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Master Data Management in PLM for the Enterprise Scope

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Abstract. Establish and management of 'Master Data' is a prerequisite in the PLM system deployment. If the PLM project goes without company-wide 'Master Data', it is need to go back to the first step of the project and make these 'Master Data'. In this paper, the definition of PLM, the process of the PLM system implementation, how to make a classification of 'Master Data' required for the PLM system deployment will be described.

Keywords: Master Data, MDM, Product Lifecycle, PLM, IT Governance

1 Introduction

Product Lifecycle Management ("PLM", henceforth) is one of the innovation initiatives. It is not a bunch of IT systems but a philosophy, and PLM system regarded as inevitable enterprise IT system as ERP and SCM. Because, Products define a company[1], and manufacturing companies keep on trying to innovate the way to make products which define the company.

PLM has been used in variety of industrial disciplines, also in the electric and electronics industries, with different solutions used according to the product type. It is not easy to integrate entire engineering IT systems and build an enterprise PLM system, even in a company that produces a single product family.

Moreover, making an integrated PLM system is a challenge to a company like the global enterprise electronics company which produces a variety of products including TV, IT devices as smart phone, semiconductors, home appliances as washing machines and refrigerators, because each of the business units requires different PLM solutions that fit for their own purposes.

Master data is key to the PLM system implementation and Master Data Management ("MDM", henceforth) is important strategy for the global manufacturing company

This paper describes the definition of PLM, the process of the PLM system implementation, how to make a classification of 'Master Data' required for the PLM system deployment will be described

2 Definition of PLM

PLM is known that first advocated in their annual report (2000) by Dassault Systèmes, and now being treated as a common noun as with CAD / CAM / CAE / ERP / SCM. The definition of PLM is defined by the number of companies and organizations; Fig. 1 illustrates a "Word Cloud" form shown by varying the size of the word according to the frequency in the sentence number of definition of PLM by Gartner, CIMdata, Dassault Systèmes, Siemens PLM, PTC and SAP PLM.

Looking at this word cloud, a few key words are well noticeable like 'PLM, Business, Product, Process, Definition, Information and Management'. Referring to mean a combination of these words, PLM can be defined as "Defines and Manages the Product and Process Information for Business".



Fig. 1. Word cloud of PLM definition.

In order to achieve effective horizontal integration at a global company with employees working in the global longitude, executives connected to the company's knowledge base and establish social ties between employees and it should form a kinship. These are supported by a standardized technical framework, Prof. Sumantra Ghoshal created a framework for the enterprise integration as Fig.2 [2].

This framework includes 'Intellectual Integration', 'Emotional Integration', 'Social Integration' and these are linked to 'Operational Integration'. PLM is central to the role of 'Operational Integration' as well as ERP and SCM. Master data is key role in these kinds of integration of the enterprise.

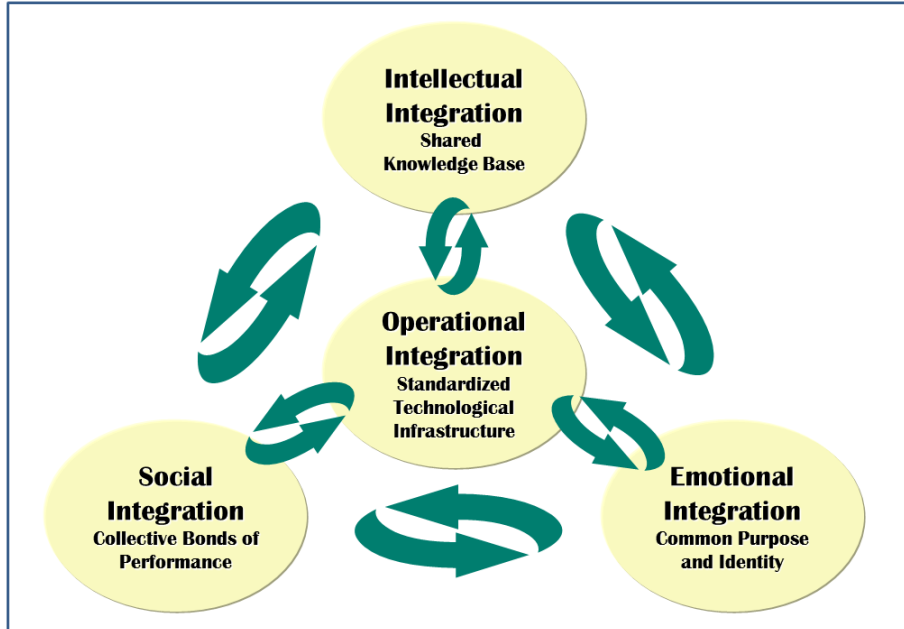


Fig. 2. Framework for organizational integration [2].

3 The Process of the PLM System Implementation

The scope of PLM needs to be defined in an early stage of the project according to the status of the company. In the early years, PLM was defined as a set of CAD, PDM and digital manufacturing solutions [3, 4]. But recently CAD is no longer a main actor in the PLM world, but a step of 'plateau of productivity' [5]. Other emerging technologies are portfolio management and requirement management. PLM functionality can be defined in various ways [6, 7, 8, 9]. In this paper, we introduced 12 function blocks.

In the a system perspective, each of the 12 function blocks can be defined as R&D strategy management, project management, performance management, portfolio management, development engineering, manufacturing engineering, marketing & product planning, requirements management, development quality management, product information management, technical asset management and out-sourcing and collaboration. 12 PLM function blocks are shown in Fig. 3. The overall PLM implementation process is shown in Fig. 3.

After defining the scope of the enterprise PLM system, we need to look into candidate PLM solution vendors for each function block. There are 4 criteria of PLM vendor selection, which are 'Functionality', 'Architecture', 'Cost' and 'Company'. After the POC (Proof of Concept) stage, the most preferred candidate vendor is selected for PLM project.

‘Development Planning’, ‘Implementation’, ‘Quality Assurance’ and ‘Deployment & Change Management’ are 4 stages of PLM implementation. Master data and MDM policy has to be determined before ‘Development Planning’ stage of PLM implementation in Fig.3 [10]. In this stage all kinds of new technologies such as SOA should be considered [11].

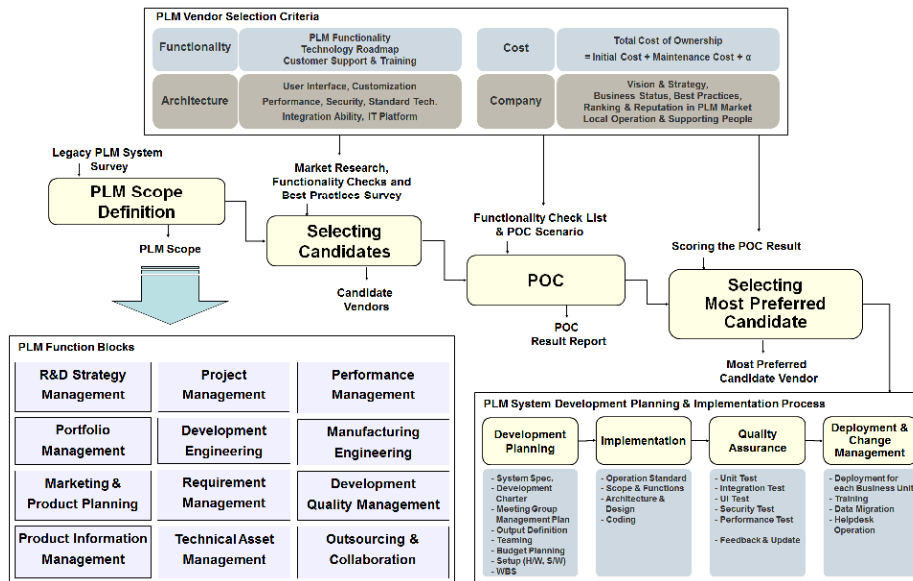


Fig. 3. The implementation process of the enterprise PLM system[10].

3 Master Data Management in PLM

3.1 Master Data

Master data is the common language of the company as the core information to be used in the same process management standards in the whole sector, and is information that is used during business performed. Master data ensure the consistency of information in the sector information of the company to control the process.

Gartner described MDM is a technology-enabled discipline in which business and IT work together to ensure the uniformity, accuracy, stewardship, semantic consistency and accountability of the enterprise’s official shared master data assets, and master data is the consistent and uniform set of identifiers and extended attributes

that describes the core entities of the enterprise including customers, prospects, citizens, suppliers, sites, hierarchies and chart of accounts [12].

Spruit and Pietzka said Master Data are the data describing the most relevant business entities, on which the activities of an organization are based, e.g. counterparties, products or employees and they defined MDM as “the management of the consistent and uniform subset of business entities that describe the core activities of an enterprise”. They derived 5 levels of master data management maturity levels which are ‘Initial’, ‘Repeatable’, ‘Defined Process’, ‘Managed and Measureable’, ‘Optimized’ [13].

Otto describes about MDM in Bosch [14], and several MDM research was done [15, 16, 17, 18, 19] and the several reports were made [20, 21, 22], but MDM is not a popular research theme in information management area. Also many company doesn’t interested in enterprise wide MDM strategy. Without MDM strategy, a company confused to implement IT system such as PLM, ERP and SCM, and eventually spend a lot of time for align the master data before the last minute of implementation of enterprise IT system. “One Specification One Code” rule can be secured if MDM strategy is strictly activated in companywide.

Fig. 4 illustrates a "Word Cloud" of MDM based on the reference book, reports and papers of this paper. Looking at this word cloud, a few key words are well noticeable like ‘Master, Data, Management, MDM, Business, Information, Application, System, Customer, Process and Organization’. We can define MDM intuitively by this word cloud. Some other word cloud of MDM can be found through the internet [23].



Fig. 4. Word cloud of Master Data Management

Loshin said master data includes the following: Customers, Employees, Vendors, Suppliers, Parts, Products, Locations, Contact mechanism, Profiles, Accounting items, Contracts, Policies [24].

3.2 MDM in PLM

Master data standardization is a prerequisite for PLM deployment. Fig. 5 illustrates Product Master Data in MDM [25]. MDM manages 'Customer Master Data', 'Supplier Master Data', 'Employee Master Data' and 'Product Master Data'.

There are 9 kinds of in Product Master Data which are Parts Data, Design Data, BOM, Docs/Specification, Configuration Data, Work Instructions, Product Quality Data, Product Compliance Data, Product Service Data.

In addition to these 9 Product Master Data, more master data should be managed for PLM, because PLM also covers marketing, R&D project management, not only product data.

Fig.6 shows PLM master data for ERP, PLM and SCM. PLM Master data, for the relevant departments within the company, the role of reference point for recognizing the work to the same destination, procedures and information, and to ensure linkages and consistency between enterprise systems and forms to maximize the efficiency of enterprise-wide rather than piecemeal efficiency.

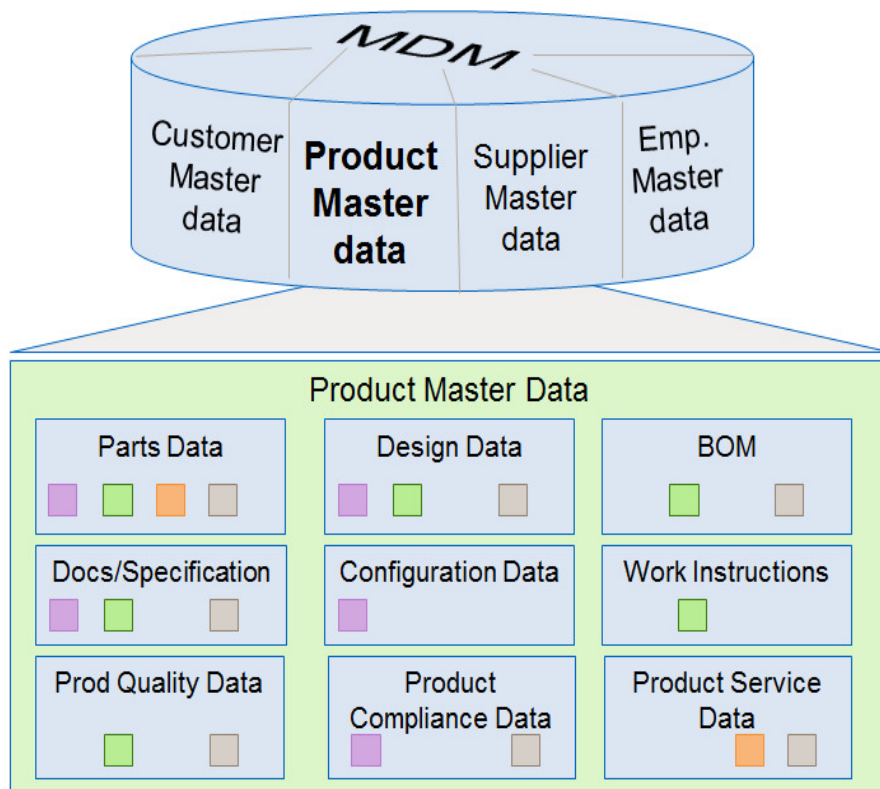


Fig. 5. Product Master Data in MDM [25]

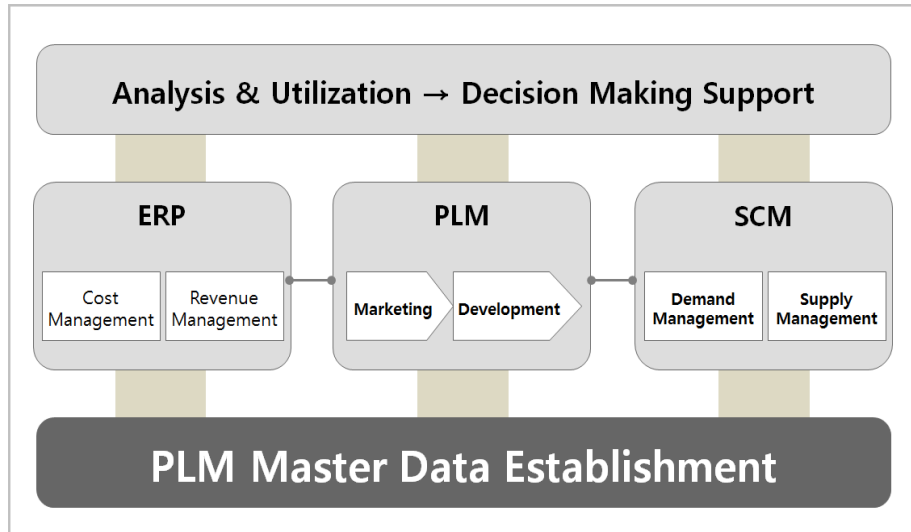


Fig. 6. PLM Master Data for ERP, PLM and SCM

Effective analysis of the company's own information using the ERP/PLM/SCM by enabling the systematic management and rapid decision-making based on PLM master data.

There are major four kinds of master data in PLM master data for the manufacturing enterprise. These are 'Product Hierarchy', 'Development Type', 'Unit' and 'Functions'. Fig. 7 shows PLM master data for the manufacturing enterprise.

PLM Master Data	Contents
Product Hierarchy	<ul style="list-style-type: none"> • Definition of Product Hierarchy → Product Group, Product, Model
Product Development Type	<ul style="list-style-type: none"> • Research Project • Development Project
Code / Naming	<ul style="list-style-type: none"> • Product Tree, Project Tree • Code / Name for Project, Product, Parts
Functions	<ul style="list-style-type: none"> • Mechanical, Electrical Functions & S/W
Etc.	<ul style="list-style-type: none"> • Plan, Milestone • Objectives • Roles & Responsibilities • Technical Documents

Fig. 7. PLM Master Data for the Manufacturing Enterprise

4 Conclusion

This paper describes the definition of PLM, the process of the PLM system implementation, how to make a classification of 'Master Data' required for the PLM system deployment will be described.

Master data authoring system should be defined, depending on the characteristics of each data. In a system other than the master data authoring system that requires a policy used by referencing the master data. It is the basis of the "One Specification One Code" rule of the company. Major master data authoring systems are PLM, ERP, SCM in the enterprise manufacturing company.

Master data is a very important basic data for the PLM, it should be commonly used in enterprise information systems. Master data must be established before the construction of enterprise information systems, such as the PLM system, continue to be a change in management.

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