



**Issue in Focus:
Integrating Cloud PLM**

***Considerations for Systems
Integration in the Cloud***



Table of Contents

Introducing the Issue	3
Start with the Business in Mind	4
Choose a Problem to Solve.....	4
Identify the Roles PLM and other Systems Play	5
Determine how PLM and other Systems will Interact.....	6
Understand the Evolution of Cloud Integration.....	7
Get Started	8
Address IT Considerations	8
Conclusion.....	9
Recommendations	10
About the Author	11



Introducing the Issue

Manufacturers today face increased expectations for rapid innovation while battling unprecedented product development complexity. This has driven a lot of interest in Product Lifecycle Management (PLM), including cloud-based PLM. Like more established cloud Customer Relationship Management (CRM) and supply chain offerings, cloud PLM is generating a lot of discussion. Why? The promise that the business benefits of PLM – increased revenue, decreased product cost, and reduced product development cost – can be achieved with lower investment. Tech-Clarity’s [Assessing the Cloud PLM Opportunity](#) explains that the cloud offers the potential to significantly improve PLM value by:

- Leveraging economies of scale
- Eliminating non-value added work
- Taking advantage of cloud level systems performance
- Enhancing flexibility and agility while reducing business risk

Now that Cloud PLM discussions are more prevalent, it’s time to address real-world issues about operating PLM in the cloud. One area that manufacturers frequently ask about is integration. People ask, “What happens when I want to integrate to the cloud PLM system?” and “How will I get data to and from PLM?” But some of the most challenging questions about integrating cloud PLM are still the basic business questions about integration addressed in papers such as [The Evolving Roles of ERP and PLM](#) and [Integrating PLM and MES](#), among others. These include:

- What should I integrate with PLM?
- Which solutions are responsible for which data?
- What level of integration do I need? Data only? Process? Bi-directional?

These are important questions to answer, but there are some new questions as well:

- Can I integrate cloud applications to the ones behind my firewall?
- What new integration considerations do cloud applications bring?
- Can I take advantage of cloud business benefits in integration?

Others have addressed integration in the cloud, paving the path for PLM.

For those that have experienced challenging integration projects in the past, don’t be afraid to read on. Integration projects of the past don’t necessarily reflect what will happen now. Today’s solutions are easier and more affordable to integrate. In fact, business people and engineers can play a much more active role in integration than ever before, although it’s always important to keep IT in the loop. This paper provides insight into integration questions to help companies evaluate the cloud computing opportunity in PLM. As in other aspects of cloud, the good news is that others have addressed integration in the cloud, paving the path for PLM.



Start with the Business in Mind

Before we get into any of the mechanics of integration, let's talk business. There are many good reasons to integrate PLM with other systems, but integration isn't something that should be done for the sake of integration. The typical business goals of PLM integration range from tactical to highly strategic:

- Eliminate dual data entry to improve efficiency and data quality
- Synchronize and share product data across the business and the supply chain
- Provide accurate, timely product information to help people make better decisions
- Close the loop between product development and the rest of the product lifecycle

The results can range from tangible time and cost savings to something more strategic like providing manufacturing and service feedback to engineers. Whatever the goal, it's important to start with an understanding of the desired value and then focus on the process and data flow required to enable it. Technology is critical to integrate successfully, but the effort should start with people that understand business processes and how they can be improved.

Technology is critical to integrate successfully, but the effort should start with people that understand business processes.

Choose a Problem to Solve

There are some points of integration that are more common than others. One of the more common objectives companies seek is improving product release to manufacturing. ERP, MES, and other applications need the most up to date bills of material (BOMs), specifications, and manufacturing instructions to plan, support, and execute production. This engineering information is critical to operational success and should be passed into operational systems. This promotes speed to market, reduces rekeying errors, ensures synchronization and accuracy of data ("one version of the truth"), and prevents mistakes that lead to costly rework, delays, and scrap.

A critical success factor is providing designers with the right information from around the enterprise during product development.

Another business objective addressed through integration is "design for enterprise." This includes designing products for optimal cost, compliance, risk, manufacturability, service, and more. A critical success factor is providing designers with the right information from around the enterprise during product development. For example part specifications and supply chain data from sourcing systems can help engineers make better decisions. When they are specifying a component, for example, they might have to

choose between several parts with relatively equivalent performance. If they can view real costs, inventory, usage, obsolescence forecasts, supplier locations, and quality data they can choose a part that is optimized for supply as well as performance.

There are countless opportunities for engineers to access enterprise data to make better design decisions and for product developers to share information to help downstream departments.

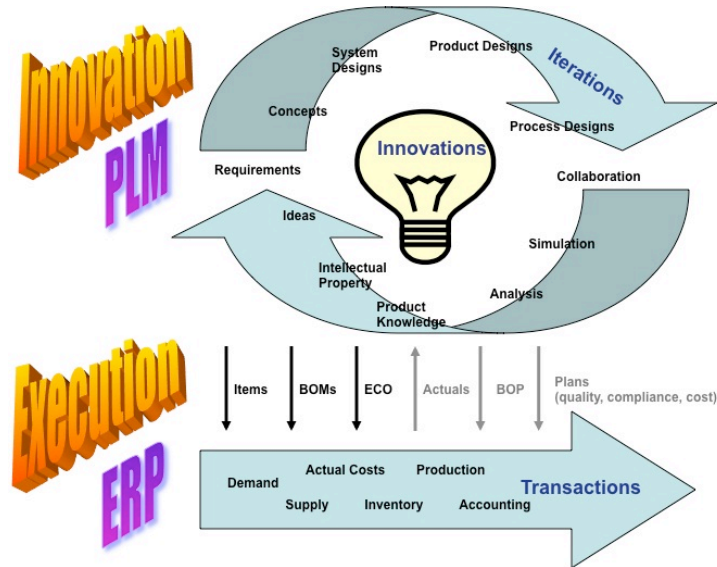
Manufacturers are also trying incorporate more “voice of the customer” in their product development processes. Integrating call center and complaint data from enterprise CRM offers a good potential source to get real-world feedback to designers. Companies may also choose to integrate with service-oriented systems like Maintenance, Repair and Overhaul (MRO) or Service Lifecycle Management (SLM). Or, if quality is a high priority they may choose to integrate defect information into PLM from a Quality Lifecycle Management (QLM) system. These are just a few examples of the ways manufacturers can integrate PLM with their other systems. There are countless opportunities for engineers to access enterprise data to make better design decisions and for product developers to share information to help downstream departments. By starting with business improvement in mind, integration will provide the most value.

Identify the Roles PLM and other Systems Play

One important aspect of an integration strategy is defining the roles that each system will play to support the business. Enterprise systems help orchestrate and enable business processes that frequently cross the boundaries of multiple systems. When this happens, it’s critically important to define the part each system will play, with particular emphasis on what system creates, maintains, and accesses which data.

Tech-Clarity provides insights on how PLM fits in context with ERP, Manufacturing Execution Systems (MES), SLM/MRO, QLM, and other applications in reports including [The Integrated ERP-PLM Strategy](#). Role definitions should be based on business processes and data flow, not systems architecture. Because of that, the roles of ERP, PLM, and other applications in the enterprise systems ecosystem don’t really change in the cloud (Figure 1). In general:

- PLM helps companies innovate and develop products, serving as the master for product and process definitions and data (Innovation)
- ERP puts the product definition into operation and reports results (Transactions)
- MES, SLM, and others execute the daily business operations of the manufacturer
- CRM helps manage customer relationships and related interactions



Graphic 1: Tech-Clarity ERP-PLM Integration Framework

Determine how PLM and other Systems will Interact

Another important decision in the integration strategy is defining the integration approach. It's important to evaluate different technical integration approaches by first looking at them from a business process and user experience perspective. The most common integration is typically data transfer. The goal here is typically synchronized data so everyone is acting on the same information. This could start with something as straight forward as an exported spreadsheet with a manual process with import tools to accept data into the PLM system from a browser. It could also be a more automated approach such as publishing data from PLM to ERP or CRM. Or, it might include bi-directional integration, such as providing PLM with actual production results from ERP or actual sales data from CRM.

It's important to evaluate different technical integration approaches by first looking at them from a business process and user experience perspective.

A second common integration approach is providing visibility to information in another system without actually moving it. For example, integration could show 3D information in a downstream system without requiring a user in manufacturing to learn to use a CAD or PLM system. Or, it might show current part data such as demand levels, inventory, production schedules, or other enterprise data in the PLM system. As one of the recommendations from Evolving Roles of ERP and PLM suggests, "*Blur the lines between ERP and PLM ... to give users the information they need when they need it, regardless of which system owns it.*"



A third level of integration maturity (and complexity) adds process integration and cross-application workflow. This approach includes synchronizing processes and data across systems and can help enable closed-loop processes. For example, an engineer might take quality results data from MES to compare to design tolerances in PLM and create new test requirements to be passed into QLM. In turn, revised test procedures may need to be sent from QLM to PLM and MES systems.

Integration is becoming much more accessible.

Each of these approaches has merit for different situations and brings different technical requirements. As one might expect, the complexity gets greater as more systems are involved and the integration requires more data and process synchronization. So while it's important to start with business needs first and then determine how best to support them, it is also very important to involve technical resources. Integration, however, is becoming much more accessible. As [The Integrated ERP-PLM Strategy](#) explains, "*The good news is that integration has gotten much easier from a technical perspective.*" This reduced integration effort might lower the threshold on integration that was more difficult in older systems and promote more depth and complexity of integration.

Understand the Evolution of Cloud Integration

While the discussion so far has been primarily oriented around the functional side of integration, even business process experts or users have questions about integrating in the cloud. The main question most people ask is whether they can integrate a cloud PLM into other systems, particularly those that are locally installed. Of course the answer is yes, or cloud applications wouldn't be feasible. In fact, the companies that usually don't ask this question are the ones that have already integrated a cloud system like CRM with an ERP system behind the firewall.

It is now common to integrate cloud solutions, hosted solutions, and traditional on-site solutions together.

Once again, earlier cloud solutions have paved the way for PLM. It is now common to integrate cloud solutions, hosted solutions, and traditional on-site solutions together. The integration tools industry is evolving to support this. Existing vendors are updating their capabilities and a whole new class of cloud-based integration suppliers emerging. In fact, these cloud-based integration companies offer some of the same benefits (lower TCO, ease of access, ease of use, economies of scale, less reliance on IT, time to value, etc.) that bring companies to the cloud in the first place. These solutions are mature, robust and in use on an enterprise scale today and are ready to address the PLM integration opportunity.

Get Started

With that background, it's time to get started and take advantage of the agility that cloud solutions can provide. For those that have embarked on cloud PLM, it's time to learn about your data and explore the possibilities that integration can offer. A modern integration framework can help business people, power users, and process owners feel confident that they can make significant progress on integration even without formal IT involvement. Today's advanced systems and integration tools can make it much easier with plain language, point-and-click, and drag and drop mapping of properties to target fields. Many users can even grasp the fundamentals of triggers, rules, and calculations if they can handle things like macros and pivot tables in spreadsheets. Start slowly, select state-of-the-art integration tools, do some investigation on your own, and build confidence.

Start slowly, select state-of-the-art integration tools, do some investigation on your own, and build confidence.

Having said that, it is still a good idea to involve IT to ensure data models are properly understood and make integration industrial strength. If you don't have experience with databases and business systems, you may be surprised by some of the data you find. For example, it can be a little daunting when you discover how many "cost" fields your ERP system really has, or how it stores multi-currency data. It might be a good idea to get an IT "coach" in the beginning of the process to help make sense of complex enterprise data models.

Beyond integrating on your own, as Tech-Clarity's past reports suggest, there is a lot of value in looking for someone who has already done the integration work for you. It's likely that someone has already integrated the most common systems you want to integrate. This work may be a template or a standard integration offering from your vendor. If available, these can be a big help. As [Evolving Roles of ERP & PLM](#) points out, there is a lot of value in "*Pre-integrated solutions where the vendors have worked out the semantics, data models, and workflows between the systems.*"

Address IT Considerations

Now that we have discussed the value of having business and power users involved in integration, it's time to recognize the need for experienced IT support. In many ways integrating cloud solutions is much easier than traditional systems. In the past, simply connecting systems used to be a big challenge. Now, cloud-based PLM and integration technologies make mapping and connecting modern systems much easier. Many are built on web services internally, so they are much more likely to have well structured APIs that can be simply exposed to external services.

Although power users can do a lot more with integration, it's still critical to make sure you understand the meaning and assumptions behind the data model and think through the integration. In order to get the anticipated results, it's important to understand the validation rules and database constructs that have to be respected in integration, although well-constructed APIs should help handle those. Then, cloud integration tools are available to help map, validate, and transform data and create audit logs of the process.

Beyond understanding the data, it's important for IT to make integration industrial strength.

Beyond understanding the data, it's important for IT to make integration industrial strength. Improper integration can cause performance problems, corrupt data, or fail to correct itself when an unexpected situation like a network failure occurs during a transaction. IT may also be able to identify business impacts of integration such as impact on licensing, or might understand where they can reuse existing integration routines or technologies.

Hard-coded integration quickly becomes ineffective and expensive because cloud applications are upgraded more continuously.

One final consideration has to do with the release frequency of cloud solutions. Although easier to integrate, cloud solutions demand more flexible, agile integration approaches because cloud applications are much more dynamic. Cloud offerings are usually upgraded frequently, adding new features and capabilities on a monthly or quarterly basis. Hard-coded integration quickly becomes ineffective and expensive because cloud applications are upgraded more continuously. Using published APIs can help ensure that changes can be absorbed properly. In addition, it's worth investigating the way that cloud integration vendors monitor and update their solutions based on expected changes to the cloud applications they support.

Conclusion

Cloud PLM is compelling because it offers the opportunity for manufacturers to achieve the strategic business benefits of PLM faster and with lower total cost of ownership (TCO). Companies investigating how these systems will work in their existing IT infrastructure are now asking about integration. The good news is that integrating cloud solutions is proven in other applications like CRM, and integration solutions are evolving to support connecting cloud systems with hosted and traditional, onsite systems. Integrating cloud PLM with other cloud solutions or on-premise is achievable, and integration solutions are ready and available.

The first step in integrating PLM is defining business goals and needs. Then, power users or process owners can explore and get started defining information flow and learning about data structures. The business needs should then drive integration requirements and help determine which techniques and levels of maturity of integration are required. Integration approaches range from simple data transfers to more involved, bi-directional synchronization of data and business processes. Again, the choice between these approaches should be led by business needs. A qualified partner should have the experience and skills necessary to coach manufacturers through these decisions.

Today's modern applications and integration tools make integration much easier than in the past, and users can play a more significant role.

Today's modern applications and integration tools make integration much easier than in the past, allowing users can play a more significant role in the process. But IT needs to be involved to ensure the solution is industrial strength and evaluate impacts on issues like licensing. They should also validate and coach business people on data structures, validation rules, and other technical requirements. In many ways it's easier to integrate cloud applications, but it's important to consider how dynamic cloud solutions are when developing an innovation strategy. For example, it's best to avoid hard-coded approaches that will break or consider using a cloud integration vendor that helps monitor and absorb application changes.

Recommendations

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

- Identify opportunities to improve business by sharing information
- Share accurate information up and down the product lifecycle, closing the loop between product developers and the rest of the business
- Understand the roles of systems to be integrated from a business and information flow perspective
- Leverage today's modern, cloud-enabled integration platforms to reduce integration effort and risk
- Take advantage of partners with technical and functional expertise in PLM integration
- Don't be afraid to get started. Start slow, build confidence
- Look for templates or pre-integrated solutions where available
- Have an IT coach, trust them to select the right integration approach and make it industrial strength

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.

Jim can be reached at jim.brown@tech-clarity.com. You can follow Jim on Twitter at [@jim_techclarity](https://twitter.com/jim_techclarity), read additional research and Jim's blog at www.tech-clarity.com, or find Tech-Clarity on Facebook as TechClarity.inc.