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# Product Lifecycle Management Using AI

**Manikandan Natarajan**

Supply Chain Architect

**Abstract:**
Recently, artificial intelligence (AI) technology receives extensive attention in the manufacturing field. As the core technology, it generates considerable interest among smart manufacturing and Industry 4.0 strategy.
Product lifecycle management (PLM) copes with various kinds of engineering, business, and management activities concerning a product throughout its whole lifecycle—from the inception of an intangible concept through the recycling of a finished product.
PLM platforms are suites of connected software bringing together people, processes and data, creating a seamless collaborative environment. In addition, making product creation simple, successful and sustainable.
In the context of smart manufacturing, this paper reviews various theories, algorithms, and technologies of AI to different stages of PLM (i.e., product design, manufacturing, and service).
A structured roadmap is presented to navigate the future research and application of AI in PLM. This paper also discusses the opportunities and challenges of applying AI for PLM.
This paper also discussed into AI built into your (PLM) Product lifecycle Management processes. Transform your PLM with AI-driven insights, recommendations, and automation integrated into supply chain solutions from.
With AI Technologies, you can predict events, make better-informed decisions, and modernise functions from design to operate.

- Predict customer demand reliably with AI-powered demand forecasting
- Improve quality with intelligent anomaly detection and visual inspections
- Synchronise operations and maximise efficiency with predictive maintenance
- Intelligent access to information through the Joule copilot in PLM solution

**Keywords**: Artificial intelligence. Product lifecycle management.

## Introduction:

The design to operate (D2O) process includes the entire lifecycle of products in an end-to-end, connected, and interoperable supply chain process from how a product can designed, planned, manufactured, delivered, to how it operates and maintained.
The planning stage of the process involves defining supply chain, manufacturing and service-fulfilment strategies; planning demand, inventory, and supply; aligning plans through sales and operations planning; and finally, managing supply chain performance.
The planning process culminates in the initiation of operational procurement.


The production stage of the process includes production planning, production operations, quality management, and production performance management – for both tangible and intangible goods.

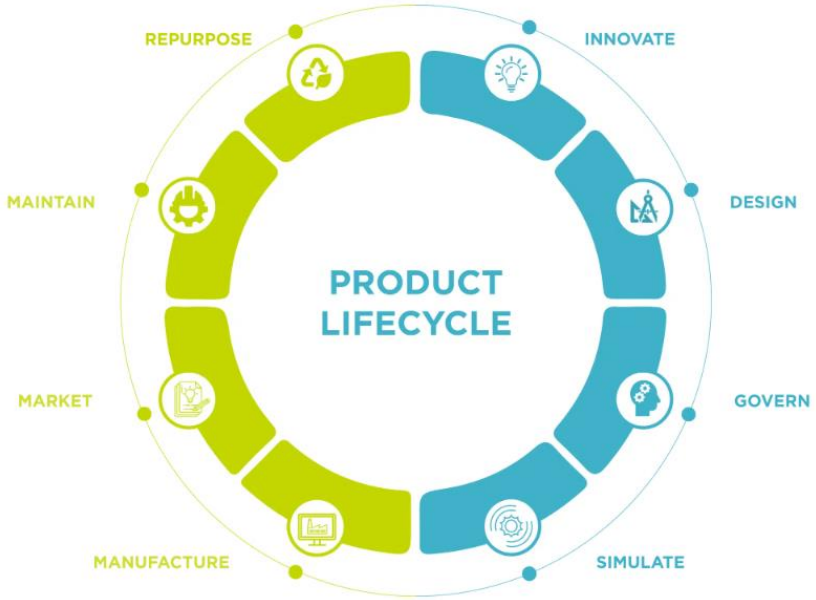
The delivery-and-fulfilment stage of the process differs for tangible goods versus services. For tangible goods, it covers inbound or outbound deliveries in any context as well as order promising, warehouse and inventory management, dock and yard logistics, transportation management, and logistics performance management.

For services, it involves service planning and scheduling, service execution and delivery, and service performance management.

**Product Lifecycle Management:**

PLM is a holistic approach to product development. It incorporates every aspect of a product's lifecycle – from innovation through to repurposing, reuse and recycling.

PLM platforms are suites of connected software bringing together people, processes and data, creating a seamless collaborative environment. In addition, making product creation simple, successful and sustainable.



However, the platform itself is only a set of tools that support your teams in their individual roles.
When implementing PLM in your organization, each of your teams should be prepared to take on an entirely new approach to product development.
So, let us break down each phase of a product's lifecycle and see how PLM supports, enables and enhances your teams' performances.

**Product Lifecycle Management Using AI:**

AI integration into PLM tools revolutionizes product development by automating tasks, providing contextual assistance, and optimizing decision-making processes.
From design optimization to supply chain management, AI augments human expertise, streamlines workflows, and accelerates time-to-market.


Predictive analytics enable proactive maintenance, while sustainability assessments align product development with environmental objectives.
Overall, AI in PLM tools enhances efficiency, agility, and innovation throughout the product lifecycle.

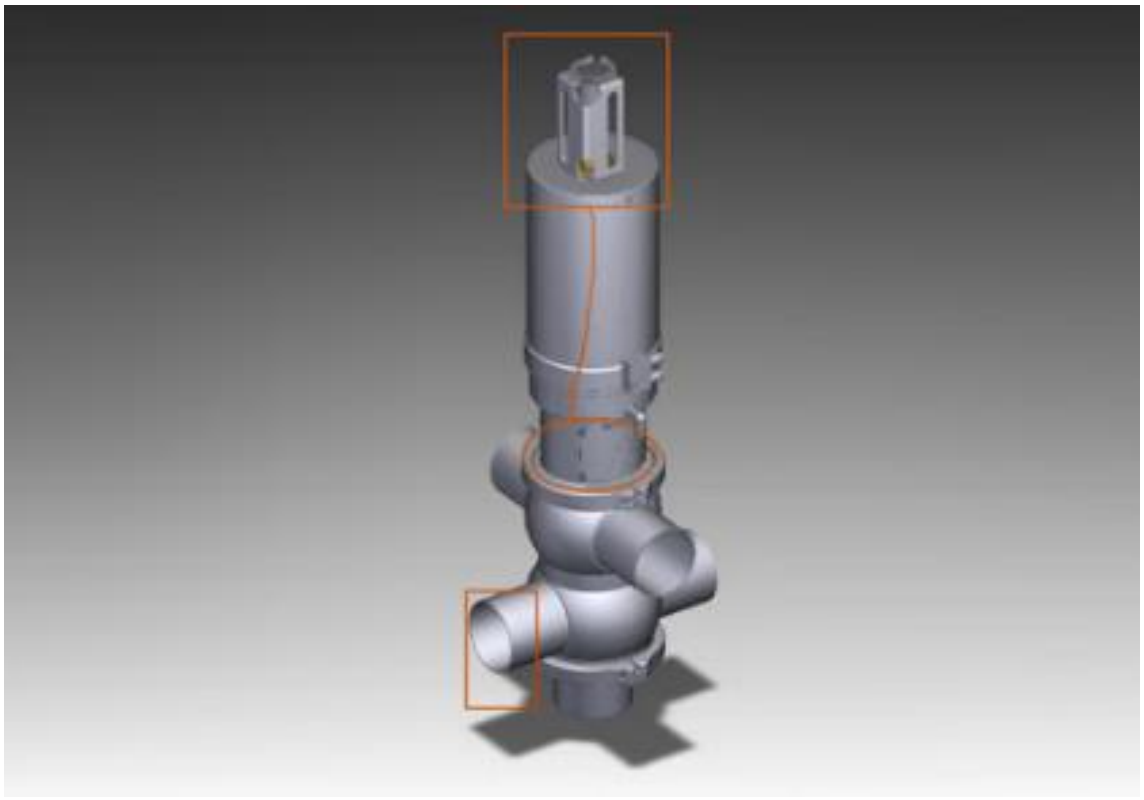
**Reimagine innovation with product development in the cloud:**

Reduce time to market by digitalising product development from design to operate for discrete manufacturers and design to consume for process manufacturers
Accelerate product development, speed time to value, and reduce costs with the Product Lifecycle Management solution, formerly known as Enterprise Product Development.

- Software as a service (SaaS) solution to support the collaborative idea-to-market process
- Bi-directional product data synchronisation

**Revolutionise the innovation funnel:**

Support a fact-based approach to product development. Using 's AI copilot, Joule, product developers can now gather and enhance new product ideas quickly and effectively using natural language queries.



**Augment the product engineering process:**

Empower end users to increase efficiency and eliminate redundant tasks. Reduce time spent on tagging master data to 3D visualisation objects by 50-70%.

Automatically identify and assign respective master data to each component in the 3D visualisation.

- Single source of truth for product data
- Embedded collaboration and a 360-degree overview for better analysis and decision making

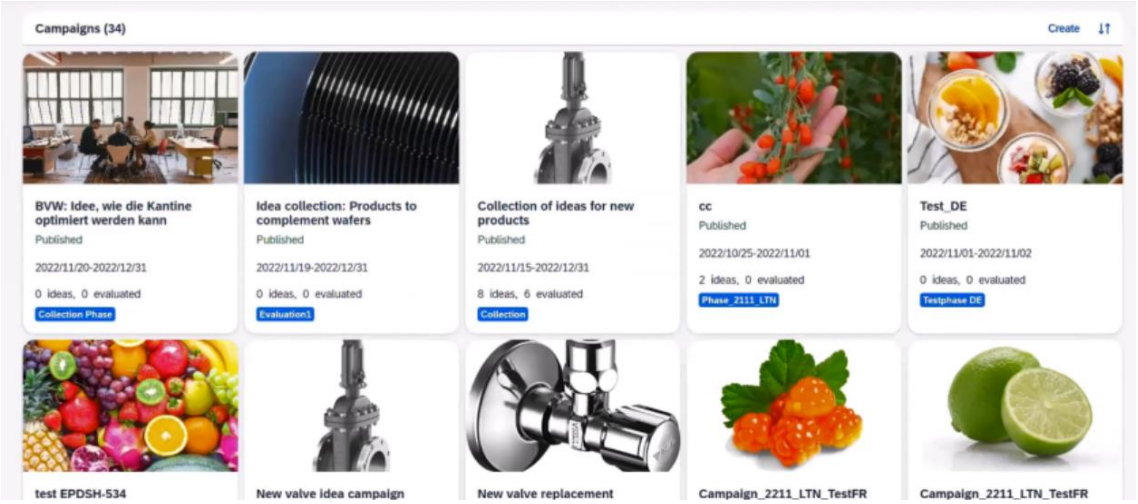
**Key features**

**Define:**

- Run crowd innovation campaigns to identify new product development needs
- Obtain feedback and insights from voice-of-the-customer systems, service feedback, sensors, and more
- Link requirements to product and business data for full traceability and transparency

**Develop:**

- Collaborate in real time to minimise the risk of supply chain disruptions
- Verify and validate product performance against requirements
- Build a single source of truth for product, raw material, and packaging specifications
- Control product data, enforce consistent change management, and create an audit trail to fulfil regulatory requirements




**Deliver:**

- Combine business data and engineering models to create smart products and digital twins
- Create recurring revenue streams with subscription-based business models
- Hand over different product model views to extend and augment the digital thread
- Turn product data into spare parts catalogues to increase order accuracy and drive aftermarket revenues
- Transform 3D product data into interactive visual service instructions with augmented reality

**Manage:**

- Connect 3D CAD data to ERP and master data to visualise and manage products as digital twins
- Manage your product master data and sustainability information to make better, faster decisions
- Empower teams to take the right actions based on information in dashboards, KPIs, and charts
- Integrate the product development process with S/4HANA and the extended enterprise

**Key benefits**

**Innovate new products quickly:**

Develop high-quality, connected, compliant, and sustainable products through innovative development processes.

**Provide actionable information:**
Enable enterprise collaboration with all relevant information, insights, and stakeholders to accelerate product development

**Empower the enterprise:**
Create closed-loop enterprise processes to synchronise the digital thread from design to operate and design to consume.

**Conclusion:**
In conclusion, the integration of Artificial Intelligence into Product Lifecycle Management represents a pivotal shift towards more efficient, agile, and innovative processes.
With AI tool at the forefront of AI-driven PLM solutions, organizations can unlock unparalleled opportunities for optimization, collaboration, and growth.
Embrace the future of PLM with AI tool and revolutionize the way you innovate, streamline, and succeed in today's dynamic market landscape.
As the growing breakthroughs of platforms, algorithms, and interaction modes, AI research and application have shown explosive growth in modern industries.
This paper thoroughly investigates the sophisticated and promising applications of AI in the context of PLM. In the product design stage, AI can enhance design decision-making in conceptual design, embodiment design, and detail design by mapping, in a highly customized fashion, customer needs and preferences to product attributes, functions, and performance.
In the product manufacturing stage, AI can support perception, analysis and decision-making in material selection, supplier selection, production planning, shop-floor organization, and warehouse logistics.
In the product service stage, the main task of AI is to enhance human-computer interaction, behavioural control, and intelligent decision-making in terms of customer service, product maintenance, disassembly, and recycling, as a way, to improve the information, intelligence, and sustain-able development of product-service ecosystem

**References:**
1. https://www.engineering.com/how-ai-can-improve-plm/
2. https://makersite.io/ai-enabled-product-lifecycle-intelligence-pli/