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PLM Roadmapping: The Key to a Value-Based Transformation

Management Summary

Product Lifecycle Management (PLM) is a strategic approach that helps companies manage their products throughout their entire lifecycle. It is particularly significant for manufacturing companies as it streamlines product development, enhances collaboration, improves efficiency, and ensures better quality control and regulatory compliance.

A holistic PLM solution comprises of one or more major systems which are connected with many other systems in the enterprise architecture of a company.

PLM Roadmapping involves creating, controlling, and continuously adapting a strategic plan for implementing, extending and optimizing such a PLM solution. PLM Roadmapping ensures that value is maximized by balancing:

1. Improvements, extensions, and broader roll-out of an existing PLM,
2. Introduction of new capabilities, support of all product lifecycle phases, and realization of a holistic Digital Thread, and
3. Modernizing the IT landscape of PLM including conversion to Cloud / SaaS.

For greenfield and brownfield implementations, the PLM Roadmapping approach slightly differs, with greenfield projects requiring a comprehensive plan from scratch and brownfield projects focusing on identifying & closing gaps and improving existing solutions.

DxP Services offers value to customers throughout their entire PLM journey. The DxP Services methodology includes consulting services for PLM Roadmapping as well as comprehensive implementation, deployment, and optimization services for PLM. This enables customers to maximize the value of their PLM investments and achieve their strategic objectives.

What is PLM?

PLM stands for Product Lifecycle Management. It is a strategic and systematic approach to managing the entire lifecycle of a product, from inception, conception, design, verification and validation through to manufacturing, service, and eventual disposal. PLM integrates people, processes, and technology, enabling companies to efficiently and effectively manage their product portfolios, reduce time-to-market, improve product quality, and lower overall costs.

PLM is particularly significant for manufacturing companies because it provides for:

Streamlined product development

PLM helps companies in organizing and managing product data, leading to reduced errors, better collaboration, and faster decision-making.

Configuration and change management

PLM centralizes and streamlines the tracking, control, and coordination of product configurations and modifications throughout their lifecycle.

Enhanced collaboration

PLM systems facilitate communication among different departments and stakeholders, ensuring that everyone is working with the same upto-date information. Thus, PLM is the enabler for Digital Threads.

Improved efficiency

By integrating different software tools and processes, PLM can help companies reduce duplicate work and improve overall productivity.

Better quality control

PLM systems help track product defects and issues, enabling companies to make improvements in their design and manufacturing processes.

Regulatory compliance

PLM systems help companies maintain accurate records and documentation to meet industry-specific regulations and standards.

How is PLM introduced in enterprises?

Introducing full PLM in an enterprise is typically a multiyear undertaking which is organized as a program with several projects (or a big project with multiple phases). During such a timeframe, a company has to react to changing market needs, may extend or streamline its product portfolio, may change its strategy, and continuously improve its processes Successful companies continuously transform themselves.

Therefore, introducing PLM requires continuous adaption of both the already implemented solution and the program plan for the upcoming projects: A PLM program must be executed in an agile way.

A PLM program typically starts by focusing on a few phases in the product lifecycle.

It is common practice to start the journey by improving core design processes for a few domains such as mechanical and electrical engineering. In such cases, the initial PLM solution is intended to support core capabilities for product data management (including part management, engineering BOM management, CAD data management) as well as change and configuration management.

Subsequently, the PLM Program may take multiple paths:

- Continuous improvement of implemented core PLM capabilities
- Deployment of implemented core PLM capabilities to additional organizations, business units, and sites
- Deepening the integration in the enterprise IT architecture
- Extension of implemented core PLM capabilities
- Extension of PLM to additional development processes and capability domains e.g. by implementation and connection of ALM solutions for software engineering
- Extension of PLM capabilities to earlier phases of the lifecycle to support e.g. processes around (Model-Based) Systems Engineering and Requirements Management
- Extension of PLM capabilities to later phases of the lifecycle to include Manufacturing and/or Service
- Consolidation of additional data sources incl. data migrations
- Moving systems to the Cloud or converting to SaaS

The big challenge is to identify and maintain the path which maximizes the overall value for given time and resource limitations. PLM Roadmapping is the key to maximize this value.

Applying PLM Roadmapping to a practical use-case highlights the differences in path-taking: A company which has successfully introduced MCAD data management for one or more CAD tools seeks to get more value out of the PLM solution by adding core capabilities for part, EBOM, and change & configuration management.

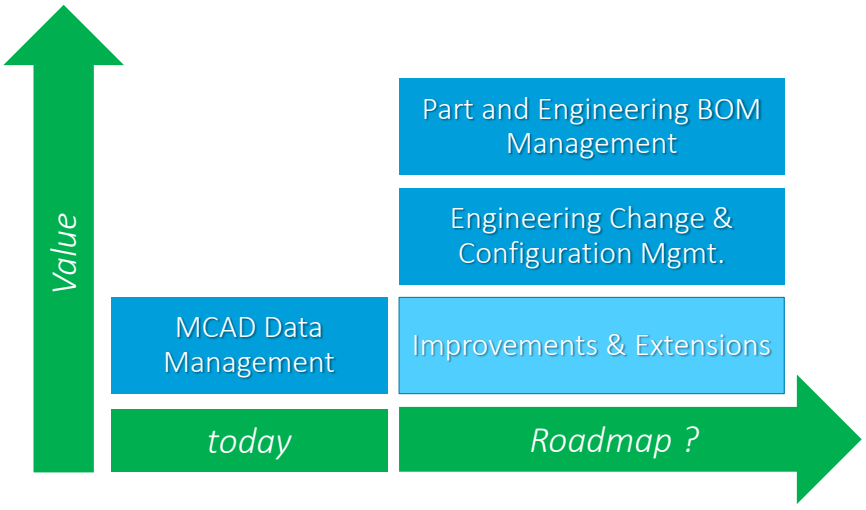


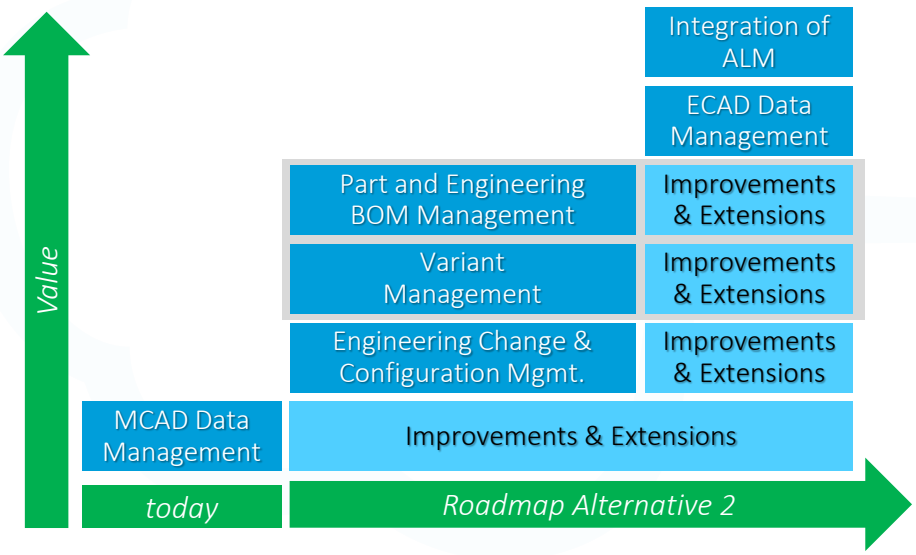
Figure 1 Illustrative example: Current PLM solution and possible advancement

At first glance this might look like a simple path leading to increased value. So why not start implementing immediately as shown in Figure 1.

Depending on the holistic PLM strategy, this may lead to more or less value: If it is ensured, that the scope of PLM remains constant, then the proposed advancement may be implemented with the desired increase in value. If, however, the strategy is to maximize value by supporting a wider PLM scope, then additional phases impact significantly the next one: You must know the PLM strategy and roadmap to make the right decisions for the next step.

If the integration of systems for application life cycle management (ALM), variant management, and ECAD data management are considered as part of the PLM strategy of the aforementioned organization, there are dependencies which mean that a choice between two potential directions is required:

- Engineering BOM Management is implemented so that product structures can be converted and extended to variant structures in a later project as soon as variant management is introduced.
- Engineering BOM Management is implemented so that product structures allow basic variant management right from the beginning.



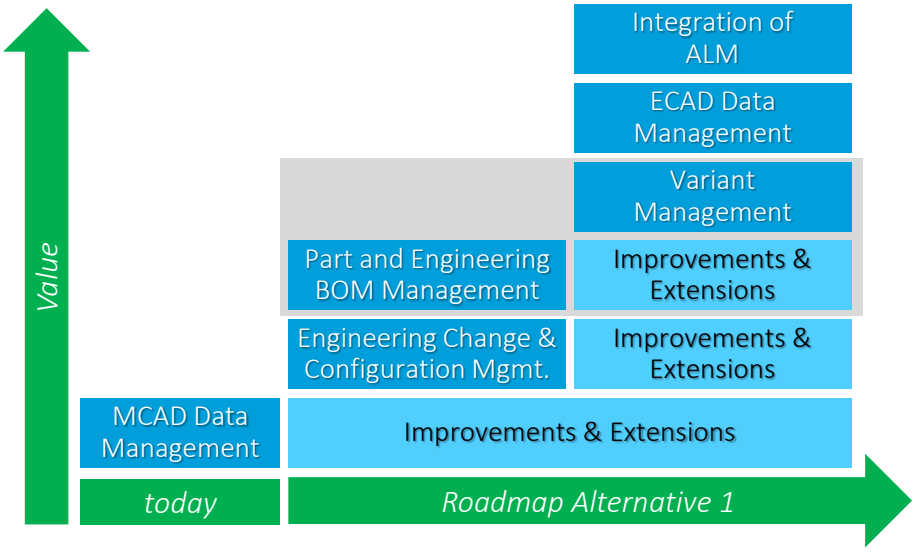


Figure 2 Illustrative example: Current PLM solution and possible advancement

Alternative 1 may look obvious and generate fast value. However, depending on the specific situation, a later conversion to variant management may require huge efforts. Ultimately, alternative 1 may lead to less overall value than alternative 2.

Generally, the overall value is maximized if all dependencies between capabilities are considered and if the value is balanced between:

- Value of improvements, extensions, and broader roll-out of the existing solution (deepening PLM)
- Value of new capabilities and support of additional domains or product lifecycle phases (widening PLM to the complete Digital Thread)
- Value of improved IT landscape (modernizing PLM systems)

PLM Roadmapping ensures that value is maximized on all three dimensions.

How does DxP Services support companies in PLM Roadmapping?

DxP Services has 20+ years of experience in PLM. A major part of the consulting portfolio of DxP Services is PLM Roadmapping. The methodology for PLM Roadmapping focuses on fast, sustainable value. It is based on agile principles and is tailored to customer specific needs. Full PLM Roadmapping is organized in the following work streams:

Value Management is the definition and alignment of the target value for the entire program and each subordinate project or phase.

Enterprise Architecture Management is the identification of impacted business processes, the definition of the enterprise data model, and the collection of the solution capabilities. Also, developing and maintaining the overall application and IT architecture is part of Enterprise Architecture Management.

Roadmap Management is the creation and maintenance of a robust roadmap / master plan & blueprint with defined goals and milestone-based value realization. Additionally, developing strategies for data consolidation/migration, quality assurance, roll-out, adoption, and organizational change management is part of Roadmap Management. Roadmap Management typically results in an initial plan, which is then maintained in an agile approach.

Program Management is the planning, execution, controlling, and closing of projects or phases, while identifying and mitigating risks to ensure successful outcomes.

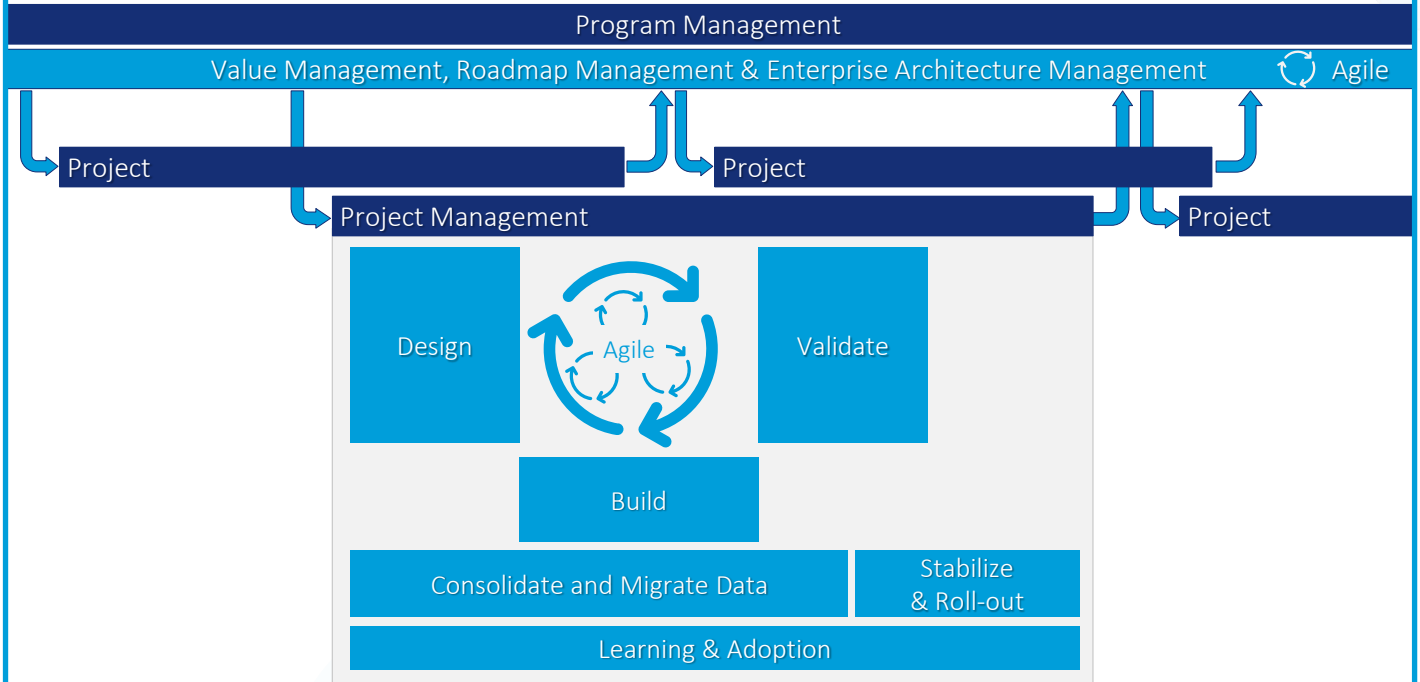


Figure 3 PLM Roadmapping within the DxP Services Methodology

Within the work streams, the following activities are executed cyclically:

Assessment	Strategy Development	Implementation Oversight	Continuous Improvement
Evaluate the current state of the company's PLM solution, identify gaps and areas for improvement, detail or update the vision and objectives for the next PLM project or phase.	Establish and adapt the overall PLM strategy, select new PLM software tools or modules, define or update the architecture, and identify necessary process changes.	Guide the running PLM implementation and deployment projects and ensure that the solution designs, configurations, and customizations are executed in a way that maximizes value as defined.	Monitor the performance of the PLM solution and identify optimization potential. Integrate changing business requirements into the PLM roadmap.

By following a structured PLM Roadmapping process, companies can ensure a successful implementation that delivers tangible benefits throughout the product lifecycle.

What are the outcomes of DxP Services for PLM Roadmapping ?

Key outcomes are the Value Definition including a Proof of Value, the Master Plan and Roadmap including the updated Enterprise Architecture, a Program Strategy and a Governance Model.

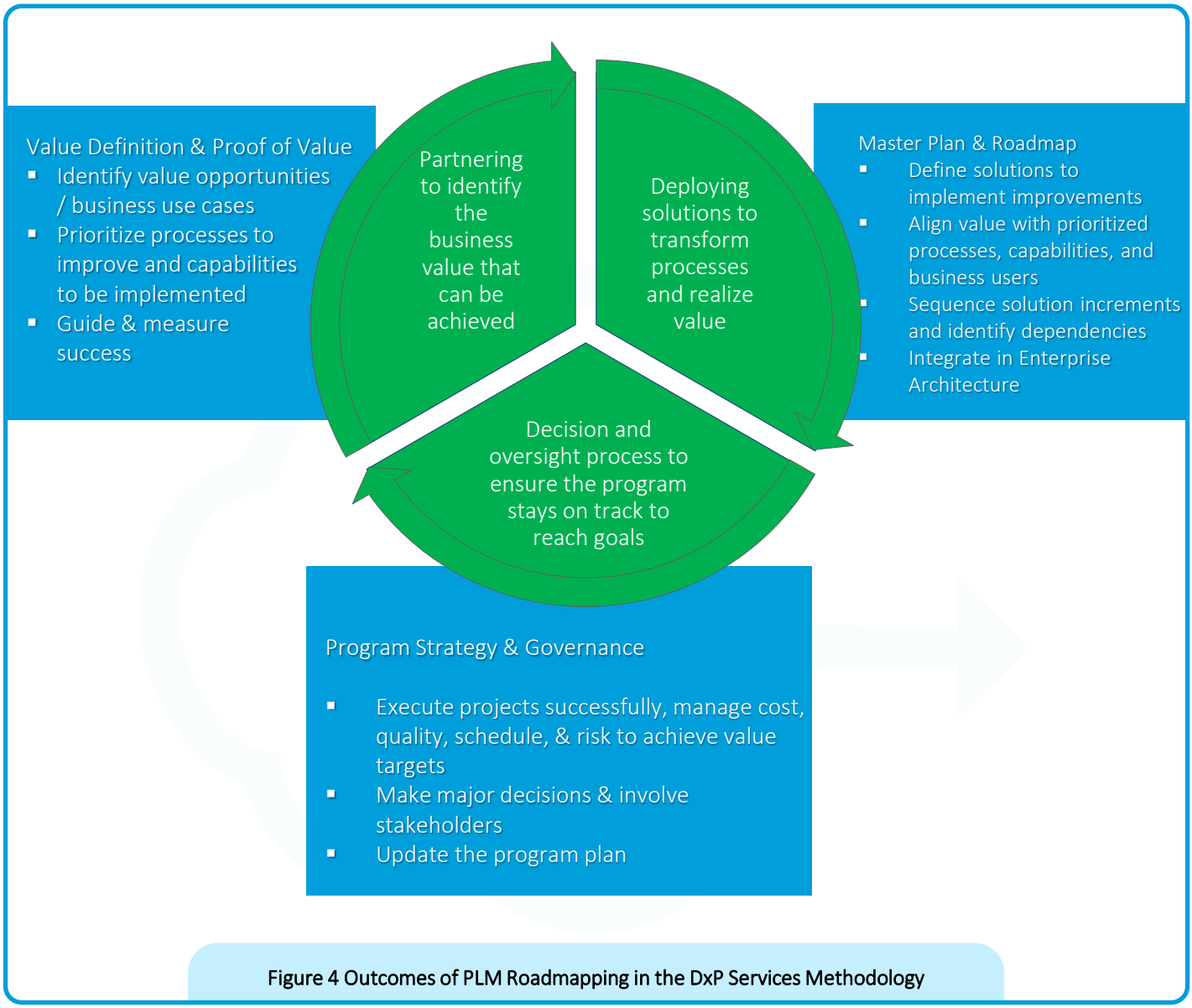


Figure 4 Outcomes of PLM Roadmapping in the DxP Services Methodology

All these outcomes are initially created and then continuously managed and detailed for upcoming phases:

- The **Value Definition** is the documented summary of the expected benefits and outcomes from implementing PLM. It is aligned between all stakeholders and regularly updated. An aligned Value Definition helps a company to connect their PLM objectives with their overall business goals and provides a clear understanding of the desired outcomes.

- The **Proof of Value (PoV)** is a small-scale, focused pilot project or phase which is used by a company to validate the expected benefits and ROI of the next PLM solution extension. In literature a PoV is also referred to as a Proof of Concept (PoC). It complements the theoretical estimation of an ROI. By testing the system in a controlled environment, the company can evaluate its effectiveness and potential impact on the organization. A PoV helps mitigate risks associated with a large-scale PLM implementation, reduces uncertainty, and ensures that the selected solution extension is the right fit for the company's needs.

- The **Roadmap / Master Plan** is a summary document mainly used for communication purposes. It connects the expected value to the target solutions in terms of improved processes, adopted working methods, implemented critical capabilities, consolidated & migrated data, integrated systems, and enabled users. It is a high-level plan for the program which is continuously updated in an agile approach such as SAFe® (Scaled Agile Framework) and contains projects / phases running in parallel or sequentially. A documented Roadmap / Master Plan gives business context to the target solution, guides teams during implementation and deployment phases, and streamlines communications & decision making.

- The **Program Strategy** contains the methodology for implementing PLM in projects or phases, the quality assurance strategy, and the roll-out and adoption strategy.

- The **Governance Model** defines executive steering for reporting activities, project / program responsibilities, product owners, decision-making authorities, and escalation paths. It is essential for ensuring that the PLM implementation is executed efficiently and effectively, with a clear understanding of roles, responsibilities, and expectations among all stakeholders.

All these outcomes are important because they provide a structured, holistic approach to PLM implementation and deployment, ensuring that the overall solution is tailored to the company's needs and delivers the desired benefits. They also help mitigate risks, facilitate stakeholder alignment, and enable continuous improvement of the PLM solution.

Is PLM Roadmapping useful only for greenfield implementations?

A greenfield project refers to a new implementation without existing PLM systems or processes which constrain the solution. A greenfield implementation needs a structured approach to develop a comprehensive plan from scratch, so PLM Roadmapping is essential.

A brownfield project focuses on the transformation of an existing PLM solution. Such an existing PLM solution constrains the potential advancements and extensions. Therefore, the transformation of PLM also needs a structured approach, but the PLM Roadmapping activities slightly differ:

Activity	Greenfield Implementation	Brownfield Implementation
Assessment	Identify business objectives, product development goals, and potential areas of improvement.	Evaluate the current PLM solution landscape, its strengths and weaknesses, and areas for improvement.
	Evaluate the current product development and creation process and identify opportunities for PLM implementation.	Identify gaps and pain points in the existing systems and their integrations with other enterprise systems.
	Engage stakeholders to understand their needs and expectations.	Engage stakeholders to understand their needs and expectations from the enhanced and extended PLM solution.
Strategy Development	Define the initial PLM strategy, including objectives, scope, and timeline.	Define the PLM expansion and improvement strategy, including objectives, scope, and timeline.
	Select the appropriate PLM software and software modules that align with the company's needs and industry standards.	Identify additional features or software modules needed in the existing PLM solution or consider data & system consolidations if needed.
	Identify process changes and establish a high-level solution architecture.	Plan system integration improvements and process optimizations.
Implementation Oversight	Ensure the PLM system is configured and customized according to industry standards and the roadmap.	Ensure upgrades or modifications of the existing PLM solution are done based on the identified enhancements of the roadmap.
	Ensure that the PLM system is integrated with other enterprise software and tools as defined in the roadmap / enterprise architecture.	Ensure that the PLM system is integrated with additional enterprise software and tools, or existing integrations are improved.
	Ensure that relevant data from existing sources are migrated to the new PLM system.	Ensure that additional data are migrated or existing data is cleaned-up as needed.
	Ensure end-users are trained on the new system and processes.	Ensure end-users are trained on the updated system and processes.
Continuous Improvement	Monitor overall performance and user adoption.	
	Collect user feedback, identify opportunities for further enhancements, and integrate them in the roadmap.	
	Ensure that the roadmap remains aligned with evolving needs for the PLM solution.	

Conclusion

Product Lifecycle Management (PLM) is a critical approach for managing products throughout their entire lifecycle, from inception to disposal. It is especially significant for manufacturing companies as it streamlines product development, enhances collaboration, improves efficiency, and ensures better quality control and regulatory compliance. A holistic PLM solution consists of one or more major connected systems.

PLM Roadmapping involves creating, controlling, and continuously adapting a strategic plan for implementing, extending, and optimizing PLM. PLM Roadmapping ensures that value is maximized in three dimensions: The improvement, extension, and broader roll-out of PLM; the introduction of new capabilities to realize a Digital Thread along all product lifecycle phases; and the modernization of the IT landscape including conversion to Cloud/SaaS.

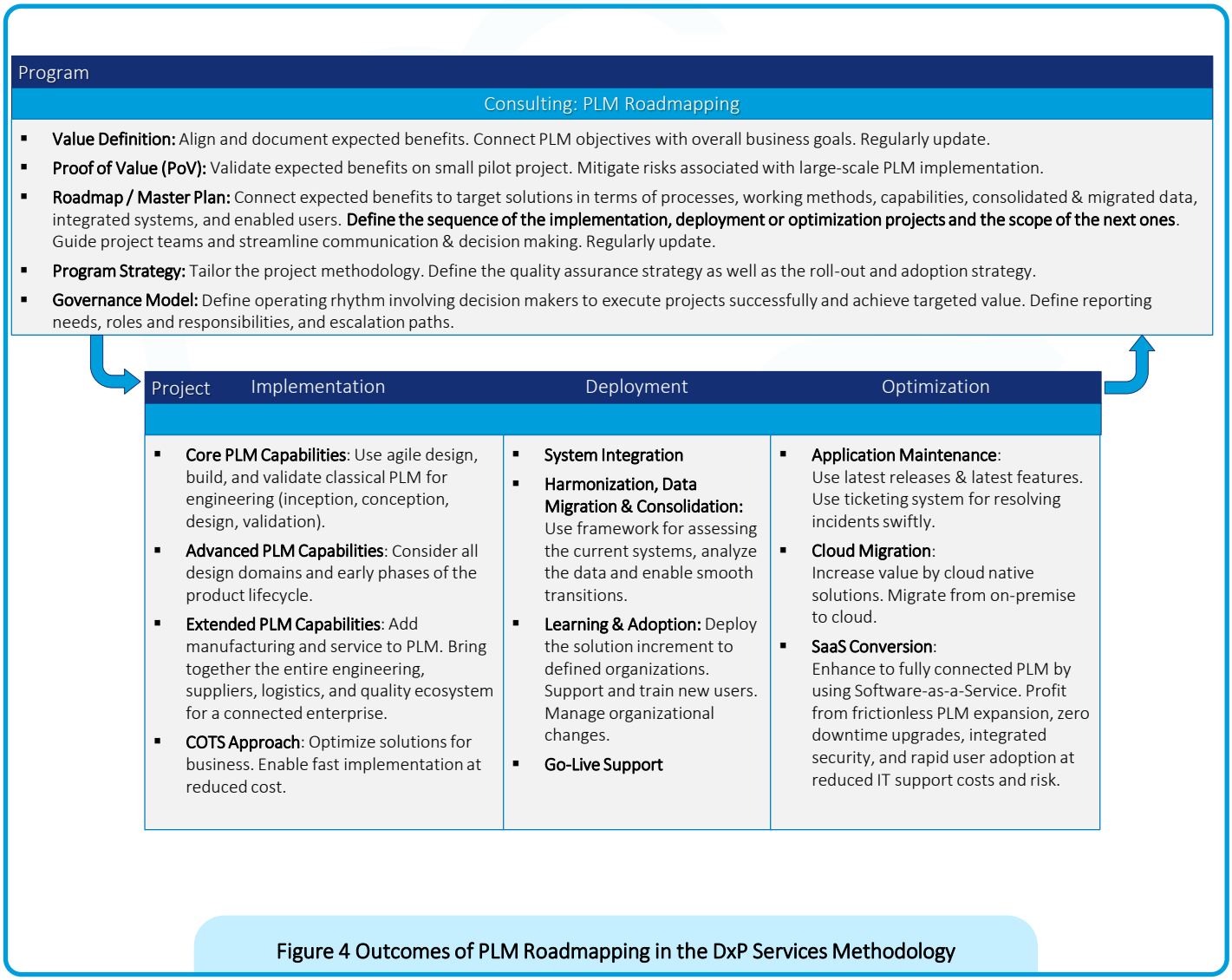


Figure 4 Outcomes of PLM Roadmapping in the DxP Services Methodology

At DxP Services, we offer value to customers throughout their entire PLM journey. Our PLM Roadmapping methodology focuses on fast, sustainable value, is based on agile principles and tailored to customer-specific needs. Our methodology covers all aspects of PLM Roadmapping, including Value Management, Enterprise Architecture Management, Roadmap Management, and Program Management.

Our methodology applies to both greenfield and brownfield implementations. For greenfield projects, we develop a comprehensive plan from scratch. For brownfield projects, we transform existing PLM solutions by identifying gaps and pain points and extending the solution in a structured way.

At DxP Services, we are committed to helping our customers maximize the value of their PLM investments and achieve their strategic objectives. Contact us to learn more about our PLM Roadmapping services and how we can help your company transform its product lifecycle management.

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