Product Lifecycle Management Transformation

Viewpoint

March 2023

pwc

Companies are facing complex data management and other key challenges in their PLM transformation programs

Processes and systems along the value chain

- Product lifecycle management (PLM) systems should be connected and integrated with other systems/third party solutions (e.g. ERP systems, manufacturing execution systems (MESs), connected devices/industrial internet of things (IIoT)) to enable collaboration across domains, divisions and with external partners.

- End-to-end process harmonisation and standardisation is key to achieve the necessary levels of efficiency.

Change Management

- Assessing, managing and communicating engineering changes is a major obstacle due to complex products involving various engineering disciplines and global stakeholders.

- Change management should be integrated into the product change process.

Data Management

- Having multiple systems can result in or directly cause redundant data entry. They can also interrupt the flow of product information from its origin to the point of use.

- Excessive manual data handling leads to information silos, overlapping processes, loss of knowledge, and redundant copies of data – resulting in quality issues.

- A single source of truth should be established for all products.

Data Security

- Enterprise data, knowledge and information are all integrated into PLM systems. This makes it important to establish data protection standards.

PLM Challenges

Turn complexity into competitive advantage

Seven major trends in the market are setting new benchmarks and shaping the future of product lifecycle management

Cloud Transformation

Software-as-a-service (SaaS) offerings and cloud-based PLM are becoming increasingly common, enabling reduced upfront capital investments, full system scalability and data access from anywhere on any device.

Ecosystem Integration

PLM is becoming part of a broader (innovation) platform ecosystem, focusing on seamless data exchange and collaboration throughout product lifecycles and across engineering applications. Examples include application lifecycle management (ALM), building information modelling (BIM), simulation and computer-aided x (CAx) tools.

Lifecycle Data Management

PLM records data and makes it available throughout product lifecycles, enabling digital (product) twins and helping companies to ensure compliance with regulations – e.g. on carbon emissions.

Trends in **P**roduct **L**ifecycle **M**anagement

Configuration and Variant Management

PLM enables companies to better manage the diversity and complexity of their product ranges.

Development Cycle Synchronisation

PLM can orchestrate different development cycles and lifecycles between hardware, software and electronics, allowing efficient synchronization and management of innovation cycles.
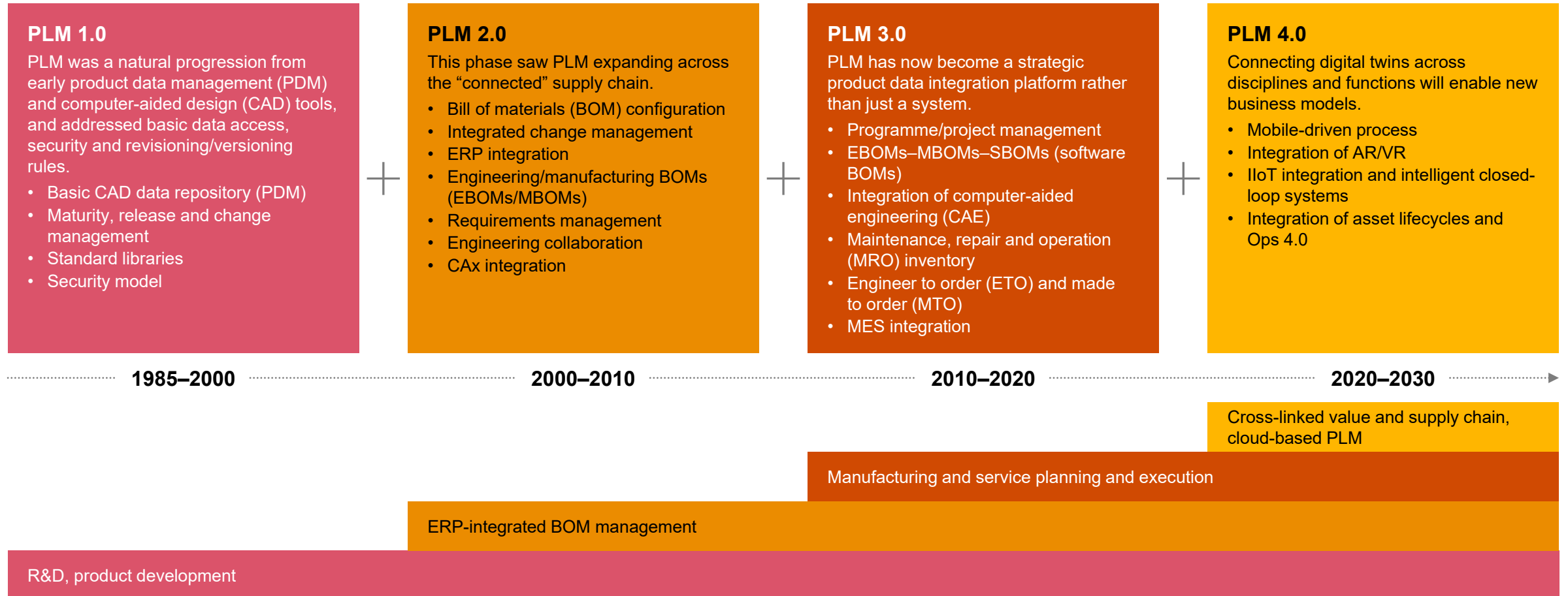
Digital Twin

PLM supports digital product models which are continuously enriched with data throughout their lifecycle. This enables new business models and capabilities such as digital configuration, hardware-free prototyping and closed-loop optimisation.

Sustainability

PLM is creating a framework for developing ESG criteria, and supports data-driven integration of ESG KPIs into corporate planning.

An example PLM ecosystem featuring an E2E digital thread. This enables data transparency and part-centric, holistic collaboration with any domain

PLM 1.0
PLM was a natural progression from early product data management (PDM) and computer-aided design (CAD) tools, and addressed basic data access, security and revisioning/versioning rules.
- Basic CAD data repository (PDM)
- Maturity, release and change management
- Standard libraries
- Security model

PLM 2.0
This phase saw PLM expanding across the "connected" supply chain.
- Bill of materials (BOM) configuration
- Integrated change management
- ERP integration
- Engineering/manufacturing BOMs (EBOMs/MBOMs)
- Requirements management
- Engineering collaboration
- CAx integration

PLM 3.0
PLM has now become a strategic product data integration platform rather than just a system.
- Programme/project management
- EBOMs–MBOMs–SBOMs (software BOMs)
- Integration of computer-aided engineering (CAE)
- Maintenance, repair and operation (MRO) inventory
- Engineer to order (ETO) and made to order (MTO)
- MES integration

PLM 4.0
Connecting digital twins across disciplines and functions will enable new business models.
- Mobile-driven process
- Integration of AR/VR
- IIoT integration and intelligent closed-loop systems
- Integration of asset lifecycles and Ops 4.0

1985–2000   **2000–2010**   **2010–2020**   **2020–2030**

Cross-linked value and supply chain, cloud-based PLM

Manufacturing and service planning and execution

ERP-integrated BOM management

R&D, product development

The PLM ecosystem connects data from all enterprise domains and links internal and external stakeholders

PLM of the future
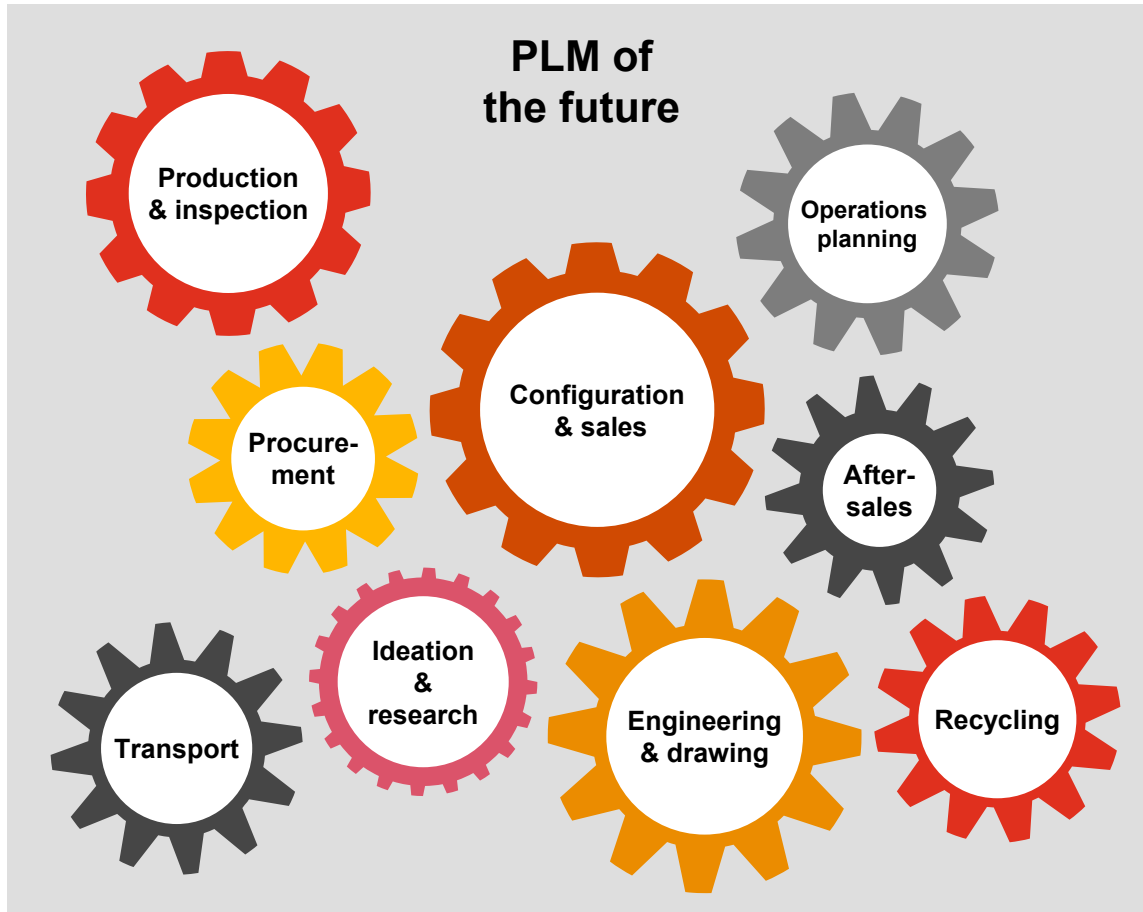
Cornerstones of a modern PLM ecosystem

- Starting from ideation and research, the **PLM system serves as the data backbone for the hardware** throughout the value chain; **Application Lifecycle Management (ALM)** is the **data backbone for the software**.

- The ecosystem collects data, and **makes it available to multiple internal and external stakeholders** and systems that have an interface to this data cloud.

- Connected systems such as **MESs or computer-aided quality system (CAQ)** in factories allow PLM data to be enriched with information on machines and processes. This can then be leveraged to achieve goals such as **quality enhancement, cost optimisation or providing traceable product data** after delivery to the customer.

- This allows **all information relating to an individual product** to be made available, such as serial number, production site and machines, or software version.

- **Applying AI and big data analytics** to PLM ecosystems offers the opportunity to identify even more improvements throughout the value chain.

- **ALM** can be seen as an extension of PLM, ultimately enabling both hardware and software to be integrated in a single BOM.

Successful PLM transformation depends on six key building blocks, mirroring the challenges our clients are facing

Vision
- Develop an overall vision and mission
- Evaluate common business models
- Assess processes and undertake fit-gap analysis
- Design a target vision for the business
- Design a target vision for the solution
- Create a digital twin
- Include sustainability and resilience

Governance
- Cross-functional strategic guidance
- Operational and tactical decision-making
- Strict and effective governance structure
- Mature transformation management functions

Process
- End-to-end thinking across functions and divisions throughout the value chain
- Map out processes – both as-is and to-be
- Create a common vocabulary
- Align design principles
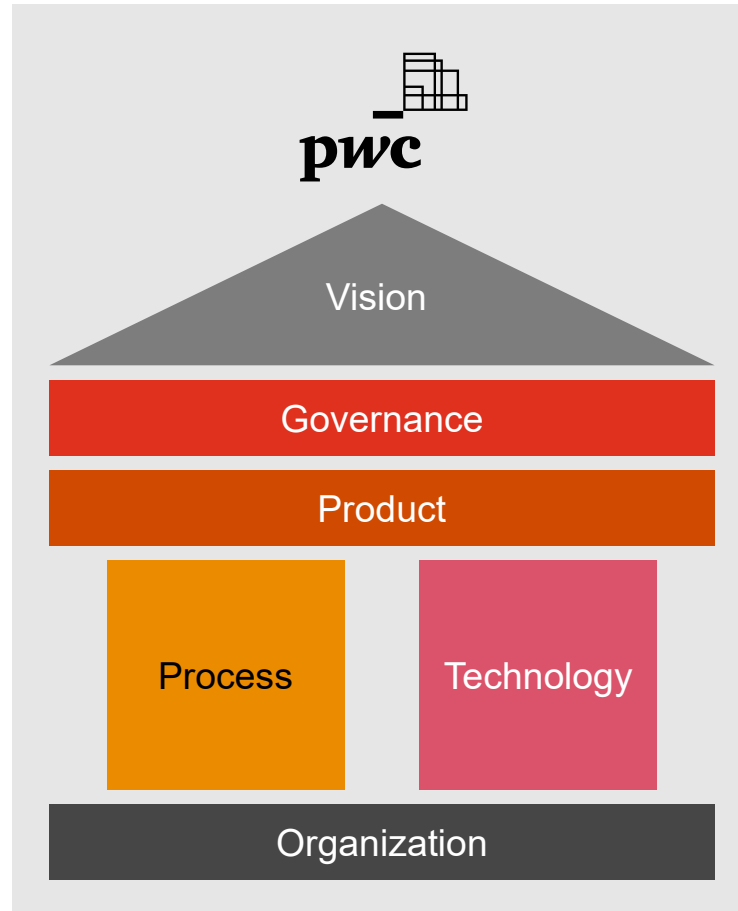
Product
- Design a holistic data model
- Include flexibility to meet future requirements
- Integrate third parties, e.g. suppliers
- Specify data governance

Technology
- Future-fit tool selection process, based on target vision and capabilities required
- Consistently select system integrators
- Orchestrate vendors and integrators

Organization
- Establish clear roles and responsibilities, and get key stakeholders involved early
- Plan and drive change and communication
- Assign and fill roles based on skills
- Allocate capacity based on necessary scope
- Align cultural change with delivery models (e.g. SAFe)

pwc

Vision

Governance

Product

Process

Technology

Organization

Our proven five-step approach helps your organisation to overcome the challenges of a PLM transformation programme

1. Analyse
- Carry out as-is assessment
- Set up the programme
- Refine your vision

2. Design
- Design your solution
- Specify and prioritise functions
- Select tools and integrators

3. Develop
- Sprint planning and execution
- Test your solution
- Deploy your solution

4. Roll-out
- Roll out strategy
- Launch lighthouse projects
- Plan roadmap and milestones

5. Hypercare
- Monitor solution performance
- Train key users and regular users
- Gather feedback

PLM project management

Data migration

Change management

Technology/tool selection

PwC has a track record of successful PLM transformations, from strategy through to implementation, across industries

Our PLM transformation projects have included the following:

Automotive	Energy and utilities	Automation and robotics	Household and electronics	Aerospace and defence
• Holistic **assessment and detailed review** of client PLM programme • Identifying **potential for improvement** based on **major pain points** • Developing **a global PLM vision** • Undertaking a **vendor selection process** to find a suitable PLM solution	• Developing a **strategic target operating model** • Creating **business specifications** and **translating these to the technical requirements, delivering a PLM blueprint** for a technical solution • Specifying **functional prototypes for a PLM collaboration tool** to increase output and reduce costs	• Assessing the current situation in detail, covering **processes, data and IT tools** • Developing a fully **integrated target system architecture.** • **Identifying gaps** between the current state and the target state • Starting implementation and providing support through **overall programme and change management**	• Evaluating the **existing PLM ecosystem** • Identifying and mapping **pain points using our best practice** capability library • Mapping **business models to business case benefits** • Developing an **implementation roadmap**	• Developing **lifecycle management** for military equipment, **from supply to operations** • Designing a modern, holistic **IT landscape** • Providing a **tailored blueprint solution** • Successfully **implementing a PLM ecosystem**
Impact **15%** cost reduction **20%** shorter time to market	**Impact** **17%** efficiency increase **25%** shorter time to market	**Impact** **30%** efficiency increase **29%** shorter time to market	**Impact** **20%** cost reduction **25%** efficiency increase	**Impact** **18%** efficiency increase **22%** lower lifecycle costs

Contact persons

Jochen-Thomas Morr

Partner

📞 +49 69 / 9585-2033

✉️ jochen-thomas.morr@pwc.com

Dr. Tobias Zimmermann

Manager

📞 +49 211 / 981-4788

✉️ tobias.zimmermann@pwc.com

Dr. Ahmad Rabanizada

Senior Associate

📞 +49 40 / 6378-1582

✉️ ahmad.r.rabanizada@pwc.com

Thank you

pwc.com