Building a PLM concept

Introduction

Today we hear many companies say - Product Lifecycle Management (PLM) is an important part of their business strategy or PLM has a big role in their corporate strategy. What does this mean in practise? The most difficult issue, regarding business strategy and strategical decisions, is the implementation of the decisions made in the strategy definition. This generalization also applies also PLM.

It might be difficult to find and create a practical business strategy for a company, however the making it true is even more difficult. This is especially true when the implementation of strategical decisions require large scale transformation – a long lasting, corporate wide change process - in daily operations. When talking about PLM and business strategy usually it is all about this, making a huge leap to next level regarding lifecycle management operations and product management practices. When the first big transformation towards well controlled and IT-system enabled PLM has been made, PLM operations are business as usual and the real life realization of strategical decisions in the PLM area becomes much more straight forward.

Importance of PLM

PLM - is an essential tool for coping with the challenges of more demanding global competition and ever-shortening product and component lifecycles. New and better products must be introduced to markets more quickly, with more profit and less labor, and the lifecycle

of each product must be better controlled, for example from financial and environmental perspectives. Fierce competition in global markets drives companies to perform better. In order to perform well financially, companies must be able to make informed decisions concerning the lifecycle of each product in their portfolio. Winner products must be introduced to market quickly and poorly performing products must be removed from the market. To do this well, companies must have a very good command of the lifecycle of each product. A good command of product and process definitions over a large product portfolio requires that ways of operation and IT-systems must support each other flawlessly.

Today's complex products require the collaboration of large specialist networks. In this kind of supplier and partner network, product information must be transferred between companies in electronic form, with a high level of information security. Overall, PLM can also be considered as a tool for collaboration in the supply network and for managing product creation and lifecycle processes in today's networked world, bringing new products to market with less expenditure of time and effort.

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.

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 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 manufacturers.

How it is understood?

Well, what does all this – the strategical value of PLM and the undisputable benefits of it - mean for corporate management? It means in practice making a big decision to implement the defined strategy in practice in order to gain the wanted strategical and operational benefits.

This decision making is usually the first pitfall of PLM realization. The management decision is usually to implement an IT system to reach for the benefits promised. The big question however is, that why an earth if PLM is a strategical issue for a corporation and large scale transformation procedure it turns out to be an IT-project in the end? Are all other strategical objectives in a company turned into IT-projects – I would definitely say no.

The second common mistake usually why PLM misses the targets set for it, is the fact that companies go straight to implementing an IT-system to meet PLM development needs and solve problems at hand. Companies seldom recognize the fact that the PLM maturity of the

company is too low to launch a large scale PLM system project for the first time. There simply is not enough understanding of PLM and its possibilities, but also its impacts to current way of doing things. Usually the case also is that the processes and practices of a company are not mature enough to be utilized in PLM context.

In this kind of immature development phase, where the decision has been made to start the PLM implementation project and targets have been set for creating realization for PLM, it means that IT will lead the way to the targets making all very major essential business / process definitions, making up business rules, etc. in the PLM area. Well everyone can guess – is this the right way to do this?

The third big why – why PLM fails to deliver the benefits set for it, is because the PLM IT solution has been build as an independent island, a point solution, without lager and deeper connections to daily business. Again, I can be said that IT drives the development of PLM, when all necessary business drivers has not been recognized, defined or understood.

How it should be realized?

How to tackle these pitfalls then? One good solution is to grow the PLM maturity of the company by creating a comprehensive PLM business concept first and after that start planning for a PLM project with high objectives. Building the PLM maturity and creating a PLM business concept helps companies and organizations in understanding the nature and the scale of the transformation of the practices; it also builds foundation for new management models in the PLM area and naturally creates the practices and the process for new ways of executing efficient PLM. I.e. the benefits of the creation of the PLM business concept are two fold: the PLM maturity will develop during the definition of the concept while the required PLM business decisions are made and the rules and practices are developed outside an IT-implementation program by proper resources of the organization.

In the following there is a definition of Saaksvuori PLM Maturity model that defines five stages of PLM maturity. (ref. The model has been adapted from COBIT IT maturity and follows the same principal idea.)

Based on exhaustive experience regarding PLM implementations I would claim that a company about to launch a PLM implementation project must be on level 3 (Saaksvuori PLM maturity scale) before stating a PLM project. This is absolute necessity in order to enable smooth implementation of PLM practices as well as an IT system supporting PLM. Being on the level 3 assures that all required and vital PLM related business decisions have been made and a smooth PLM implementation is enabled. In practice this means that the business definitions referred to in the Saaksvuori PLM concept are made on one way or the other.

Product Lifecycle management concept (as defined by Antti Saaksvuori)

The purpose of a PLM concept – product lifecycle management concept - is to describe the business framework, the drivers, rules, terms and requirements for product lifecycle management in certain context.

The product lifecycle management concept, at its simplest, is a general plan for practical product lifecycle management in daily business at the corporate level, in a particular business or product area. It is a compilation of business rules, methods, processes, and guidelines as well as instructions on how to apply the rules in practice. Usually, the product lifecycle management concept covers at least the following areas:

- Terms and abbreviations used in this field: (definition of product, product element, component, item, document, lifecycle, lifecycle phases, etc.)
- Product information models and product models
- Definition of products and product-related information objects:

- definition of product information (What is considered as product information?)
- items (what is an item, how it is identified? etc.)
- product structures (how a structure is build, how it will behave, what are the rules attached to it?)
- configuration rules (what are the relationships is a product structure, how will they behave? etc.)
- product-related documents (what is a product document, how it is identified? etc.)
- Product lifecycle management practices and principles used and applied in the company (how products are managed throughout their lifecycle, identification of information management principles such as versioning principles, information statuses, etc.)
- Product management related processes
- Product information management processes
- Instructions on how to apply the concept in everyday business

The PLM concept must be created by experts having through understanding of the PLM best practices and common methods as well as the current practices within the company. The creation of the concept must be done with the management of the company, simply because there are number of high level business decisions to make while creating the concept. It should be notes as well that the concept must be reviewed closely by the organization utilizing the practices defined in the concept, this is the only way to bind the personnel into executing the practices defined in the concept.

The significance of building this kind of product information concept lies in the need to set common business rules for the entire corporation and its business and product areas. A carefully specified concept makes it possible to achieve synergies between businesses and between products. A common product information concept allows for the smooth and speedy implementation of PLM-related processes and practices because the most crucial areas of information have been agreed at common and conceptual levels.

A good PLM-concept is never static; it keeps evolving in tune with the business and its requirements.

PLM Maturity model

The idea of the PLM maturity model (refer to COBIT generic maturity model) is to describe, on a rough level, how a company and its management team can develop and extend the use of a corporate-wide PLM concept and related processes and information systems. The origin of the model lies in the idea of phases or stages, which a company usually goes through as it adapts to new cultural issues, processes, management practices, business concepts, and modes of operation. These stages represent the organizational growth, learning, and development that occur as new methods are implemented in large corporations.

One of the best practical applications of the model can be to determine the maturity or readiness of a large international corporation for a corporate-wide PLM development program. Usually, the various parts of a large corporation have been allowed to develop at different paces, with little synchronization. Some parts of the corporation have been acquired or rearranged and some have developed purely through organic evolution. This kind of development leads to a situation where current processes, product information content and quality, and employee skills can exist at very different levels in different parts of the organization. In order successfully to develop business- and PLM-related issues such as processes or information, the current situation of every business unit, regional unit, or product area must be recognized and sufficiently understood. The PLM maturity model is valuable tool for this evaluation and analysis.
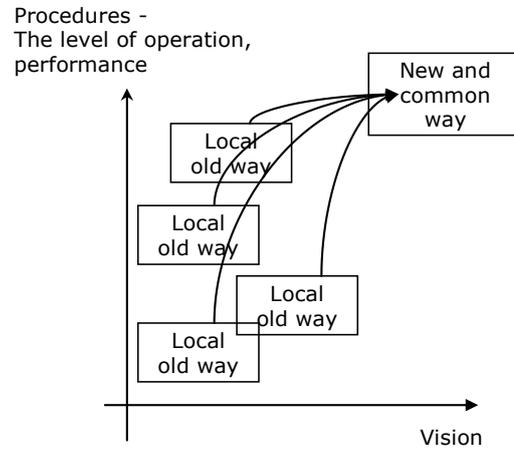
Figure1. An example of the variance in maturity of different business units, organizations, or locations, and the required development paths of these units or business entities in large corporations.

	Saaksvuori	*PLM maturity model*
1	**Unstructured**	The PLM topic has been recognized and its importance agreed. Work must be done to define and develop the PLM concept and standards. However, at present, there are no defined approaches concerning lifecycle management; all lifecycle and product management issues are resolved by individuals on a case-by-case basis.
2	**Repeatable but intuitive**	Lifecycle and product management processes have developed to the stage where similar procedures are followed by different people undertaking the same task within one organization (i.e. the processes function on ad hoc bases, corporate wide procedures or definitions do not exist). There is no formal development, definition, training, or communication of standard processes; all responsibility is left to individuals. There is a high degree of reliance on individual knowledge and therefore errors occur.

3	**Defined**	Processes and basic concepts are standardized, defined, documented, and communicated through manuals and training (on corporate level, in all business units – geographical, functional units). However, the human factor is important, there is no end-to-end PLM process supporting IT systems, all work is completely or partially manual from the process point of view. IT systems support individual parts of processes. The PLM processes or basic PLM concepts are not best-of-the-breed, nor are they uniform throughout the corporation, however they are formalized. There is common understanding of the to-be model how PLM shall be executed in the future.
4	**Managed and measurable**	It is possible to monitor and measure the compliance between processes and to take action where processes are not functioning well. Processes and concepts are under constant improvement and provide best practices. IT systems support PLM processes well. Process automation is used in a partial or limited way. Processes and concepts are developed through clear vision throughout the corporation. The state of uniformity of processes is clear.
5	**Optimal**	Processes and concepts have been refined to the level of best practice, based on continuous improvement and benchmarking with other organizations. IT is used in an integrated manner and process automation exists on an end-to-end basis.

Antti Saaksvuori is well known management consultant operating in the field of PLM. He has been helping dozens of companies in various branches of industry to develop their business through the possibilities brought by strategical and well structured product lifecycle management. Currently Mr. Saaksvuori is a partner in Talent Partners Ltd. (Finland based management Consulting Company.)

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Corporation level PLM problems and some solutions as well

Large corporations are all but homogenous what comes to their ways to operate, processes and culture. Companies have evolved through organic growth, business acquisitions, strategic investments and expansion to new markets. In practice this means that a corporation usually consists of number of business areas, geographical areas (or sites) and product areas. Various business areas may even have different business models in use. One business area makes business by delivering large projects, while other BU's develop and manufacture appliances and software to be delivered as standalone or as part of larger turnkey system delivery projects and then there is a services business unit providing lifecycle services in order to maintain and support the delivered systems and appliances.

Evolution in large corporations is usually not uniform throughout the corporation; there are more developed units and less developed units, usually dependent on the history and tradition of the unit in question. Sometimes development work is initiated by corporate directives and sometimes by local or business unit management. In many cases the agenda and priorities of corporate level development unit is a bit different than the local or business unit specific priorities, driving the development of processes, systems, skills and capabilities to different directions.

The PLM process and system development is usually launched in this kind of business environment where the understanding of PLM related issues is not shared throughout the corporation and the maturity of product development and management processes, tools and methods is not common throughout the

corporation. The product and business portfolio of the company might be a set this and that, something old and something new. If a PLM development project is launched in this kind of situation with the vision statement saying that" the PLM system and the processes to be implemented are common throughout the company" the project is likely to fail.

In the following list there are couple of very typical pitfall scenarios which will emerge (I will guarantee it!) when PLM development is initiated without full and deep understanding of the portfolio of products, set of businesses and local flavors in the business set-up and the PLM related maturity of these dimensions.

1. PLM system is designed to match the needs of one business area, geographical area or product area. When other BU's or PA's will start implementing it – the developed set of tools and processes - they realize the fact that PLM does not support their business needs at all
2. PLM system is a lukewarm compromise between the needs of all PA, GA and BA's which does not meet full requirements of any of these dimensions
3. PLM system implementation project decides all business related issues (e.g. product lifecycle phases and the phase change criteria) or PLM system project is stuck and cannot move on due to undecided business issues
4. PLM system project realizes when migrating products into the system that the products the company produces are very different by nature and thus cannot be implemented to the system
5. PLM system project tries make a giant leap from very immature ground and will fail because there are too many issues undefined and the capabilities of the current processes and methods do not allow this kind of giant leap
6. The use of more complex business models such as solution business model is not possible due to mismatch understanding of a product on conceptual level and e.g. service products cannot be implemented into a PLM system
7. Comprehensive allocation of product cost and revenue is not possible in a uniform way across PA, BA or GA due to mismatch in the logic of product arcihtecture

8. Product comparison / analysis is not possible in the portfolio level (lifecycle phases, products)

My suggestion to resolve or rather avoid the pitfall scenarios is to:

1. Evaluate your baseline thoroughly i.e. what is the real state of PLM maturity in each GA, BA, BU
2. Create a vision of the future state of PLM in your corporation
3. Evaluate the gap's between the PLM vision and the baseline
4. Create a comprehensive PLM concept
   o Including a product information model defintion covering all product areas
5. Build the PLM maturity in your company to a more uniform level using the PLM concept creation project as tool
6. Understand all business models used in the corporation
7. Draw a road map for the entire PLM development path including the implementation of the new PLM concept, processes, ways to operate and system

- When all the above is done your are ready to launch a traditional PLM development program in a company producing different kinds of products in numerous sites