Tech-Clarity

making the value of technology clear

Issue in Focus:

The Integrated ERP-PLM Strategy

Closing the Loop on Product Innovation

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Introducing the Issue

The modern manufacturer relies on strong enterprise systems to stay competitive in today's global, challenging, and uncertain markets. Of all of the solutions that manufacturers employ, ERP and PLM are the primary systems driving product profitability. As reported in Tech-Clarity research report "*The Complementary Roles of ERP and PLM,*" ERP and PLM play important, distinct, and complementary roles. The integration of these solutions has increased and advanced as manufacturers' use of the systems has matured. Combined, ERP and PLM can provide greater value, closing the loop on product lifecycles and product innovation. After all, a major product innovation such as introducing a new product can't contribute any revenue if the enterprise can't execute on sourcing, manufacturing, and selling it effectively. PLM's role of innovation and ERP's role of execution are not only complementary – they are dependent on each other.

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As clear as the lines between ERP and PLM have become, innovation is not limited to Engineering. While major new product developments typically come from Engineering or R&D, Manufacturing and Service organizations frequently identify smaller innovations that can improve quality or reduce total lifecycle costs. These day-to-day innovations, such as minor part revisions to improve manufacturing efficiency or make products more robust, are frequently implemented in a disjointed way. For example, drawings may be manually marked on the shop floor or manufacturing bills of material (BOMs) may be changed in ERP independently from the engineering BOM. This leads to disconnects between Engineering and Manufacturing and prevents capturing the innovation for future products.

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An integrated ERP-PLM strategy, on the other hand, provides the opportunity for a rapid, confident flow of innovation to and from Manufacturing. In today's lean and competitive business environment, companies can't afford a disconnect. Manufacturers must develop a strategy to close the loop between Engineering and Manufacturing to get the most business value from innovation in all its forms.

What to Expect from ERP

Most manufacturers have learned what to expect from ERP. The integrated nature of ERP provides a single view into manufacturing, sales, sourcing, and financial activity. This centralized data helps companies plan effectively and make better business decisions. In particular, ERP has proven very valuable in helping manufacturers manage and control the complexities of business in today's global, fast-paced markets. ERP helps companies control cost, manage operations, and balance supply with demand to ensure they deliver on customer expectations, and do so in a profitable way. Most manufacturers today are using some form of ERP system to manage their business. In essence, ERP's role is executing the business of manufacturing (see Figure 1).

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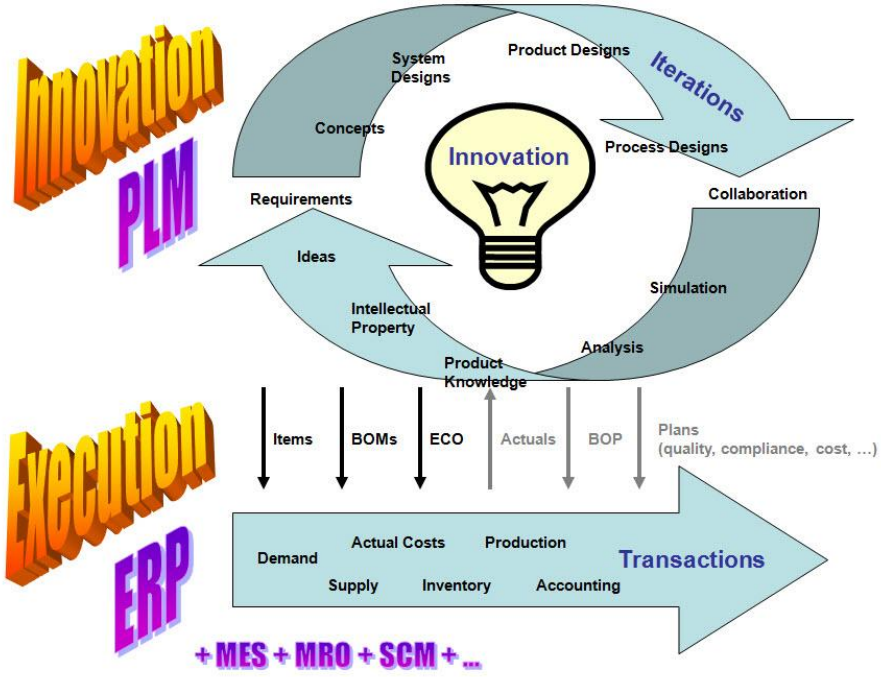

Figure 1: Manufacturing Systems Ecosystem

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What to Expect from PLM

PLM offers complementary, distinctly different value than ERP. As more companies are adopting PLM, it's important to understand what PLM can offer and how it fits with ERP. While ERP focuses on execution, PLM focuses on product innovation. PLM is designed to help manufacturers design, develop, and launch profitable products. The core capabilities of PLM include data management and engineering change control, but more advanced capabilities include configuration management, project management, design collaboration, and more. The most advanced PLM solutions also include strategic capabilities such as environmental product compliance, manufacturing process planning, and quality planning.

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Of course most manufacturers aren't able to implement all of these capabilities at once, but instead take a "PLM Program" approach to put in the basics and grow from there. As Tech-Clarity's "*The PLM Program - An Incremental Approach to the Strategic Value of PLM*" advises, however, manufacturers should be careful to select a solution and partner that they can grow with as they mature in their adoption of PLM.

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While ERP focuses primarily on control and cost management, PLM benefits include top-line drivers such as more innovative products and rapid new product introduction. Of course PLM also helps reduce product and product development costs, impacting both the top and the bottom line. Perhaps one of the most important benefits that PLM offers is fostering better communication and collaboration between Engineering, Manufacturing, Sourcing, Service, and other departments to improve product innovation and develop products right the first time. Integrating PLM with ERP helps strengthen and expand that cross-departmental cooperation.

Closing the Loop on Product Innovation

With that background on ERP and PLM and the individual roles they play, let's turn to the increased value they offer in a closed-loop, integrated manufacturing system. Today, companies are running lean in order to survive the economy. Product innovation slowed during the down period for many companies, and as Tech-Clarity's "*Innovating Through an Economic Downturn*" paper points out many companies shifted innovation focus to minor enhancements and cost reduction. But forward-thinking manufacturers recognized the need to focus on strategic innovation to take advantage of the recovery.

Now, as the early recovery is unfolding, manufacturers realize that speed and agility are the keys to taking advantage of new opportunities. Manufacturers who are able to rapidly respond to market demand and launch new products will fair much better in the recovery.

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As many found out during the down times, it was also very valuable to be able to introduce cost reductions and cosmetic enhancements to keep customers interested on an ongoing basis. The time to market for these changes includes the time to develop a new product or engineering change plus the time to release to manufacturing and scale up production. As cost improvement and quality efforts are put in place, getting those implemented in the plant and supply chain rapidly is a competitive advantage. Closing the loop means that lessons learned in manufacturing and service are fed back to engineers to design quality and cost improvements into products.

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Unfortunately, rapid introduction of continuous improvements is usually held back because companies lack confidence in their ability to implement the changes without major disruption, and are worried they will create bigger problems by introducing frequent changes that will get lost or poorly communicated. Companies can't afford to get changes wrong and are more likely to introduce them slowly, or batch together multiple changes. On the other hand, those manufacturers that have the confidence to respond to downstream feedback and rapidly introduce changes to manufacturing are at an advantage.

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A well controlled, integrated product lifecycle allows manufacturers to have the confidence to introduce more rapid product innovation of all sizes. It also helps lean organizations that can't afford the waste of inefficient release to manufacturing or poor change control which can result in wasted time and effort, but also BOM errors, building or buying to wrong revisions, and creating scrap and rework. A synchronized ERP and PLM environment helps build the required confidence as well as streamline processes for efficiency.

Developing the ERP-PLM Strategy

As manufacturers realize they need both ERP and PLM, it is important to address the solutions strategically. Companies must proactively identify the needs for product innovation and execution. They should focus on the needs of the business first, before technology needs. ERP and PLM strategies are too important to be technology-led decisions, and should be addressed in a process-centric approach.

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After requirements are identified, it is time to search for solutions. Manufacturers searching for ERP or PLM should take into account their general needs, as well as unique industry requirements. They should also recognize needs driven by their manufacturing model. For example, an engineer to order (ETO) company has different requirements for ERP and PLM than a make to order (MTO) business. Of course no software solution meets every possible need, so manufacturers should also look for solutions that provide the flexibility and tailorability needed to make the solution work for them.

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Recognizing that both ERP and PLM are critical to product profitability, manufacturers must be uncompromising on the needs of these two systems. The odds of finding a single ERP-PLM solution that meets ERP and PLM needs for their industry, their manufacturing model, and their business are very small. Most companies will need to adopt a best-of-breed strategy.

Once candidate ERP and PLM solutions are identified, manufacturers then need to consider integration. As Tech-Clarity's "*The Evolving Roles of ERP and PLM: Integrating the Roles of Execution and Innovation*" report reported, most manufacturers start small and then mature their integration over time. Event-driven integration including release to manufacturing and engineering change management processes are a good place to start. Further integration can provide visibility from shop floor to design information and 3D models, provide cost and supplier data back to Engineering, and then expand over time. Even more advanced integration includes bi-directional information flow and potentially composite applications where data from both systems is combined in workflows, dashboards, and portals. As system use and integration mature, some companies go beyond the basics of release to manufacturing and change control to include information like manufacturing processes (bill of process) and quality plans.

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The good news is that integration has gotten much easier from a technical perspective, and is now safe to consider as a lower priority selection criteria. Be aware that there are different integration approaches, look for one that meets your level of maturity in both processes and IT infrastructure. The key is to first find the best solutions for innovation and execution, and then look for integration. ERP and PLM vendors that have the right solutions for your business and have partnered to take on the role of integrating the solutions are likely a good option. These companies have proactively worked out the semantic differences and process flows between their solutions, and built technical infrastructure to assist manufacturers' efforts. They have typically also addressed capabilities such as closed loop transaction management and exception handling in their integration – features too commonly overlooked in custom integration efforts. Pre-integrated solutions can provide a significant boost to fulfilling the closed loop ERP-PLM strategy.

Conclusion

ERP and PLM offer distinct, unique value. Together, ERP and PLM offer even greater business value. Manufacturers today need to innovate rapidly, and execute confidently on innovations big and small. Closing the loop between innovation and execution helps drive more rapid time to market, reduce cost, and improve quality. Having the right PLM and ERP solutions to enable strong innovation and execution is crucial to product profitability. Integrating the solutions extends the value of each, giving manufacturers the ability to rapidly innovate and the confidence to speed that innovation to market where it can provide new business value.

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Recommendations

Based on industry experience and research for this report, Tech-Clarity offers the following recommendations to:

- Choose the right ERP and PLM solutions, making sure they meet your company, industry, and manufacturing model requirements.
- Close the loop on product innovation by integrating ERP and PLM.
- To enable product innovation and execution, look for (in order of priority):
  - Solutions that enable each of the functions.
  - Integration-capable ERP and PLM solutions, for example those that employ technology such as API, SOA, and XML.
  - Pre-integrated solutions where the vendors have worked out the semantics, data models, and workflows between the systems.

About the Author

Jim Brown is the President of Tech-Clarity, an independent research and consulting firm that specializes in analyzing the true business value of software technology and services. Jim has over 20 years of experience in software for the manufacturing industries, with a broad background including roles in industry, management consulting, the software industry, and research. His experience spans enterprise applications including PLM, ERP, quality management, service, manufacturing, and others. Jim is passionate about improving product innovation, product development, and engineering performance through the use of software technology and social computing techniques.

Jim is an experienced researcher, author, and public speaker and enjoys the opportunity to speak at conferences or anywhere that he can engage with people that are passionate about improving business performance through software technology.

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