

Science Lifecycle Management in the Enterprise Ecosystem

By : Jim Brown | President | Tech-Clarity

Complementary Roles: ScLM, PLM, ERP

ERP and PLM are the two primary systems used to enable manufacturing businesses. Tech-Clarity's research describes the roles ERP and PLM play and how they work alongside other enterprise systems. But the discussion has always stopped short of the lab and the value of R&D – developing and validating new materials, compounds, and processes that are the building blocks for product-level innovation.

The lab is involved in all phases of the product lifecycle. Now, visionary companies are taking a more holistic, integrated view of how science enables the enterprise. **An integrated ecosystem of solutions has emerged, Scientific Lifecycle Management (ScLM).** ScLM starts in early discovery with capabilities like high throughput science, molecular simulation, and lab notebooks and extends through product development, testing, and validation.

Leading companies are extending the advantage of ScLM by integrating it more broadly into their enterprise processes and systems including ERP and PLM. This eBook shares insights and experience from two companies that have started their ScLM journeys with visions toward fully integrated enterprise ecosystems that support the business of manufacturing, product innovation, and scientific exploration and discovery.



Frank Meyer | VP R&D | Unilever

“Connectivity between scientists and product developers should flow seamlessly, we want to connect the dots from science all the way to ERP.”



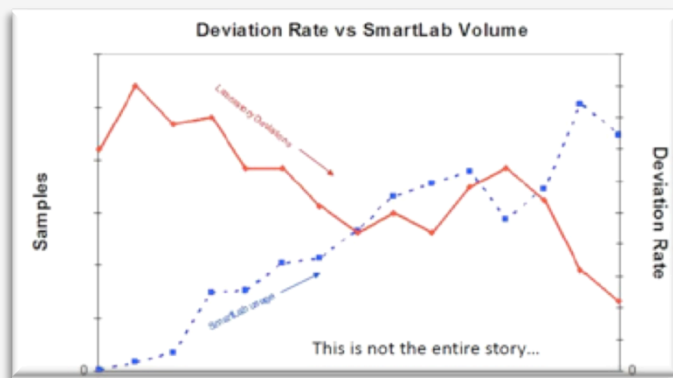
Paul McKenzie | VP Manufacturing & Technical Operations | Johnson & Johnson

“We need to manage our products and processes consistently across the whole lifecycle and enable this with systems that manage library content, execution, and visualization. Ideally it would start at first experiments in development and carry through day to day commercial manufacturing.”

The Business Value of ScLM

ScLM helps streamline and improve science-driven innovation processes and ensure that critical IP is captured and shared. For example, it helps support standard processes in the lab and provides integration to lab equipment in order to reduce non-value-added data entry, increase data reliability, and provide data for fast, efficient, low-risk audits.

As a case in point, **Eli Lilly** shared at a conference that they reduced deviations by a factor of ten (10X) by implementing ScLM functionality (see the chart from their presentation). Better control leads to fewer deviations, which in turn leads to higher productivity. As Johnson and Johnson VP Paul McKenzie says, *"We want a recipe-driven execution process where the computer guides scientists through processes to prevent mistakes and guarantee quality."*



ScLM does more than improve lab efficiency. It integrates R&D into the enterprise to support production scale up, provides scientific modeling and simulation, lab management, informatics, and operational intelligence related to scientific discovery and ongoing operations. It also provides critical support for enterprise quality and EH&S functions.

ScLM improves quality, efficiency, compliance, and scientific innovation. It integrates the lab and takes scientific operations into the mainstream of the enterprise so corporate scientific knowledge pays greater business dividends.

Beyond the lab, ScLM helps turn lab insights into actionable data that can be used to improve products and learn from past work. It brings scientific data out of the lab and makes it available for data mining. Further, it improves productivity and innovation by leveraging scientific data broadly for analytics and further simulation.

ScLM fills gaps in the scientific discovery and innovation process that PLM and ERP don't address. It effectively turns R&D and lab procedures into enterprise-class processes, and extends scientific data into a valuable enterprise asset.

The ScLM Vision



“Most companies have utilized ‘paper on glass,’ taking the same process they had on paper and executing it electronically. But the idea is to fundamentally change how scientists and engineers approach their work at the lab bench, to industrialize it and bring labs up to a new content and execution standard, and to share consistent information from development to manufacturing.”

Paul McKenzie | VP Manufacturing & Technical Operations | Johnson & Johnson



“We are building competitive capabilities. We went from paper to ELN, opening up the opportunity to harvest key data and use it for modeling and analytics, and then link it with our design processes.”

Frank Meyer | VP R&D | Unilever



Watch ScLM in the Enterprise on Tech-Clarity TV

The Business Value of PLM

PLM offers complementary, distinctly different value than ERP or ScLM. According to Tech-Clarity's The Integrated ERP-PLM Strategy, PLM is designed to help manufacturers design, develop, and launch profitable products.

PLM is proven to improve top and bottom-line business performance, improving revenue, reducing product cost, and decreasing product development cost.

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.

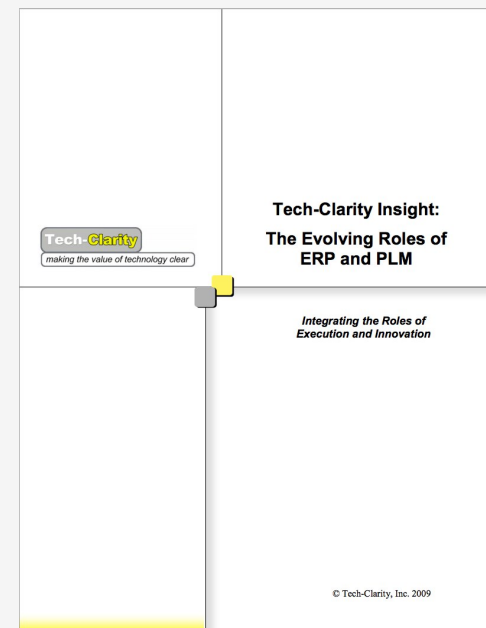


The Business Value of ERP

In essence, ERP's role is executing the business of manufacturing. Most manufacturers know 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.

ERP value comes primarily from streamlining processes and improving operational efficiency.

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 particular, ERP has proven very valuable in helping manufacturers manage and control the complexities of business in today's global, fast-paced markets.



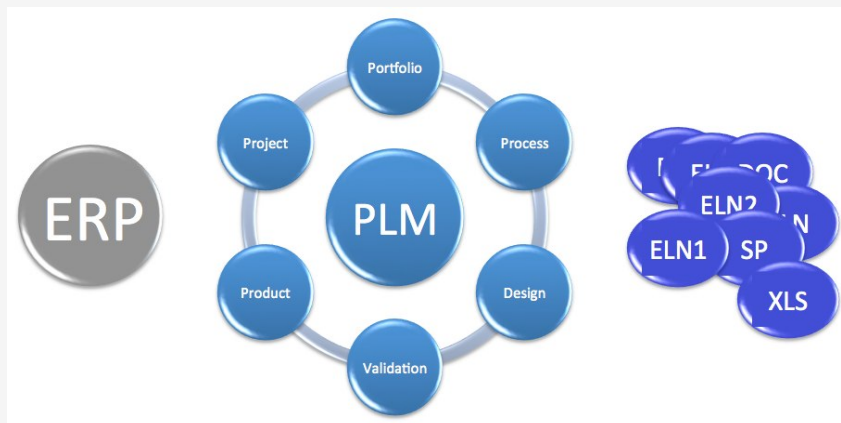
PLM plays the primary role in product innovation, product development, and engineering while ERP plays the primary role in planning and managing business execution.

The Evolving Roles of ERP and PLM

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The Current State of the Industry

Currently, most manufacturers have some form of ERP system implemented. Many have PLM, although adoption varies significantly by industry. Most have a variety of ScLM point solutions without significant levels of integration or standardization.



The current state of the industry offers a lot of room for improvement in both ScLM and integration across the product lifecycle. Frank Meyer of Unilever explains, “*We want consistency in the way scientists gather and capture information globally,*” but as J&J’s Paul McKenzie observes “*In many instances, the data captured on paper batch sheets are faxed and approaches aren’t consistent for something as simple as recording a temperature or logging chemical inventory.*”

Disjointed solutions and lack of integration leads to inefficiency, inability to reuse lab results, difficulty running analytics to find trends, and no mechanism to leverage scientific knowledge to become a “learning organization” that leverages its scientific know-how.

Few companies that have more integrated ScLM suites have integrated outside of the lab and into solutions like ERP and PLM. The opportunity to extend scientific information into the product lifecycle is a big opportunity for improvement. “*Our experiments should pay dividends multiple times instead of just once,*” says Unilever’s Meyer. “*We are reinventing the past way too often.*”

The Ideal Future State

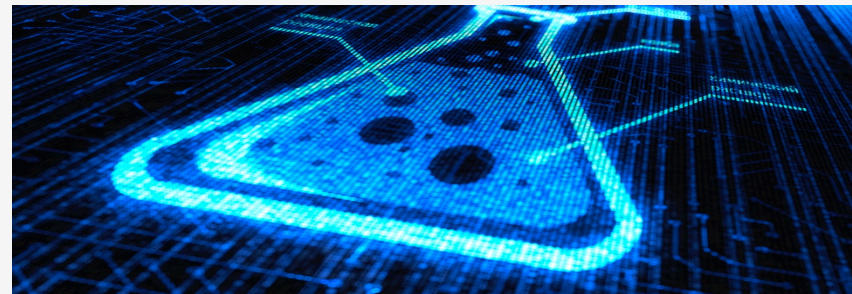
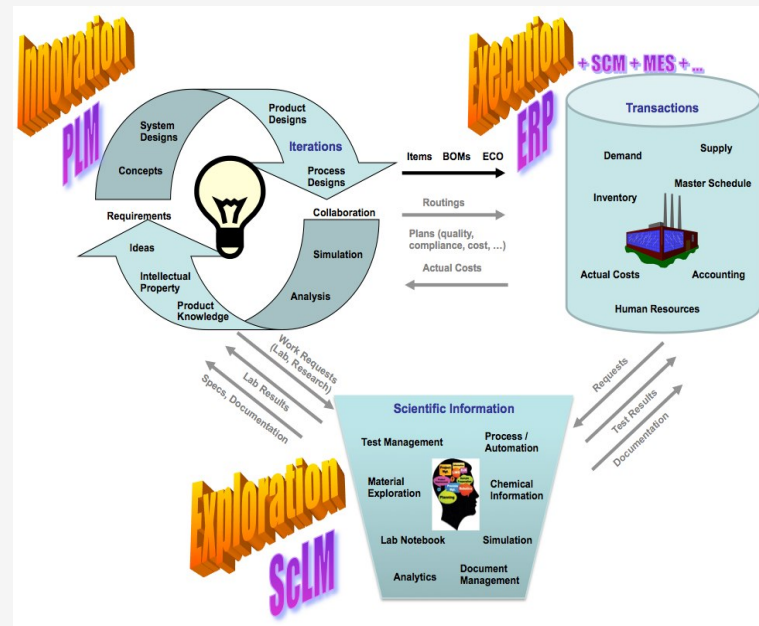
In an ideal scenario, each system plays its appropriate role in a holistic, connected ecosystem:

- **PLM** – Product innovation, product development, engineering
- **ScLM** – Scientific innovation, discovery, exploration, validation
- **ERP** – Manages the business of manufacturing

The future is an integrated ScLM suite connected with ERP and PLM.

In this ideal model, scientific innovation from R&D can easily be shared with product developers and product information is clearly linked to its underlying scientific knowledge. As Frank Meyer of Unilever explains, *“Our ambition is to take scientific data and knowledge and to use them throughout product development. A key challenge will be how do we connect the two worlds of science and product design systems.”* Linking ScLM and PLM is critical to solving this challenge.

An integrated enterprise system ecosystem supports integrated business scenarios, for example relaying a Marketing request for a product packaging change from PLM to ScLM for analysis, and uploading resulting data such as stability tests and revised packaging specs to PLM and/or ERP for production and compliance.



Conclusions and Recommendations



“One system doesn't need to own it all, but we need to use a common language for content, execution, and visualization.”

Paul McKenzie | VP Manufacturing & Technical Operations | Johnson & Johnson



“From an R&D point of view we are trying to manage data once. Whenever we create a data point in a scientific experiment that data will shape the products we bring to market. We want to capture it once and use it across applications, needs, and use cases.”

Frank Meyer | VP R&D | Unilever

ERP, PLM, ScLM are valuable solution suites on their own, playing complementary roles to enable high performance manufacturing, product innovation, and scientific exploration and discovery. Currently, most manufacturers have ERP and some have PLM, but most are running a hodgepodge of ScLM tools.

Forward-thinking companies, however, are looking to integrate ScLM in order to tie together product and scientific lifecycles.

Recommendations

- Leverage ERP, PLM, and ScLM for their respective values
- Replace / connect lab and R&D point tools to create an integrated ScLM suite
- Improve business value by integrating ScLM with PLM and ERP to share scientific knowledge more broadly and bring the science lifecycle in context with the overall product lifecycle



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About the Author

Jim Brown is the President of Tech-Clarity, an independent research and consulting firm that specializes in analyzing the business value of software technology and services. Jim has over 20 years of experience in software for the manufacturing industries. He has a broad background including roles in industry, management consulting, the software industry, and research.

Jim's experience spans enterprise applications including PLM, ERP, quality management, service lifecycle management, manufacturing, supply chain management, and more. Jim is passionate about improving product innovation, product development, and engineering performance through the use of software technology.

Jim is an experienced researcher, author, and public speaker and enjoys the opportunity to speak at conferences or anywhere he can engage with people with a passion to improve business performance through software technology.