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Six Ways to Expand Enterprise Value with Your PLM

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Tech-Clarity

Leveling Up Your PLM Value

It's Time to Drive Enterprise Level Value with PLM

Our research shows that manufacturers achieve significant business value from PLM.[1] The manufacturing industry benefits from new levels of efficiency and control from PLM and now recognizes it as a standard part of the engineering and product development toolkit.

Many manufacturers started their PLM journey by getting CAD files under control. Then, they may have grown more mature and developed BOM and change management processes. They're getting value but falling short of the full potential PLM has to offer. Times have changed. The world is now more digital, connected, and data-driven. The way companies use PLM must evolve to meet the needs of the modern manufacturer. Fortunately, our research shows that there is significant additional business value available from most current PLM implementations.[2]

Resetting the PLM Strategy for the Future

But how do manufacturers choose the right opportunities to "level up" and dramatically extend their existing system's value? We used our Six Dimensions of PLM expansion as the basis for this guide to share six practical ways manufacturers can incrementally increase business value from PLM. Let's take a look.

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Executive Summary

PLM Drives Significant Business Value

Most manufacturers with PLM (product lifecycle management) recognize that it improves engineering efficiency and reduces errors and rework. Our research shows that PLM adoption helps grow the top line in addition to these essential bottom-line savings. For example, PLM can speed up time to market by cutting product development time by up to 50%.[1] Beyond that, PLM acts as the digital product backbone, providing the trusted product data backbone to support strategic needs like improving sustainability, enabling advanced analytics, artificial intelligence (AI), and driving innovation.

Long-term success relies on trusted, current product data that is consumable across the enterprise.

Untapped Value of PLM

Despite the potential, many companies are only achieving a fraction of the available business value because they adopted PLM as more of a PDM (product data management) solution.

That leaves room to grow and tap into higher potential value to compete in today's market as companies digitally transform, become more connected across their value chain, and leverage data-centricity to get an edge on the competition.

Extend Value by Increasing Adoption and Maturity

Long-term success relies on trusted, current product data that is consumable across the enterprise. It depends on streamlined processes that connect across the business and the value chain. Many manufacturers already have the system they need to meet these requirements, but they must evolve their PLM implementation and adoption to broaden the scope of product data and support more people and processes.

Choose the Right Path to New Value

The end goal is mature, enterprise-level PLM adoption that serves as the digital product data backbone of the enterprise. But it can't happen overnight. It's essential to be realistic about your starting point and adopt what your company is ready for. Then, it's time to be agile, continuously improve, and drive additional top-line, bottom-line, and strategic benefits. We offer six ways companies can elevate PLM value to help guide the process.
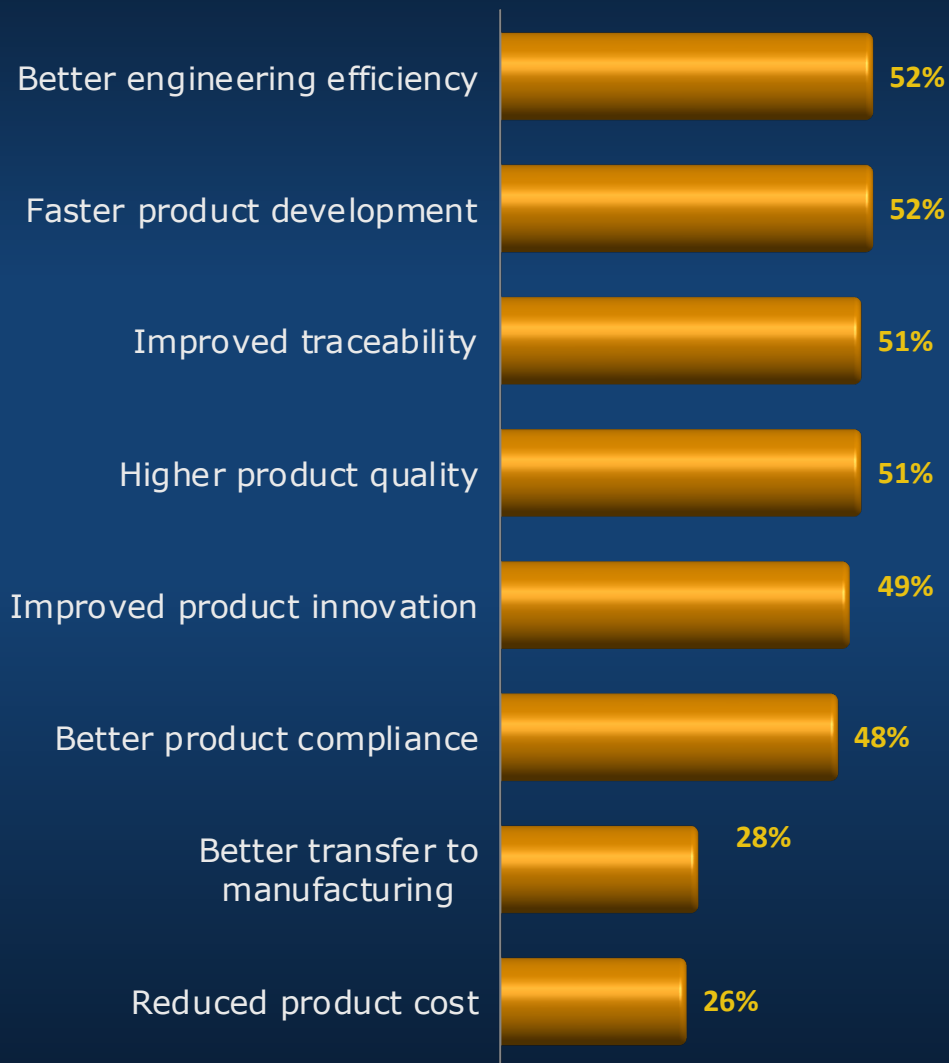
Top Performers adopt PLM as a platform for the enterprise and supply chain that is **more integrated, more advanced, more widely adopted, and kept more current.**

They are rewarded with better innovation, product development, and compliance – **all of which help drive higher profitability**.[2]

Evaluate the Opportunity

BENEFITS ACHIEVED FROM PLM[4]

Benefit	Percentage
Better engineering efficiency	52%
Faster product development	52%
Improved traceability	51%
Higher product quality	51%
Improved product innovation	49%
Better product compliance	48%
Better transfer to manufacturing	28%
Reduced product cost	26%

Recognize the Opportunity for Increased Value

Manufacturers are getting value from PLM but there is significant untapped value available. Manufacturers with PLM have the opportunity to drive both higher level, enterprise value and strategic digital transformation.

Expand to Enterprise-Level Value

PLM is the digital product data backbone required for today's manufacturers that find themselves faced with increased product, product development, and market complexity. PLM helps manufactures manage complexity to improve efficiency, time-to-market, quality, compliance, and cost (see chart). It also helps them meet challenges like increased sustainability and product personalization demands. Increasing PLM adoption and maturity sets the stage for upgrading PLM to enterprise-level value.

Build on Current PLM Foundation to Transform

Beyond improving existing processes, our research on long-term business success shows that customer relationships and innovation remain the most common drivers for sustained profitability. Manufacturers must continuously improve, innovate, and transform or they will fall behind by standing still in today's business climate.

While many have improved operational efficiency with PLM, our research shows that PLM can deliver even greater strategic value. Reinvention and continuous innovation require digital transformation, and digital transformation requires PLM to fortify the product data and process backbone so they can become more agile, innovate faster, optimize their value chains, and create the trusted data needed to support game-changing AI and process automation.

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Six Ways to Increase Business Value from PLM

Expand PLM Scope and Value

We identified four primary ways that manufacturers can expand the scope of their PLM implementations to drive greater value. These four dimensions define the difference between basic PDM or PLM implementations and those that achieve higher enterprise-wide value. These four steps include:

- Creating a richer view of the **Product** by gathering all product data into a cohesive, contextual, and traceable model
- Expanding adoption to more **People** by giving more cross-discipline people and departments access to product data and including them in cross-functional PLM processes
- Expanding PLM to support more **Processes** inside and beyond Engineering to create a more collaborative approach
- Grow support of the product **Lifecycle** upstream and downstream to support data and processes across the product lifecycle

Enhance PLM Infrastructure

Our research shows that these four dimensions of PLM expansion improve the ability to efficiently and rapidly develop more innovative, differentiated products.[2] Beyond expanding scope, manufacturers can extend the value of their PLM system by improving their overall PLM infrastructure to a more enterprise-class platform. Our research shows that top-performing companies expand PLM in two additional ways:

- Ensuring that product data is **Digital**, moving away from document-centric and proprietary data formats to create readily consumable information across the value chain
- Increasing the level of **Integration** between PLM and the supporting enterprise systems ecosystem, including ERP, MES, and others

Complementary Nature of the Six Dimensions

These six dimensions serve as a guide for manufacturers to achieve PLM's more significant role across the value chain. We believe, and our data supports, that these six areas provide greater value to the manufacturers who adopt them.

It's important to recognize that there is clear overlap between these dimensions, and many improvement opportunities will involve a combination of them. In addition, the two infrastructure improvements can help support the other four.

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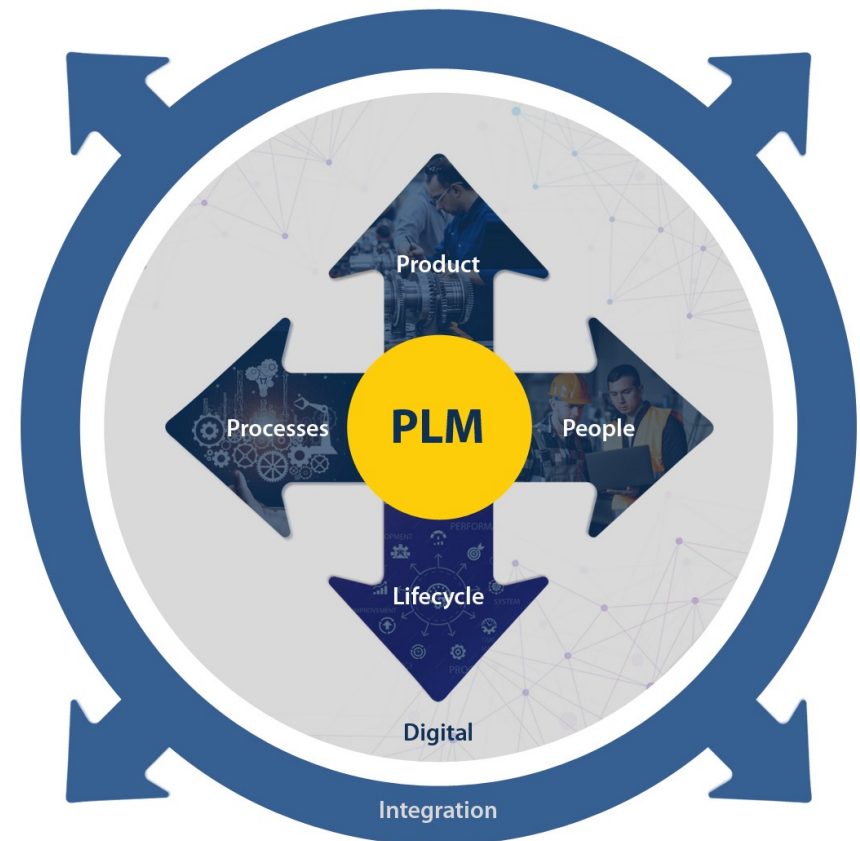
1 – Expand the View of the Product

Expand Beyond Mechanical Design

The first dimension and improvement opportunity is creating a richer, more complete view of the product. Many initial PLM implementations organize valuable design information in a file-centric format. This orientation aligns more directly with the mechanical CAD modeling perspective and helps ensure files are more accessible, prevents them from being lost, and allows better revision control. This is valuable, but it falls short. For example, implementations of this maturity are based on a mechanical CAD orientation and don't support today's multi-disciplinary designs that frequently include electrical CAD and software elements. Manufacturers should expand to a more comprehensive view of the product (see graphic).
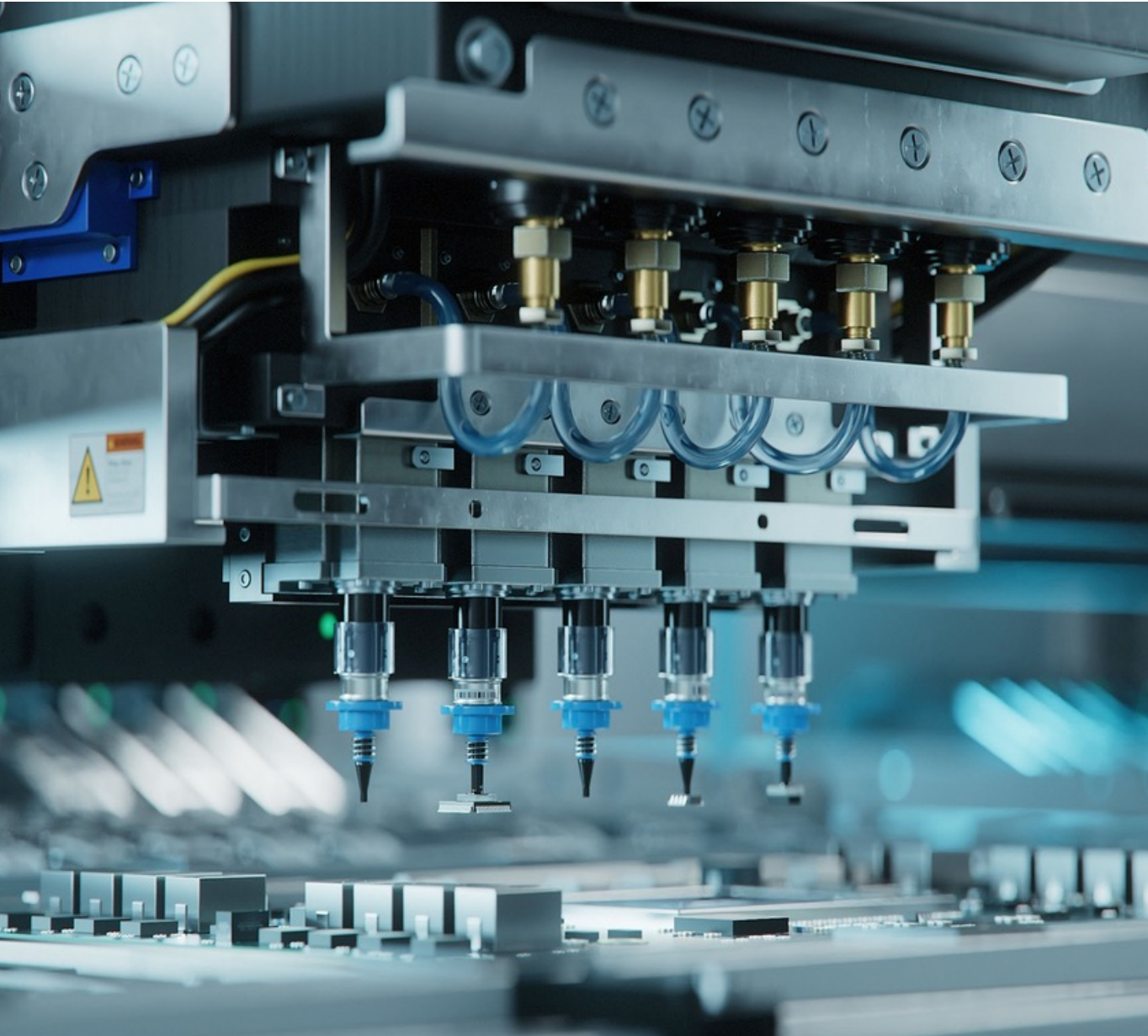
Adopt a Part-Centric Approach

Further, it's essential to evolve to a part-centric view to expand the value of PLM. A part-centric approach better incorporates procured parts and assemblies, like sensors or electric drives. This practice organizes parts into a BOM structure that goes beyond the CAD view to support the way the rest of the organization looks at items.

A part-oriented approach also helps engineers conduct change impact analysis, for example, to address upcoming part noncompliance or obsolescence. Lastly, it's a step along the way to help encourage reuse, modular design, variant management, and other engineering best practices.

Top Performers are almost **three times as likely** to have design data integrated across all disciplines.

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1 – Expand the View of the Product

Reach Beyond Engineering Information

Similarly, early PLM adoptions are frequently limited to engineering-centric information. Adopting a part- and BOM-centered approach enables product developers to capture a broader array of information in context and manage critical relationships between information. For example, designers can associate parts with technical specifications, tolerances, and related documentation. However, it can go further, capturing additional information about replacement parts, substitutes, and alternates.

The part-centric approach also allows companies to manage commercial information like suppliers, cost, and sustainability alongside design data. This information dramatically helps engineers make more informed, holistic design decisions. It can also support part classification efforts that help companies rationalize duplicate parts saving time and money across the company.

SIX WAYS TO EXPAND ENTERPRISE VALUE WITH YOUR PLM SYSTEM

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2 – Include More People / Roles

Expand to More Contributors and Reviewers

The second way to extend PLM value is to expand the number of people, departments, and roles that collaborate around trusted, shared information. Most PLM implementations start in the Engineering department with CAD designers. This is the first step to using PLM to better control, access, and share information. Many manufacturers have gained value by just making it easier for engineers to find the information they're looking for, for example, to reuse a prior design.

Beyond Engineering access, though, many people can provide input and review designs. Bringing more people into the design process to share their perspective, sometimes known as "DFX," is a more holistic version of design for manufacturing that includes design for supply, design for compliance, and more. Effective DFX improves product innovation and quality. It also helps prevent costly, time-consuming design errors caused by unintended consequences of design decisions by creating visibility to downstream impacts.

Two-thirds of companies see PLM as an Engineering application or view it as supporting a few departments (see chart on next page). **Top Performers, on the other hand, recognize the greater value of PLM in supporting the enterprise and the value chain.**

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2 – Include More People / Roles

Support New Roles

Expanding collaboration is not limited to "read-only" reviews. PLM solutions have matured to support additional roles beyond designers. Beyond providing feedback, manufacturers can expand the scope of PLM to include roles like manufacturing planning. Expanding PLM to incorporate manufacturing engineers' work, such as line designs and tooling, further expands the digital thread and enables impact analysis across disciplines.

Another logical extension is supporting people who source direct parts. Allowing component engineers to add part data into the system supports better design decision-making, leveraging the more complete, part-centric product model discussed earlier.

Allowing other people who need ready access to product designs for their jobs to work in PLM enables change control that will alert them when a part changes, preventing expensive tooling errors. Many other roles can add greater business value as well, including those in quality management or those who develop product documentation, manufacturing instructions, service procedures, and even marketing deliverables like renderings or extended reality (XR).

Improve Efficiency and Data Quality

Incorporating these additional disciplines provides a more integrated dataset that includes product, manufacturing engineering, and supply chain data in context, creating rich information for analysis and decision-making. Direct involvement also increases efficiency and drives higher data quality through increased collaboration and by eliminating duplicate data, redundant data entry, and transcription errors.

COMPANY VIEW ON THE ROLE OF PLM
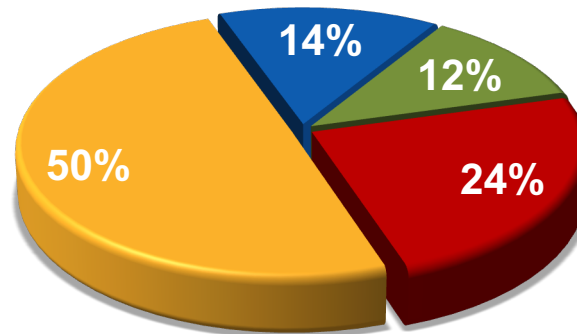
- Strategic platform supporting enterprise and value chain
- Strategic platform supporting the enterprise
- Helps support business processes across a few departments
- Primarily an R&D application
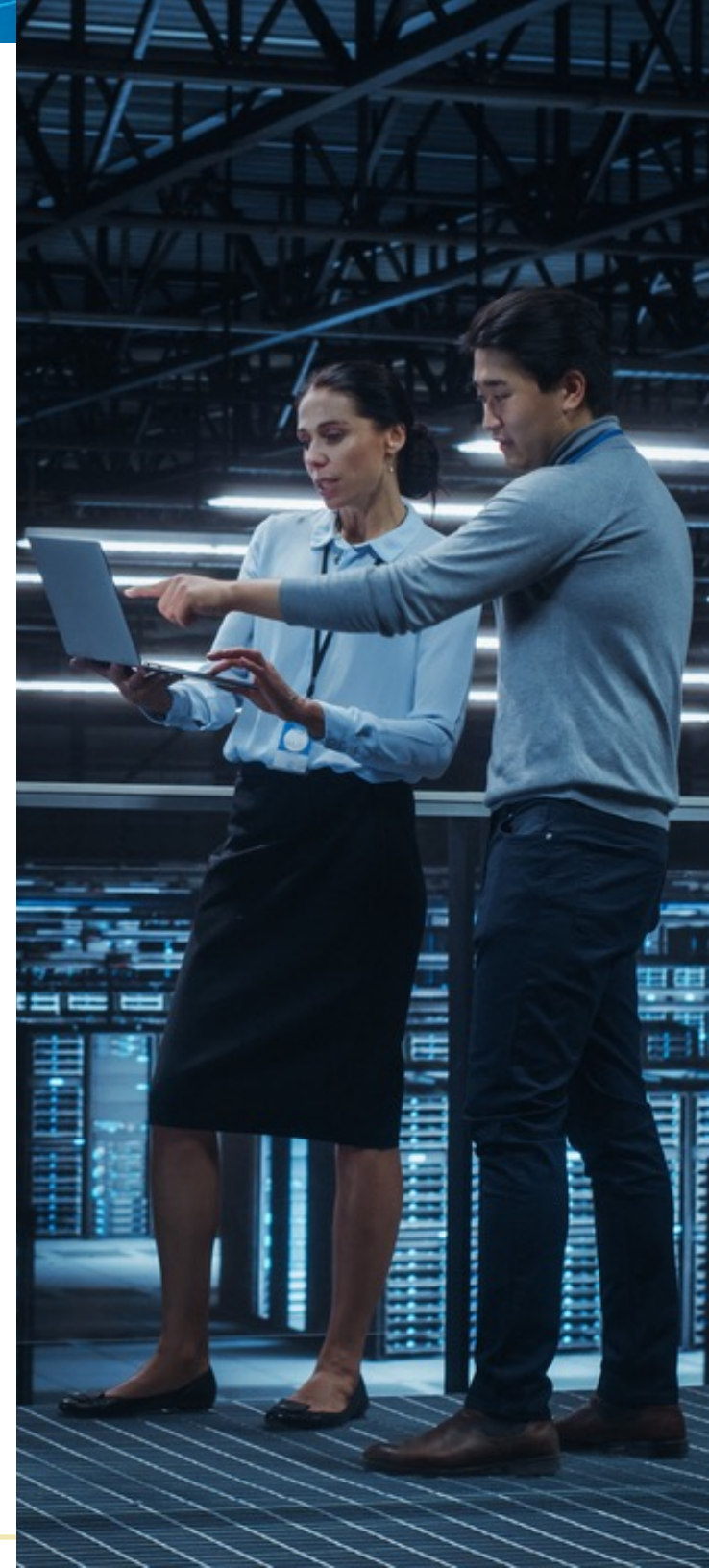
3 – Support More (and More Mature) Processes

Expand PLM to Support More Processes

The third dimension of PLM expansion involves supporting more business processes, workflows, and what some call "use cases." The first and most straightforward extensions are adjacent processes like engineering change management (ECM), formal design reviews, and release to manufacturing. These processes add new levels of value by further leveraging design data and extending it to new uses. For example, companies can support the structured transformation of engineering BOMs (EBOMS) to manufacturing BOMS (MBOMS) that can be used directly in planning and production.

Increase Process Maturity

Our research shows that top performing companies expand both number and maturity of processes (see graphic). For example, an initial PLM implementation may have helped encourage part reuse, saving time and money. A more advanced use of PLM could support a modular or platform design approach that expands the value of reuse beyond the part level. Expanding beyond basic BOMs to enterprise-level configuration management capabilities can also help manufacturers better support today's complex, tailorable products to create an edge in the marketplace.

Support Enterprise Processes

Another way to adopt more valuable processes is by leveraging data in PLM to enable enterprise-level processes. For example, companies can introduce analytical processes that help manage, predict, and report product characteristics like cost, supply risk, compliance, and sustainability. Bringing these capabilities into PLM allows designers to evaluate these factors sooner when designs are flexible and can accommodate change with less disruption. Analytical opportunities are expanding significantly as AI becomes more commonplace, allowing more analytical work and development of insights to be automated.

Top Performers use more (and more advanced) PLM capabilities, including more advanced data modeling and simulation capabilities.[2]

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Business value extends as PLM implementations mature and expand along multiple dimensions.
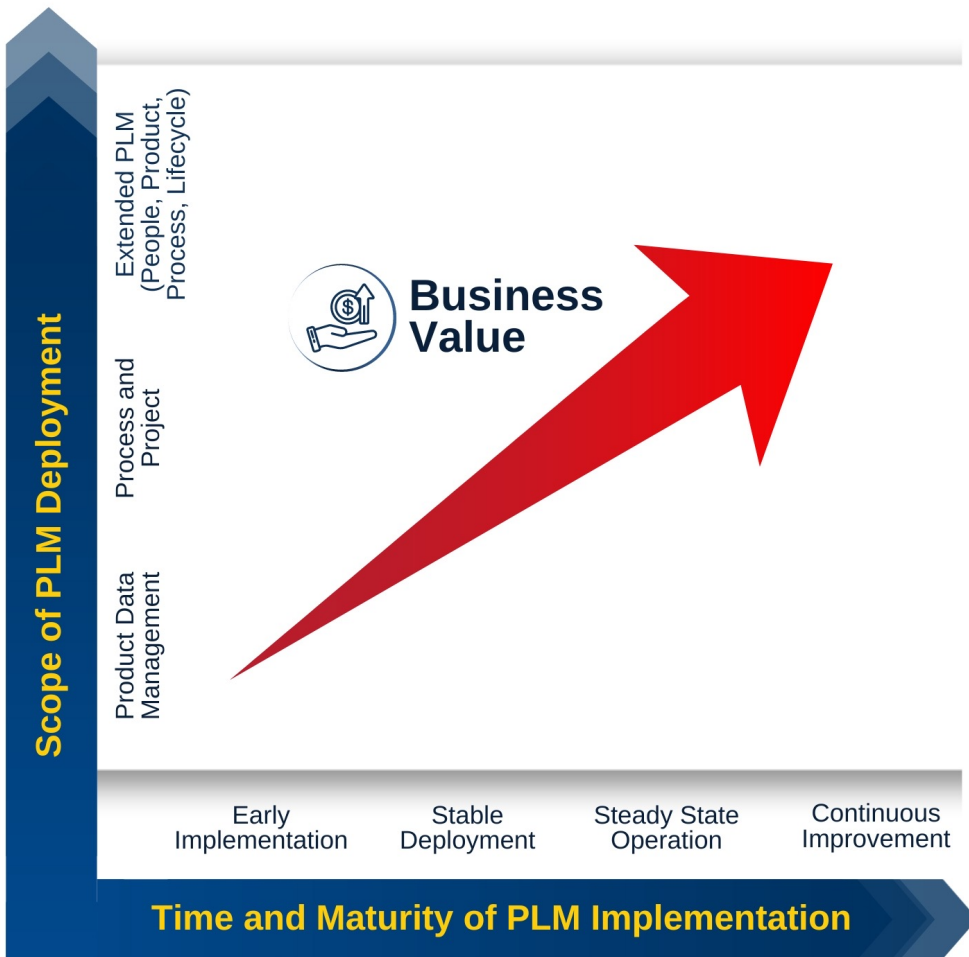
Expand Upstream

The fourth dimension is to expand PLM's scope further upstream and downstream in the product lifecycle. As PDM scope and maturity increases so does business value (see graphic). Mature companies improve product design and development outcomes by basing decisions on well-documented requirements and continuously validating that product designs meet requirements. Effective requirements management adds value and is even more powerful inside PLM to directly trace requirements to the design elements fulfilling the needs. Managing requirements in context also allows manufacturers to extend revision management and change control to requirements, allowing effective and efficient impact analysis if requirements like compliance rules change suddenly.

Extending upstream can also involve more advanced processes like systems engineering, starting with requirements and breaking them down to supporting capabilities. Then, traceability can extend across multi-disciplinary designs and help support tradeoffs between mechanical, electrical, and software components. This furthers traceability and helps drive compliance in safety-critical industries.

Expand Downstream

We've already reviewed some downstream processes in our discussions about extending to more people and processes, but more opportunities are available. For example manufacturers could support manufacturing engineering, closed-loop quality, supply chain management, or sustainability. Service is another example. Many manufacturers are transforming service as they seek higher margins and deeper customer relationships available in the operational phase of the product lifecycle. Each of these extensions has the potential to add significant new business value.

5 – Digitalize the Product Backbone
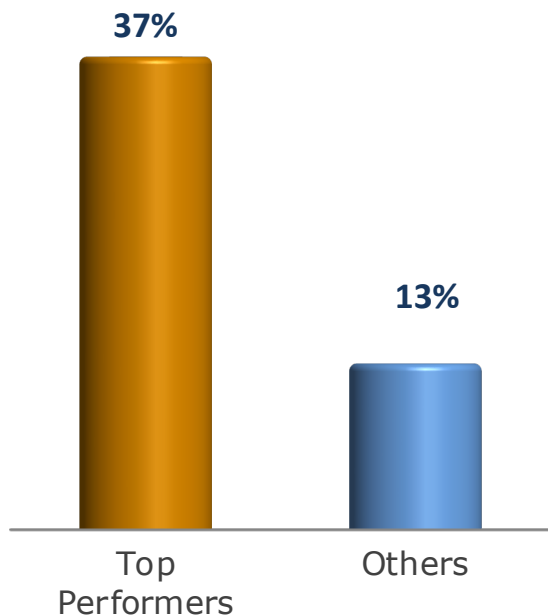
Defining Digital Data and Processes

The first four dimensions of PLM expansion reflect what companies do with PLM, the next two focus on how they do it. Let's start by dispelling the myth that all PLM data is digital. Yes, it's stored in bytes, but that isn't enough. Our definition of digital data is "Data in a database that can be accessed and interpreted by an application. It does not include data that is embedded in documents, forms, files, CAD models, or scanned data that requires a human to interpret it."

**FULLY DIGITAL PROCESSES
BY PERFORMANCE CLASS**

37%

13%

Top
Performers

Others

Data isn't valuable in the context of a digital thread, digital twin, or digital transformation unless it can add value beyond the designer and those using CAD and other authoring tools. Simply put, data trapped in documents or proprietary formats doesn't count because they are not readily machine-readable and their value is trapped in too small of an ecosystem.
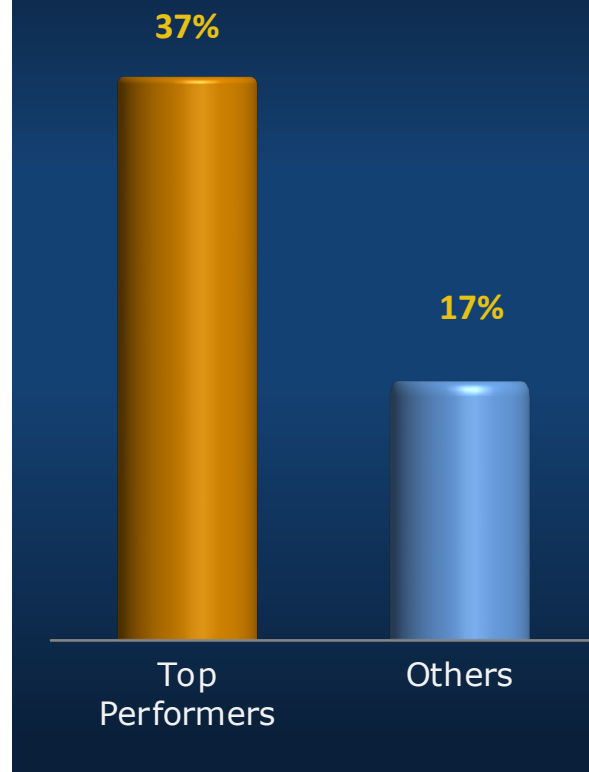
Why Digital Data is Important

The four dimensions discussed earlier require trusted, centralized data that can be easily shared between people, processes, and systems. For example, BOM data or tolerances encapsulated in a CAD document aren't useful in a change management process like a BOM comparison. Further, it can't be used in reporting or analytics to assess and determine critical information like compliance or sustainability. Similarly, parts or BOMs defined in a spreadsheet are prone to mistakes but, more importantly, are very difficult to access programmatically. This limits analysis, using algorithms like AI, reporting, and integration with other systems. In these cases, a person must disrupt their current activities to interpret the data, copy it into a spreadsheet, and then share it. On the other hand, a digital approach puts this information at the fingertips of authorized users who need that data to make decisions.

**FULLY DIGITAL DATA BY
PERFORMANCE CLASS**

37%

17%

Top
Performers

Others

Top Performers are **significantly more likely** to have fully digital data and processes.[2]

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5 – Digitalize the Product Backbone

Why Digital Processes are Important

Companies can incorporate digital data into digital workflows. Digital processes, which we define as those that are executed based on computer-managed workflows and tasks, streamline work and ensure that activities don't get lost on someone's desk or in their email. PLM extends the value of digital data by routing the appropriate data to the right person in the context of their required actions. An example of this process would be managing engineering changes and approvals. Companies can further extend digital tasks and processes for project management, another highly valuable way manufacturers can extend the value they get from their existing PLM solution.

The Value of PLM Digitalization

Digitalizing PLM is one of the highest value ways to improve PLM and helps support all of the other dimensions. Digital product data and workflows help drive new levels of speed, efficiency, scalability, and reliability. They also set the stage for more strategic enterprise value by increasing opportunities for analytics including machine learning and AI.

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6 – Integrate Product Data and Processes

Over one-third of companies report they would **gain higher value from PLM** with better / more integration with business systems, such as ERP, CRM, and MES.[2]

Integrate Product Data

The final of the six dimensions that extend PLM value is integration. As much as manufacturers strive for "one version of the truth," they have come to accept that this information will be created and managed by multiple applications. PLM has valuable information to support sourcing, manufacturing, costing, and numerous other functions managed by enterprise systems. Our research shows that companies recognize the value of integration, including ERP, MES, and CRM (see graphic). PLM also relies on information from these sources, such as cost and quality data from ERP or a quality management system (QMS). Manufacturers need to have bidirectional data flow with these systems built on top of formal data governance and part classification to support product development and traceability across the business. Integrating data across enterprise systems further creates a rich pool of data for training AI systems.

Integrate Product Tools

PLM value increases dramatically through integration with design applications and engineering systems in addition to integrating with other enterprise systems. Integrating design tools, including MCAD, ECAD, and simulation, prevents wasted effort in finding information and ensures everyone is working on current data. It also helps engineers focus on their work and provides crucial data to make decisions. Connecting cross-domain design data gives engineers early visibility to changes that might impact their work, preventing errors and the need for late rework and reconciliation.

Expand Integration Beyond Data

Integrating data is valuable by itself, but just as importantly creates the foundation for better integration of people and processes across the enterprise. In this way, integration supports increased enterprise-level value both directly and by supporting the other dimensions.

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Start Expanding PLM to Increase Business Value

Find Your PLM Expansion Opportunity

The six dimensions of PLM expansion provide a wide variety of ways that manufacturers can get more out of their PLM system. PLM expansion should be considered a journey, not a destination. There is always room for improvement and added value. To expand value, manufacturers should:

- Ensure they are getting value from PLM basics
- Understand the potential ways to expand PLM
- Focus improvement efforts on business strategy and business goals
- Take reasonable steps with clear operational and business value
- Take an agile approach to continuous improvement

Take Action

It's time to get more from your existing system. Today's manufacturing industry is evolving rapidly, and many manufacturers are undergoing significant digital transformation. Regardless of your stage of maturity, it's time to level up the value you get from your PLM system. Otherwise, you will fall behind others on their improvement journey.

For many, the next step to a more mature, valuable PLM implementation is expanding beyond document-centric PDM to part- and BOM-centric PLM. For others, it may be time to adopt a more holistic, cross-departmental systems approach. For all, they should focus on expanding the value of their trusted product data, finding ways to leverage it for new levels of business value including new value unlocked by AI. It's time to get started. Use the six dimensions as a guide to find your path and get started.

Companies that don't digitally transform and expand their PLM adoption will fall behind as others continuously improve and drive new business value.

Acknowledgments

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About the Author

Jim Brown founded Tech-Clarity in 2002 and has over 30 years of experience in the manufacturing and software industries. Jim is an experienced researcher, author, and speaker and enjoys engaging with people with a passion to improve business performance through digital enterprise strategies and supporting software technology.

Jim is actively researching the impact of digital transformation and technology convergence in the manufacturing industries.

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Tech-Clarity is an independent research firm dedicated to making the business value of technology clear. We analyze how companies improve innovation, product development, design, engineering, manufacturing, and service performance through the use of digital transformation, best practices, software technology, industrial automation, and IT services.

References
1) Michelle Boucher, *The Business Value of Reducing Engineering Time Wasters,* Tech-Clarity, 2022
2) Jim Brown, *The State of PLM in CPG 2022,* Tech-Clarity, 2022
3) Jim Brown, *Executive Strategies for Sustaining Long-Term Business Success,* Tech-Clarity, 2020
4) Jim Brown, *The State of Cloud PLM,* Tech-Clarity 2022