and robotics to social, mobile, analytics, and cloud (SMAC) and applies them across the product lifecycle to facilitate product realization*

Modern Product Realization

Over the past two decades, the tools used to convert ideas into physical products have undergone an amazing transformation. All aspects of bringing a product to market, from planning, designing, and prototyping through to production and even after-sales support, have been dramatically impacted by the migration to digital processes. CIMdata has seen many companies reduce their time to market, with better quality and profitability, using digital processes. In the digital environment, the product only exists as data in its early lifecycle, e.g., as market plans, CAD files, and simulation results. As the product definition matures, physical representations (prototypes) are developed before production is initiated. It is much easier to change a virtual product definition than a physical one; creating more digital design iterations allows the product to mature further and faster. This helps ensure that better products reach the market in a shorter amount of time, driving improved market share and profitability.

Digital processes' impact stretches beyond the product to the workplace, through improved communication, customer interaction, and even business models. Products are able to "phone home," to automatically install software updates, to provide operational data, and to signal when support is needed—all improving the customer experience. Digital process data can support complex processes that generate new revenue streams and improve customer satisfaction. A good example of the power of Digital processes are products that can consume data from the cloud to provide the customer with additional services, such as when a GPS routes around traffic jams in real time.

Social Product Development

Recent advances in social technology and the cloud have enabled companies to improve communication along the complete value chain from idea to customer. Social product development (SPD) solutions are radically changing the workplace. The "digital native"

younger generations are comfortable with SPD, using it to participate early in the product development process. Using social tools, companies are able to get information such as sentiment analysis and voice-of-the-customer data before building the product, during its development, and after it has shipped. This helps to ensure that customer needs are met and that customer demand is understood before the product ships. In addition, social tools enable internal product discussions to be carried out in a structured form associated with the product, rather than locked up in difficult to track emails. This social data becomes an asset that can be leveraged and reused on future developments.

In addition, SPD enables several use cases that are otherwise difficult to execute. Collaborative problem solving involves publishing a problem and allowing a broad community to view, comment on, discuss, and even to contribute intellectual property (IP), in order to solve the problem in unexpected ways. Sentiment analysis leverages unstructured public data sources such as Facebook as a basis for market research to identify how receptive consumers might be to a new product, feature, or service.

The key benefits achieved to date with SPD are a maximized idea pipeline, improved customer experience, and more successful product introductions. CIMdata sees the benefits achieved with SPD as well aligned with the goals of most companies, but many are afraid to take the leap and work this way. Traditional companies are not used to leveraging extreme openness and direct customer collaboration, but promising case studies are starting to show the benefits to these methods.

Big Data Analytics

Big Data is commonly defined as a collection of data sets so large and complex that they defy analysis using traditional data-processing applications.[1] Product development organizations across the globe are critically analyzing Big Data (e.g., assessing failure data, service data, warranty data, design data, performance data, and materials data) to understand and extract information patterns that can be fed back into the product development process. While connected products have been available for a long time, wider adoption of the Internet of Things (IoT) has made it cost effective and feasible to capture data from a much broader range of products. This data, commonly transmitted over the Internet, is processed and analyzed using algorithms that can assess product health and extract performance data, and can initiate product updates. This connectedness is enabling new services and improved customer experiences in both consumer and industrial markets. Big Data analytics processes are starting to have a significant impact on product development, both on the front end by gathering requirements from social sites used by consumers, and on the backend from consumer or customer responses and even directly from the products.

Other Technologies that Impact Product Realization

The cloud makes it much easier for companies to collaborate with their supply chain. Data access and real-time collaboration solutions are much simpler and support and enable ad-hoc collaboration. Mobile devices allow people to collaborate no matter where they are. In addition, services available on the cloud, like simulation tools, can be used with subscriptions or pay-per-use, making them accessible even to small companies.

On the physical side, key technologies include 3D printing, advanced manufacturing supported by artificial intelligence (AI), and robotics. 3D printing driven by digital models has evolved from making fragile prototypes that were mostly used to assess geometric shape, to

[1] http://en.wikipedia.org/wiki/Big_data

additive manufacturing that can make products and tooling out of a wide variety of materials, from plastic to metal, and even from organic material such as food products.

Robotics technology has been widely used in complex or high-volume manufacturing for many years. Fully simulated robot programs defined from digital product definitions reduce the risk of expensive robot damage via mistakes in manual or shop floor programs. Advances in electronics like the Raspberry Pi and Arduino single-board computers have enabled the creation of complex products and systems at low cost. Standardized components, including motors, actuators, sensors, and Wi-Fi, support the creation of sophisticated tools to address complex problems. Open-source software frameworks and development tools have eased the software development burden.

Product Realization Solutions From TCS

Tata Consultancy Services (TCS) is one of the largest global enterprises focused on providing business and technology services. Their over-300,000 employees support virtually all industries. In their most recent fiscal year TCS had revenues of $13.4 billion, with 16% year-over-year growth. CIMdata continues to be impressed by the breadth and depth of TCS' offerings. At a recent visit to the TCS Innovation Forum a variety of customers presented on the success they've had with high-value services and support from TCS.

TCS is focusing on five digital forces that they believe are shaping industry today: social, mobile, analytics (Big Data), cloud, and artificial intelligence/robotics. While many companies today focus on social, mobile, analytics, and cloud (SMAC), CIMdata sees great value in TCS' addition of robotics and AI, which have many applications, including autonomous operation of equipment and products, and automated data analysis. Robotics is widely used to provide low cost, sophisticated, product manufacturing capability. Robotics can also be used to provide innovative product capabilities. The understanding TCS has gained from their consulting clients and partnerships has enabled them to integrate the five digital forces into solutions that address real business problems.

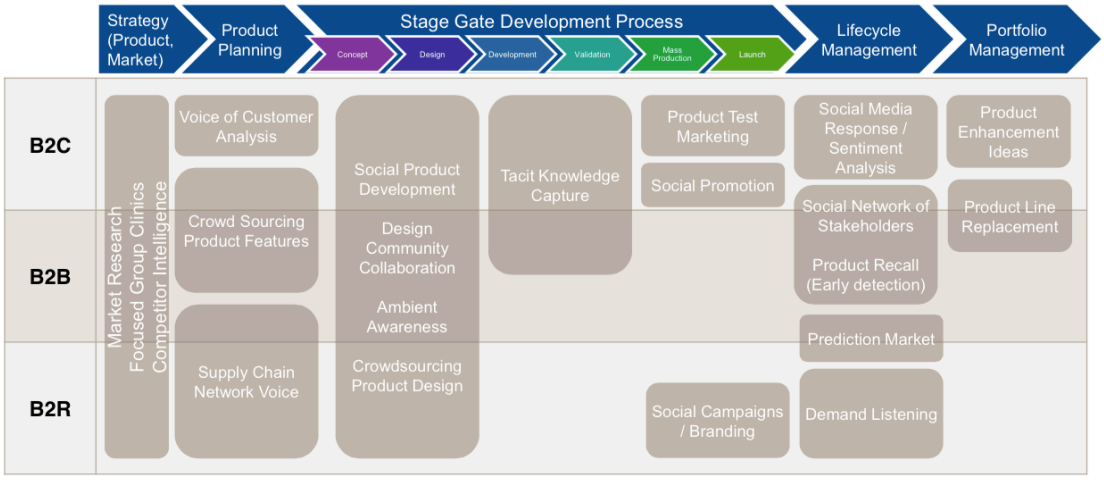

Figure 1—How TCS' Social Product Development Framework Relates to PLM
(Courtesy of TCS)

Figure 1 shows the TCS framework for SPD in the context of the product lifecycle. Because of their broad range of customers and consulting engagements, TCS has developed solutions that can support a range of end-to-end processes, including business-to-consumer (B2C), business-to-business (B2B), and business-to-reseller (B2R). Figure 2 shows the TCS framework for one of the five digital forces, Big Data analytics. TCS also has frameworks that

support the other four digital forces. TCS' engagement methodology uses the frameworks and the interoperability among them to assess how clients are currently performing and to develop and implement a roadmap that makes sense and creates appropriate business value. For example, a product planning group can analyze both market research data using sentiment analysis to determine product sustainability requirements, and supply chain analytics to identify suppliers or materials that meet those requirements within product cost targets. The state-of-the-art building-block approach to solving problems allows TCS to leverage their knowledge base and help clients reconfigure and reimagine their business processes in new ways that leverage the unique aspects of digital processes.

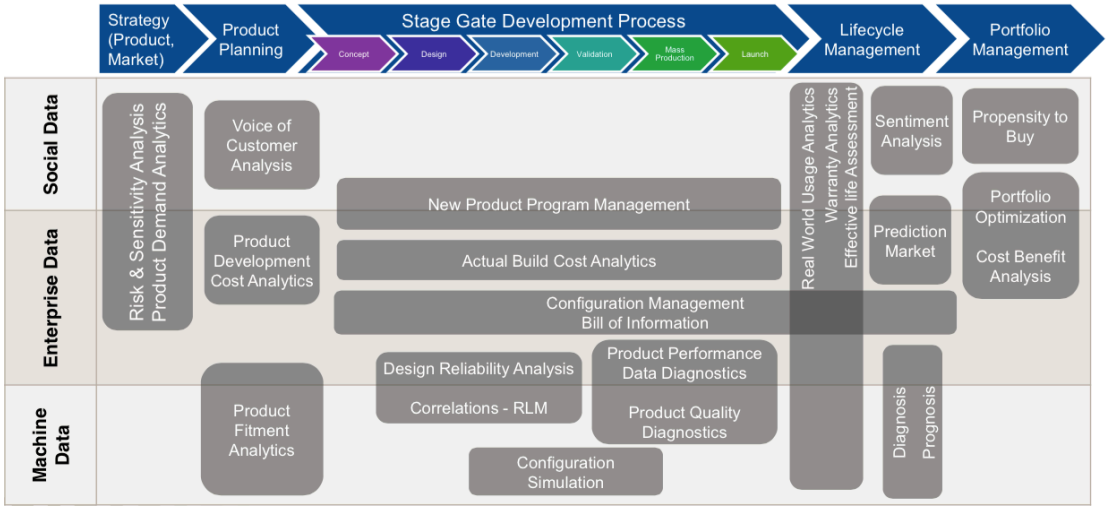

Figure 2—TCS' Big Data Analytics Framework's Relationship to PLM
(Courtesy of TCS)

Conclusion

Effective product realization is crucial to satisfying customer needs and wants. Recent advances in technology are having a significant impact on business. Customer cost, quality and delivery expectations, material and labor costs, and regulations, are always increasing. The adoption of new technologies and strategies like social product development and analytics are helping companies improve customer satisfaction while meeting business challenges. Social product development is improving communication across all aspects of the product lifecycle. Analytics technology using data-driven insights to leverage the technology is enabling better decisions to be made and offering the best opportunity to address business issues.

TCS' focus on and experience with the five digital forces, SMAC plus AI/Robotics, has helped them to deliver the improvements companies seek. CIMdata sees social product development and analytics as key competencies that companies must implement to be competitive and take their product realization processes into the future. TCS' state-of-the-art digital forces frameworks and methodologies provide client insights and efficiencies, and help them gain effective competitive advantages.

About CIMdata

CIMdata, an independent worldwide firm, provides strategic management consulting to maximize an enterprise's ability to design and deliver innovative products and services through the application of Product Lifecycle Management (PLM). CIMdata provides world-

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