

Chapter 1 – Introduction

Product lifecycle management makes it possible to command the whole lifespan of a product and the information connected with it. Efficient product lifecycle management enables companies to compete successfully in international and global markets.

What is a product?

Usually, when talking about products we mean tangible products i.e. goods. The term goods refers to physical, tangible products that can be owned, traded, and distributed to different places at different times without changing their identity. However, a product in a modern world can also be something very intangible such as a piece of software, a piece of knowledge or an algorithm or a formula. They are products as much as tangible products are.

When referring to a product in this book, we refer to three different kinds of products:

1. Goods meaning physical, tangible products
2. Services (a definition for services will be addressed in more detail in chapter 9)
3. Intangible products meaning non-physical products that are not services. For example:
 - Software
 - An algorithm

PLM: What is it?

In many ways, product data management can be seen as a subset of PLM. First EDM (Engineering Data Management) and then PDM (Product Data Management) emerged in the late 1980s as engineers in the manufacturing industries

recognized a need to keep track of the growing volumes of design files generated by CAD (Computer Aided Design) systems. PDM allowed them to standardize items, to store and control document files, to maintain BOM's, to control item, BOM and document revision levels, and immediately to see relationships between parts and assemblies. This functionality let them quickly access standard items, BOM structures, and files for reuse and derivation, while reducing the risk of using incorrect design versions and increasing the reuse of existing product information.

However, the benefits of operational PLM go far beyond incremental savings, yielding greater bottom line savings and top-line revenue growth not only by implementing tools and technologies, but also by making necessary, and often tough, changes in processes, practices and methods and gaining control over product lifecycles and lifecycle processes. The return on investment for PLM is based on a broader corporate business value, specifically the greater market share and increased profitability achieved by streamlining the business processes that help deliver innovative, winning products with high brand image quickly to market, while being able to make informed lifecycle decisions over the complete product portfolio during the lifecycle of each individual product.

The scope of product information being stored, refined, searched, and shared with PLM has expanded. PLM is a holistic business concept developed to manage a product and its lifecycle including not only items, documents, and BOM's, but also analysis results, test specifications, environmental component information, quality standards, engineering requirements, change orders, manufacturing procedures, product performance information, component suppliers, and so forth.

On the other hand, modern PLM system capabilities include workflow, program management, and project control features that standardize, automate, and speed up product management operations. Web-based systems enable companies easily to connect their globally dispersed facilities with each other and with outside organizations such as suppliers, partners, and even customers. A PLM system is a collaborative backbone allowing people throughout extended enterprises to work together more effectively.

Operational efficiencies are improved with PLM because groups all across the value chain can work faster through advanced information retrieval, electronic information sharing, data reuse, and numerous automated capabilities, with greater information traceability and data security. This allows companies to process engineering change orders and respond to product support calls more quickly and with less labor. They can also work more effectively with suppliers in handling bids and quotes, exchange critical product information more smoothly with

manufacturing facilities, and allow service technicians and spare part sales reps to quickly access required engineering data in the field.

In this way, PLM can result in impressive cost savings, with many companies reporting pay-off periods of one to two years or less based solely on reduced product development costs. PLM also enables better control over the product lifecycle. This gives opportunities for companies to boost revenue streams by accelerating the pace at which innovative products are brought to market. Excellent lifecycle control over products also gives new opportunities to control product margins more carefully and remove poorly performing products from the markets. This set of benefits, driving top line revenue growth and bottom line profitability, makes ROI extremely compelling, with some industry analysts characterizing PLM as a competitive necessity for manufacturing and software businesses and today also for service businesses.

Product Lifecycle Management: background

Product lifecycle management (PLM) is a systematic, controlled concept for managing and developing products and product related information. PLM offers management and control of the product (product development, productizing and product marketing) process and the order-delivery process*, the control of product related information throughout the product life cycle, from the initial idea to the scrap yard (figure 1). Almost without exception, the PDM and PLM abbreviations also refer to information systems developed to manage product lifecycle and product related data.

The core of product lifecycle management is the creation, preservation and storage of information relating to the company's products and activities, in order to ensure the fast, easy and trouble-free finding, refining, distribution and reutilization of the data required for daily operations. In other words, work that has once been done should remain exploitable, regardless of place, time or – within prescribed limits, naturally – data ownership. At the same time, the idea is to convert data managed by the company's employees, skilled persons and specialists into company capital in an easily manageable and sharable form – as bits.

* In many fields of manufacturing industry, the order-delivery process is also called the customer process due to the frequency of build-to-order production. The fulfillment of the customer's purchase order, i.e. the manufacture and delivery of the actual product, is already allocated to a certain customer and to a certain order. In this context the customer process is considered a synonym for the order-delivery process and does not refer to customer relations management.

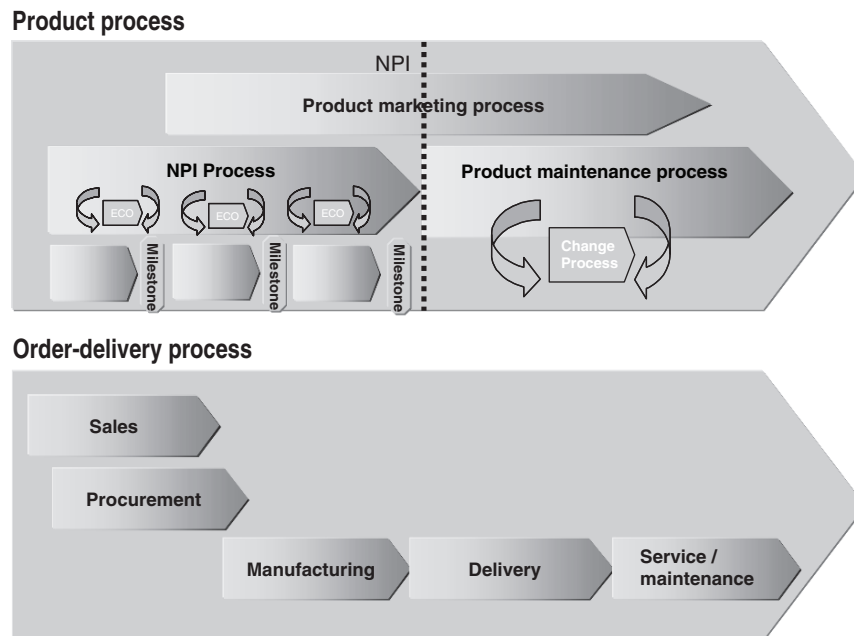


Figure 1. Product (product development, productizing, product design maintenance and marketing) process; order and delivery (customer) process. (Note: In many fields of manufacturing industry, the order-delivery process is also called the customer process due to the frequency of build-to-order production. The fulfillment of the customer's purchase order, i.e. the manufacture and delivery of the actual product, is already allocated to a certain customer and to a certain order.) NPI refers to New Product Introduction.

Recently capital goods manufacturers in particular have tried to find new business opportunities in services, especially the after market services that surround products. Traditional manufacturing industries are increasingly interested in offering their customers a wider range of value added services. The objective is to provide services covering the whole life cycle of the product, which – especially for capital goods – can be as much as 30 years. On the other hand, product and component life cycles are shortening while new products must be delivered to market more quickly than before.

From this perspective the term PDM gains a wider meaning, and now we more often speak of Life Time Service of products and management of the life cycle of the product, from PLM (Product Life cycle Management). The management of the whole life cycle of products and related services is becoming a central factor in certain fields of industry. In addition to PLM and Life Time Service, the term

Extended Product is also used of this wider outline in some connections. Service functions are connected to the concept of the extended product both before the production and after the delivery of the product.

Customer guidance is a driving force behind companies. Competition is hard in international markets. Companies must be able, cost-efficiently, to serve customers better and react more quickly to changing markets. Combined with cost-effectiveness, reaction and service capacities are closely related to rapid product development and order/delivery processes and fast, controlled reactions to changes in market conditions. It should be possible to change the product's design or development and production processes quickly, even if it is often for a single client.

One feature of the modern business world is powerful inter-company networking. Individual products are generally born from cooperation between companies, each of which is responsible for some part of the product's planning, component preparation or assembly. The task of the principal (owner of the product trademark or product concept or OEM – Original Equipment Manufacturer) or the company selected for the role of principal is the management of the whole network and the coordination of cooperative effort. The management of an extensive and scattered network of subcontractors and partners is not easy. It requires very effective data management.

Corporate challenges

Large companies handle considerable amounts of data. The manufacturer of millions of units of complex, customer-tailored products across a broad product range clearly cannot operate globally without effective data management. Software and service companies often create and produce extremely complex products with high level of configurability. In these businesses it is absolutely necessary to master the definition of each product in order to be able to design the product functionality further as well as handle the delivery, maintenance and support of the product efficiently.

On the other hand, the data produced by existing information system applications is already in an electronic format. In any case, it is electronically stored somewhere. This makes possible the inauguration and effective exploitation of information systems designed for product lifecycle management.

In a networked operational business environment, making changes to product designs or product implementations is also a big challenge, when data integrity

must be preserved regardless of circumstances. All the interested parties must have access to the latest version of the documentation of each product. In addition, it should be possible to see the effect of changes to product elements as the changes are planned.

Modern industry almost invariably uses various information systems as aids in planning, production, delivery and customer service. This demonstrates one of the challenges of the networked operational environment. Different parties each have their own systems, and yet information and files must be transferred, used and refined throughout the network. The necessary technology is available. Its application is a little more difficult, but not impossible.

The practical application of product lifecycle management – the implementation of the PLM system within the company – is an extensive project involving a detailed and laborious definition of various features of the business processes of the company. It is important, indeed essential from the system implementation point of view, that the company is thoroughly acquainted with its own business processes. Additionally, it is important to note that the storage, management and use of product data affect a large part of the company's organization.

It is also useful, when implementing a product lifecycle management system, critically to scrutinize the company's operational models, processes and information models. If necessary, the processes and information models must be changed and renewed. It is worth noting that the implementation of a first PLM-system within a company often involves large changes in its processes. This naturally causes resistance within the organization, prolonging the adoption of new processes and the PLM system itself, while also increasing the need for staff training.

In this book, we examine the basics of product data and product lifecycle management and review the nature and extent of the development project required for the initiation of systematic product lifecycle management. In addition, we examine points essential to the smooth and successful completion of a PLM information management project. We also consider the significance of product lifecycle management from the viewpoint of company-wide operational development and the move to electronic business.