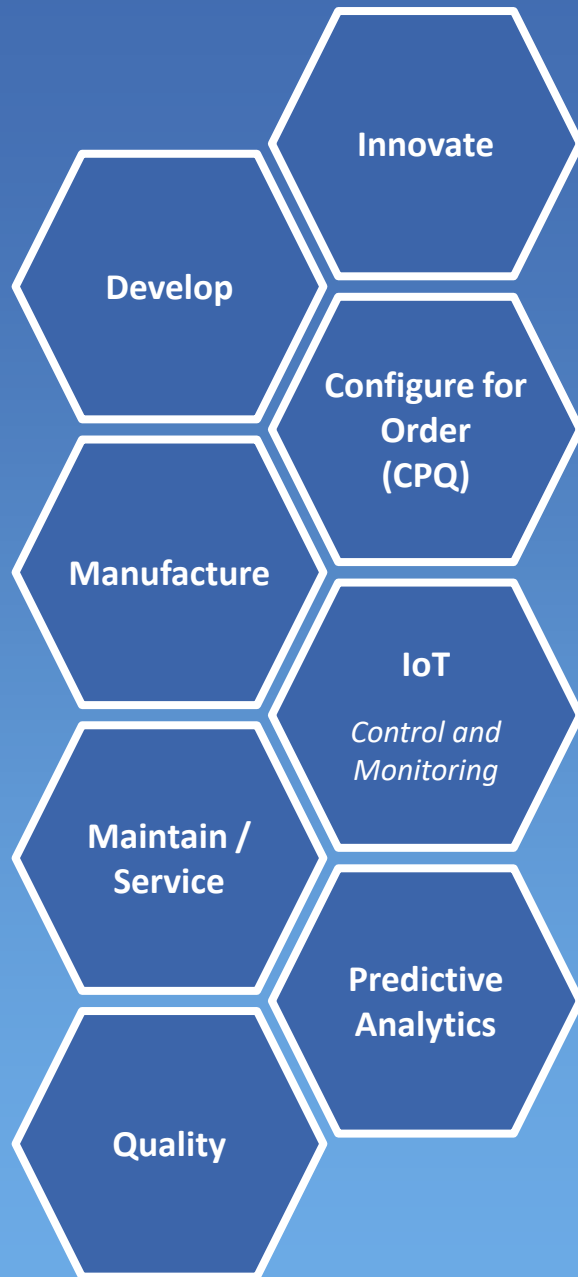


Making the Connection: The Path to Cloud PLM

Growth and adoption of cloud PLM services in the manufacturing industry



Graphic courtesy of Oracle

The Cloud Wave

Cloud services have swept across the landscape, fundamentally changing the market in several domains, and PLM is poised to be next

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Rapid Growth

The market for public cloud computing services is estimated to exceed US\$125B in revenue for CY 2017, representing more than 500% growth from 2011.¹

The adoption of cloud services has spread from industry to industry as companies recognize the advantages that cloud services can offer when compared to traditional on-premise solutions. From customer relationship management (CRM) to human capital management (HCM) and financial technology (FinTech), cloud service adoption has grown rapidly in multiple domains.

New Entrants and Familiar Names

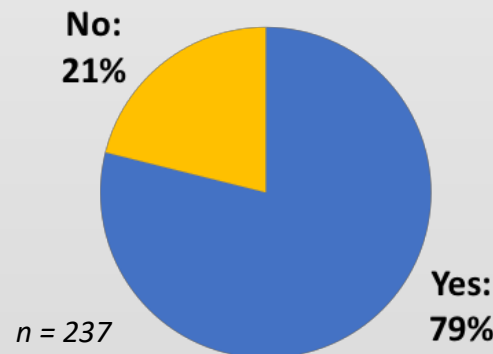
In some cases, cloud services have been introduced by startups seeking to disrupt the market by capitalizing on market niches. Increasingly, however, growth in the cloud services market is coming from established solution providers bringing the benefits of the cloud to enterprise markets.

PLM and the Cloud

Compared to some other markets, the adoption of PLM in the cloud has moved at a more measured pace. In March and April 2017, CIMdata conducted a survey of current and prospective cloud PLM customers, and data from this study shows that companies are open to cloud PLM:

- 73% of respondents indicated interest in cloud-based PLM
- 79% of respondents indicated that their companies have already deployed enterprise applications in the cloud (most commonly CRM and ERP)

Companies Using Enterprise Cloud Solutions Today



Growth of Cloud in the Enterprise

Companies are increasingly adopting the cloud for mission-critical applications. An example is Enterprise Resource Planning (ERP) systems, which contain some of the most sensitive information businesses possess. As a result, customers have demanding requirements for ERP system availability, security, and integration capabilities. Despite these demands, customer interest in cloud ERP has continued to grow, driven by cost advantages and simplified management of the cloud model.

More recently, that interest has translated into rapid growth. A number of cloud ERP providers, including Epicor, Infor, Oracle, and Plex Systems, now serve multiple industry verticals. Some of these providers extend their cloud ERP offerings with additional enterprise capabilities including Customer Relationship Management (CRM) and Human Capital Management (HCM).



The Many Flavors of Cloud

Understanding options is important to identify the right cloud deployment model to fit individual customer needs

Defining the Cloud

Cloud services can be characterized across multiple dimensions:

- Service models
- Architecture models
- Deployment models
- Pricing models

Service Models

The US National Institute of Standards and Technology (NIST) defines three cloud service models:²

- Software as a Service (SaaS) delivers turnkey applications
- Platform as a Service (PaaS) provides hardware and software services on which applications can be developed and delivered
- Infrastructure as a Service (IaaS) delivers hardware computing capabilities, often with a virtualization layer

Architecture Models

With **single-tenant** solutions, each customer instance is logically and physically separated. In **multi-tenant** solutions, multiple customers share a single instance with logical separation of data for security.

Deployment Models

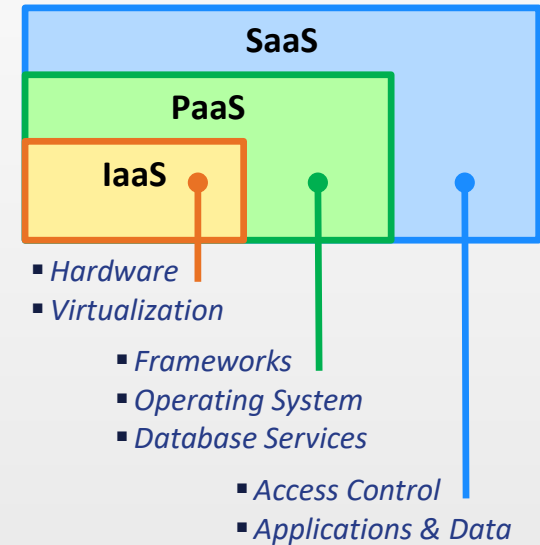
NIST also defines four deployment models:

- Private clouds provide dedicated resources with perimeter security for a single organization
- Community clouds are similar to private clouds, but serve multiple organizations
- Hybrid clouds distribute data and processes between private and public clouds
- Public clouds provide shared resources with managed access via the public internet

Flexible Pricing Models

Flexible pricing models are common for cloud services. These models include metered usage ("pay as you use"), term subscriptions of varying lengths, or project-based pricing. More attractive pricing is sometimes available for fixed long-term commitments.

One common theme is avoidance of capital expenditures at the beginning of a project to acquire hardware and software.



PLM in the Cloud

When delivered using the SaaS model, cloud PLM applications commonly use multi-tenant architectures to take advantage of economies of scale, however single-tenant architectures are also used.

Some cloud PLM providers focus exclusively on one deployment model, while others offer options for private/community, hybrid, and public deployment.

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Drivers of Cloud Adoption

Growth in cloud services is underpinned by significant economic and operational advantages for customers

Foundational Advantages of the Cloud

The continued growth in cloud services is the clearest indicator of the attractiveness of the cloud model. The mix of benefits varies by application, but frequently includes:

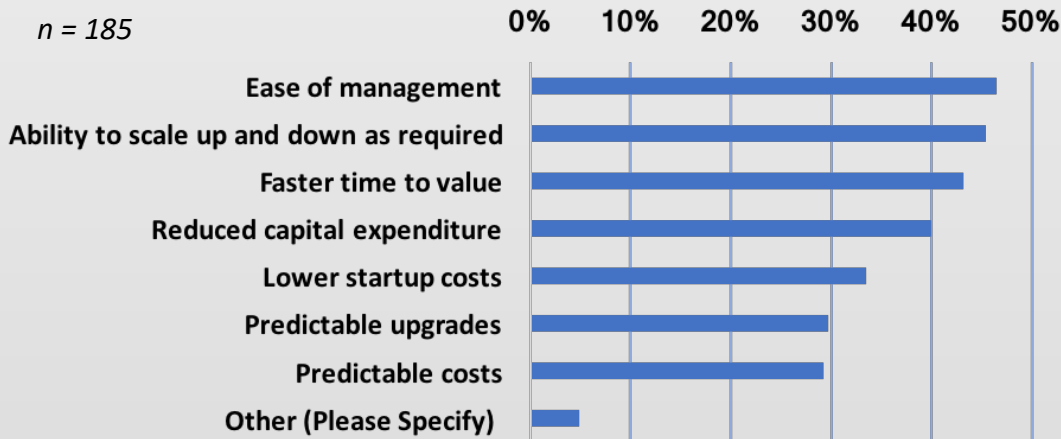
- Lower startup costs and reduced capital expenditures with flexible “pay as you go” pricing models
- Faster implementation and ongoing updates
- Rapid scalability
- Reduced management effort
- Simple and robust enterprise integrations
- Accessibility for remote workers and mobile devices
- Flexible collaboration across the extended enterprise

Why Customers are Interested in the Cloud

The CIMdata Cloud PLM study was conducted in partnership with Oracle and other solution providers. This study found that customers are very interested in the convenience and economic advantages of the cloud. The top four benefits (respondents could select multiple answers) that customers hope to achieve from cloud-based PLM are:

- Ease of management (46%)
- Ability to scale up and down as required (45%)
- Faster time to value (43%)
- Reduced capital expenditure (40%)

Cloud Benefits



“Other” benefits included *supplier integration, pervasive access, and reduced time and effort to upgrade*

Faster Time-To-Value

Williams Comfort Products is a nationwide leader for quality heating, ventilation, and air conditioning (HVAC) products in the United States. The company recently adopted Oracle CPQ Cloud to optimize the process of creating proposals for customer opportunities. According to Jerry Miller, a Vice President at Williams Comfort Product, “We completed the startup-to-rollout process of Oracle CPQ Cloud in only four months.”

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The Innovation Imperative

Innovation has always been important, but today innovation involves extended enterprise collaboration—something the cloud inherently supports

Disrupt to Survive

In his classic 1997 book *The Innovator's Dilemma*, Clayton Christensen described how the need to sustain business success in the face of technology changes can, if not managed deliberately, undermine the long-term outlook for an organization.³

Today, the need for innovation is even greater than it was two decades ago. A 2014 report from McKinsey documented the decreasing tenure for companies within the S&P 500 stock index—and that a prime driver for the disappearance of these companies is the failure to innovate continuously.⁴

Total Innovation

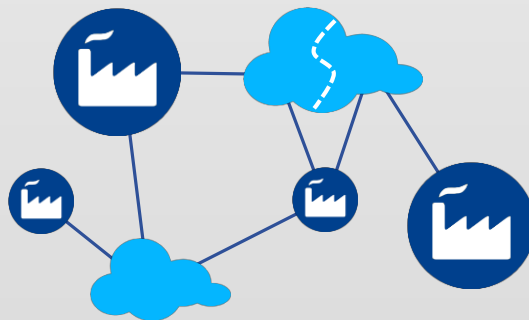
CIMdata has worked with industrial customers for more than thirty years, with much of this effort focused on effective strategies for and implementation of PLM to enable innovation. One lesson is clear above all others—innovation is not merely the domain of engineering or R&D.

Continuous innovation requires engaging the extended enterprise, including external partners in addition to multiple functional areas within the enterprise. Cloud services are built for just this kind of extra-enterprise collaboration and innovation.

Global Innovation

The high tech electronics industry is highly competitive, with constant technology innovation and complex global supply chains. Companies in this industry must work closely with global suppliers to manage product definition throughout the lifecycle. One such company is Dell, a major provider of computers and related products to a variety of markets.

According to Glenn Neland, VP of Worldwide Procurement at Dell, “Oracle enterprise PLM’s rich, collaborative, product content-based process management has improved communication with our internal divisions and supplier network, by ensuring that all product content information is centrally aggregated in a single global system and that all product changes are instantly disseminated and tracked across the global supply chain.”



A cloud PLM platform can provide an accessible and secure way for companies and their business partners to collaborate and innovate

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The majority of PLM implementations today are traditional on-premise solutions focused on managing engineering data

Shadows of Past Decisions

Most PLM applications in use today grew from efforts to manage change processes and engineering data revisions, starting in the 1980s and with steady growth over the following two decades. Inevitably, these implementations relied on client-server architectures, reflecting prevailing practice at the time.

Early PLM systems focused on the needs of product data management (PDM) for discrete manufacturing. Since then, solution providers have expanded PLM capabilities into other product related areas such as quality systems, sourcing, project and portfolio management, analytics, and aftersales service. Providers have also added support for process and hybrid manufacturing. Despite these advances, PLM is still often associated with its PDM roots.

This has led the vast majority of existing PLM implementations to be on-premise, based upon traditional client-server architectures.

Patching the Foundation

As customers have extended their PLM implementations beyond PDM, they have run into the need to adapt these applications to integrate with other enterprise systems and to fit company-specific needs. This has in turn led to significant development effort to customize systems and create client-specific integrations.

While customers clearly see value in these customizations—they wouldn't invest in them otherwise—there are implications.

Each upgrade, whether to a PLM application, or to an enterprise system, requires revisiting connections to other enterprise processes and systems and then rigorous testing prior to deployment. When issues occur, more investment is needed before the upgrade can be released. The time and investment needed to maintain systems can be considerable and can take away from efforts to innovate and deploy new capabilities.

Sustainable PLM in the Cloud

The cloud provides a more sustainable model for PLM. Compared to on-premise solutions, PLM in the cloud simplifies the upgrade process so that a customer can focus on business processes and depend on the solution provider to deliver functionality. With SaaS cloud PLM, the provider is typically responsible for hardware, upgrades, maintenance, patches, backup, and recovery.

Customer control over the timing of upgrades can vary depending upon the deployment model. With a private cloud, the customer is typically involved in determining the schedule for upgrades. By contrast, upgrades to multi-tenant public cloud deployments are scheduled by the provider.

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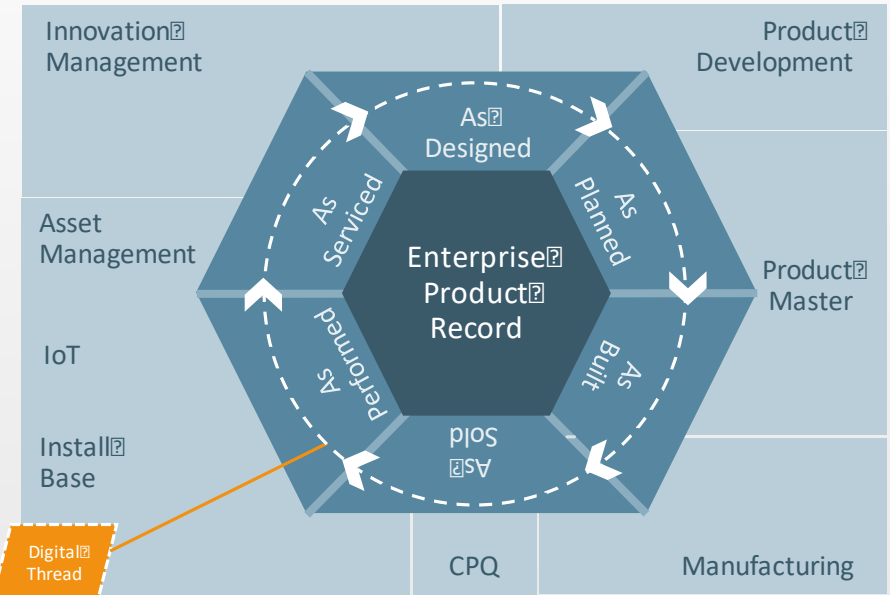
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Cloud PLM represents a fundamental shift in architecture and creates new opportunities for collaboration and integration

Integration and Innovation

The primary means of integration for cloud PLM is through web services, typically using RESTful APIs (REST is an industry standard for web services). Abstracting integrations through stable API calls simplifies integration development and reduces the effort required to upgrade systems.

With cloud PLM, the time and investment that otherwise would have gone into basic integrations and maintaining systems can instead be invested into enabling new organizational capabilities and efficiencies.



Graphic courtesy of Oracle

PLM and the Connected Enterprise

Next generation manufacturing initiatives are the driving force behind Industry 4.0 or Digital Manufacturing. Forward-thinking companies view the availability of new technologies such as the Internet of Things (IoT) and predictive analytics as the means to revolutionize their supply chain and manufacturing processes with a “digital thread” which both connects and transfers Enterprise Product Record data across the product lifecycle.

The speed of market growth, product variations, and product and supply chain complexity make product-data transfer over a disparate network of supply chain and manufacturing processes unsustainable. Cloud-based PLM enables the ability to federate data and integrate processes to support extended inter-connected business requirements. With data integration, collaboration, knowledge transfer and predictive analytics across the entire product lifecycle from the initial idea through to design, engineering, manufacturing, delivery, service and quality, companies are enabled to make faster, well informed decisions using data from across processes to maximize value, competitiveness, and drive Digital Transformation initiatives.

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Cloud Objections and Obstacles

Although cloud PLM offers a number of advantages, there are real and perceived issues that may slow adoption by some customers

What's Holding Back Cloud PLM

Not surprisingly, the issue of security risks ranked high among the factors that respondents selected as concerns with cloud PLM—it was the second-highest ranked factor.

The other top risks centered on the ability of cloud PLM to meet the specific integration, capability, and performance needs of each organization. Overall, the top four concerns (respondents could select multiple answers) were:

- Integrating cloud PLM with enterprise systems (45%)
- Security risks (43%)
- Inability to customize to our specific needs (32%)
- Lack of confidence in performance (27%)

In summary, customers are looking for secure, scalable, and configurable systems that integrate readily with other enterprise systems.

Addressing Concerns

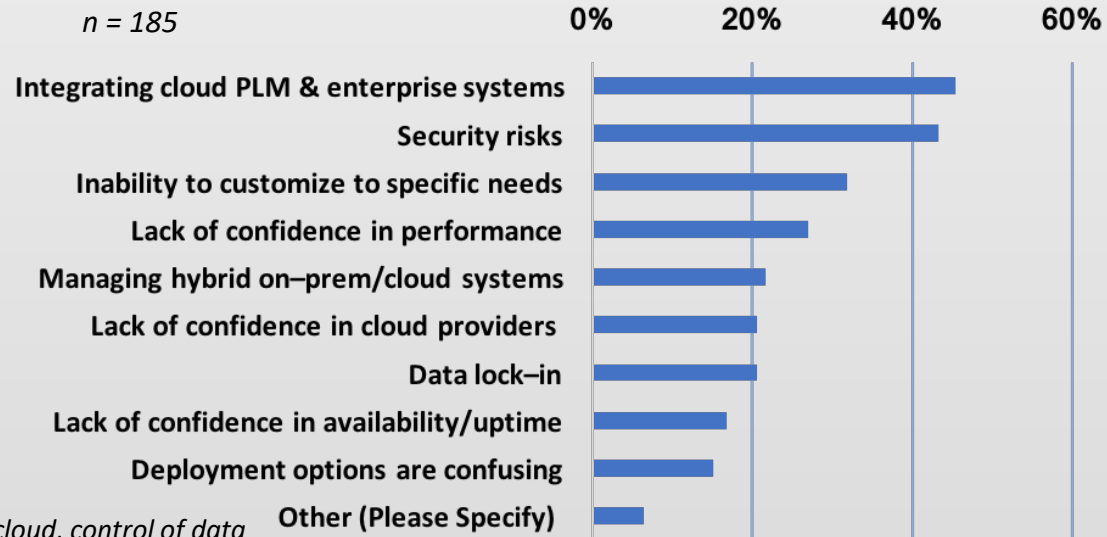
Pre-built and configurable enterprise integrations are already available for many cloud PLM applications, plus solution providers and their partners are continually adding new integration capabilities.

Security is not a simple cloud-or-no-cloud question. Securing a cloud PLM system requires a layered security model and partnering with a provider that maintains industry-recognized security certifications.

Cloud PLM can also improve security by eliminating the need for insecure “shadow IT” practices commonly used for sharing data externally.

Customization (or configuration) and performance concerns can be directly addressed using well-defined requirements, proof of concept projects, and simulated system loading tests.

Cloud Concerns



“Other” concerns included *IP in the cloud*, *control of data in the cloud*, and *bandwidth limitations with CAD file sizes*

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The question is not *if* the cloud will be part of your future PLM strategy, but instead *how* the cloud will fit into that strategy

Different Paths to the Cloud

Adopting cloud PLM doesn't necessarily mean replacing an existing PLM implementation all at once. There are multiple paths to the cloud—the key is to identify the best path for your company. For a company without a legacy PLM system, it may make sense to start in the cloud.

Augment

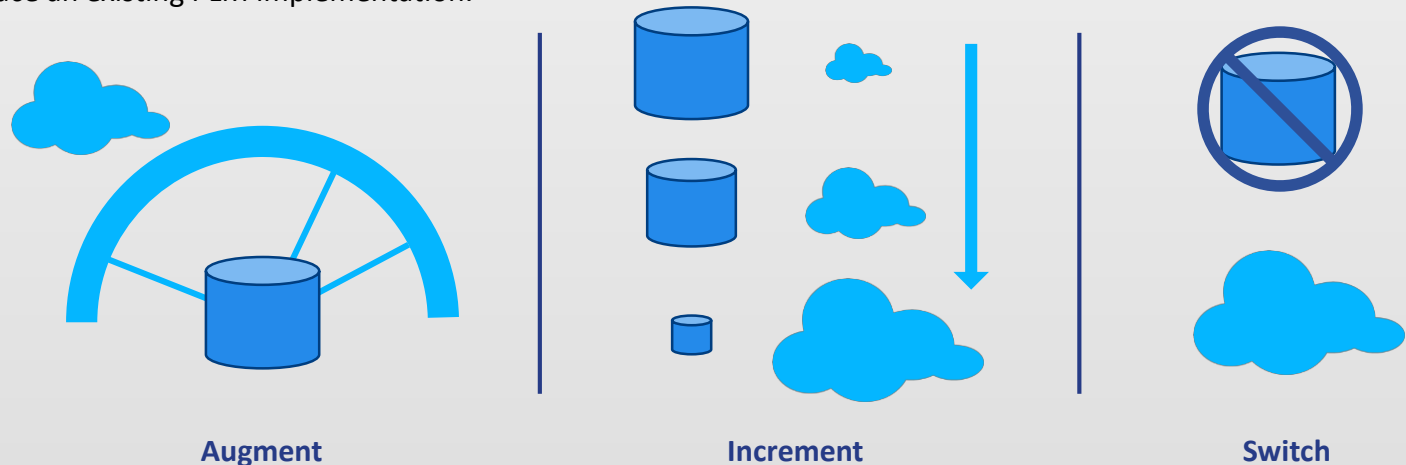
It can make sense to encapsulate and extend an existing PLM system with additional cloud functionality. This option is minimally disruptive and can provide fast payback. Negatives include greater integration complexity. This option can provide flexibility to defer the decision to replace an existing PLM implementation.

Increment

An incremental approach can take two forms. It's possible to incrementally migrate and turn off functionality in an existing system as capabilities are brought online in the cloud. Alternatively, decentralized organizations can roll out implementations incrementally across business units.

Switch

A wholesale switchover may make sense for some customers, especially if there is a compelling driver for change. However, this model contains the highest degree of risk and requires extensive implementation planning.



"We selected Oracle Innovation Management Cloud and Oracle Project Portfolio Management Cloud to score and quantify each opportunity and align our (innovation) portfolio with our company strategy." Chuck Johnson, Sr. Manager of Innovation at Rehrig Pacific Company

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Oracle PLM Cloud is part of a broader suite of cloud solutions from Oracle that address business processes across the enterprise

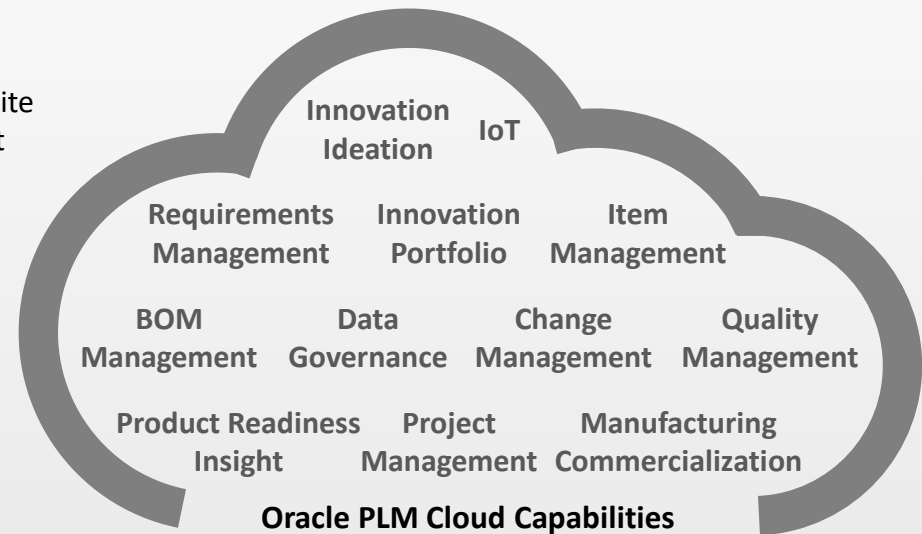
Oracle PLM Cloud Solution

Oracle's Product Lifecycle Management (PLM) is a suite of solutions that provides a single integrated product record across the three tenets of a modern product value chain—Innovate, Develop, and Commercialize. These solutions help you transform fragmented product development processes into information-driven product value chains with full visibility into product information, real-time social collaboration, and cross-functional enablement across the entire product network.

For more information, visit Oracle at:

- [Oracle Product Lifecycle Management](#)
- [Oracle Internet of Things Applications](#)
- [Oracle Cloud Documentation](#)
- [Oracle Cloud Customer Connect](#)

Or contact Oracle at 1-800-633-0738.



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¹ "Total size of the public cloud computing market from 2008 to 2020." Statista. Accessed March 15, 2017. <https://www.statista.com/statistics/510350/worldwide-public-cloud-computing/>

² *The NIST Definition of Cloud Computing*. NIST Special Publication 800-145. <http://csrc.nist.gov/publications/PubsSPs.html#800-145>

³ Christensen, Clayton M. *The Innovator's Dilemma*. Boston, MA: Harvard Business Review Press, 1997.

⁴ Chan, Vanessa, et al. "Meeting the innovation imperative: How large defenders can go on the attack." McKinsey & Company. June, 2014.

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