

Developing a PLM-ERP Integration Framework for Portability of Data

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ABSTRACT: Development of new product is presently monitored and managed by means of design support and various tools of project management such as Product Lifecycle Management (PLM). Few firms have victimized, Enterprise Resource Planning (ERP) system to handle all the aspects related to transactions. The manufacturing organization is in lack of a system which understands management of revision and processes of engineering modification. Due to manual processes and disparate product data, the organizations are facing data inaccuracies. Using separate databases, each and every team members of engineering, operations, document and internal control are tracking the data of design and operations. From the prevailing practices study, it is evident that, a correct exchange of information is critical between PLM & ERP noting into issues of the movability, compatibility, and readability of information for the right operation of each PLM & ERP systems. The companies have accomplished the requirement for a system with seamless integration which may improvise the productivity and making the management effective in their whole process of new development of product. In view of this, companies have set to travel sure PLM application to cater to their process of new development of product.

Given that elements transaction, whether or not it's the design of a model or a Production part etc., at the corporate ought to happen through the ERP, item master creation and BOM in ERP come off to be one amongst the foremost vital aspects even for the process of new development of product. With the scenario in present, the format is not compatible between PLM and ERP results in productivity loss throughout the interchange of information at each levels of managerial and engineering. The case being above, a utility link of database is employed for the interchange of information between numerous databases through the Enterprise System Integration (ESI).

By synchronizing the PLM and ERP systems, engineering groups can access the information of business-level from the ERP to support higher processes of design and production is made certain receipt of the foremost design data for additional economical processes of production. ERP in integration with PLM, decreases information duplication; speeds development cycles, and improves turnaround of new product, enhancing the method in obtaining product to promote and ultimately helps in company's competitive position sustainability. Integration of those configurations on the combination server and making an atmosphere for conducting an integration testing for conforming the operation of configurations as per the practical needs concludes the study.

Keywords: PLM, ERP, BOM, ESI, API, Data, Information.

I. INTRODUCTION

PLM was configured to handle information of product throughout the product lifecycle. A system of PLM is critical throughout the planning section, wherever engineers want immediate product information access as well as specifications, parameters of engineering and documentation. The data will be centralized by PLM for straightforward access by all the members of team. PLM tracks and handles part information, BOMs, documentation of product, changes & revisions in engineering, additionally as compliance information. PLM conjointly supply the pliability to aid the various iterations of a design before it reaches the functional prototype and production phases. PLM system provides an automatic modification of facility management that enables users to propose changes in product to BOMs, documents, and supplier or vendor info electronically.

An ERP could be a tool of business management want to fulfil the requirements of the

many aspects of an organization as well as finance and accounting, human resources, distribution, client service and production. ERP assists these numerous departments by delivering processes which are improved like an automatic technique for order fulfilment, allowing one location for pursuit value data to make sure constancy, and serving to human resources to normalize their data. ERP is employed to handle the supply of obtaining a product to clients once a design is discharged.

PLM & ERP address completely variety of needs of business for manufacturing organizations. There's some uncertainty within the organization as on what character every system plays in an exceedingly business method of a company. Simplification of the solution options of PLM & ERP, wherever they slot in the method of development and production of product and the way these environments are integrated will deliver practical results which is vital for producers to actually perceive why every data is therefore important to their accomplishment. Additionally, having this simplification can facilitate organization to augment the practicality of every system and earn the foremost from their funding.

The present work is to integrate both PLM and ERP systems and further database integration system is adopted, that typically involves the employment of a typical database. Few data are exchanged between two or a lot of applications. The data which is found in exactly single database application, to that alternative applications have approach wherever applicable. However, data being retrieved can even be derived frequently from different databases. In alternative words, the data will be duplicated to a different database. This can be still a case of exchanging data, however the tactic used is database integration. Database integration is commonly applied through a supposed Application Programming Interface (API). Several programs of application embody a specially outlined package interface, the API. The services that the appliance in query provides to applications which are external are outlined within the API. In observation, the API is the interface for discussion between the applications.

II. STUDY OF ERP CONNECTOR PROCESS MANUAL

ERP connection may be a product designed to leverage current normal ESI capabilities on the PLM facet, exploiting any third-party Enterprise application integration package. This uni-directional integration permits the publication of product data held in PDMLink to

distribution targets in eXtensible Markup Language. ERP connection permits the transfer and mapping of business objects like elements, BOMs, Enterprise amendment Notices and documents from PDMLink to the distribution targets and conjointly is the inspiration for a lot of advanced group action managed integrations. Connecting these systems optimizes and automates business processes, improves operational efficiencies and creates opportunities to feature worth not out there with isolated systems.

Out-of-the-box ERP Connector features allows publishing objects from within PDMLink using Sample workflow, Customized workflow, Custom calls to various functions available in PDMLink and Ad hoc operations from a menu command in the object properties page.

Figure 1, shows the Web Architecture of the PLM and ERP integration, how the data are exchanged by means of web applications between PLM and ERP systems.

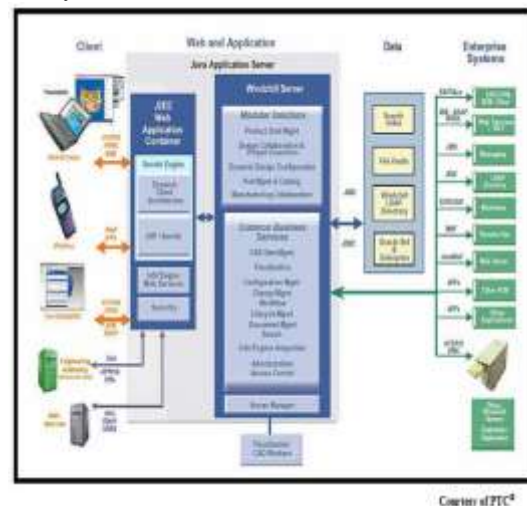


Fig. 1. Web Architecture of PLM and ERP.

2.1 Business Processes and Guidelines

ERP Connector supports multiple business processes. It is necessary to follow several guidelines when using ERP Connector to maximize its performance and capabilities.

The solution of connector supports major business processes within the engineering and production domains. The capabilities of connector give support to numerous client business processes like new introduction of product, bringing out a brand new engineering BOM for designing and production, product lifecycle management, publishing, maintenance and end-of-life of elements, design of product and development of product, creation of latest product, existing product maintenance, product configuration management,

managing completely different variations of one product, collaboration of product design, engineering design maintenance and sharing and information of product across multiple product lines, planning of production and product manufacturing schedule supporting inventory data.

There are business process decisions that need to be made prior to determining how to implement ERP Connector. The major areas to consider are Data Management, Publishing Management, Change Management, Data Reconciliation, System-of-Record, Creating or Changing Business Objects with ERP Connector.

Within each of these areas, the business process decisions shape the way ERP Connector is configured to work. These business processes provide greater solution flexibility without coding which in turn reduces deployment cost and time, provides a supported customization path for situations not covered by OOTB code.

Figure 2, shows ESI Publishing Management, meant for managing the publishing of objects.

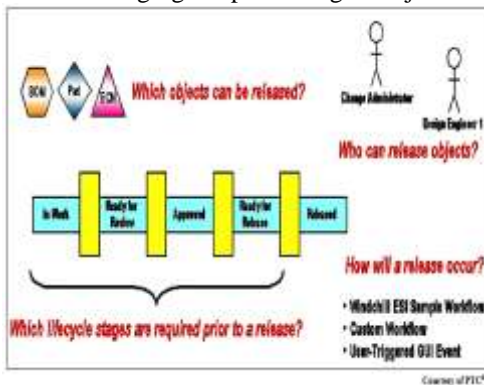


Fig. 2. ESI Publishing Management

Figure 3, shows the System-of-Record of PDM and the Distribution target.

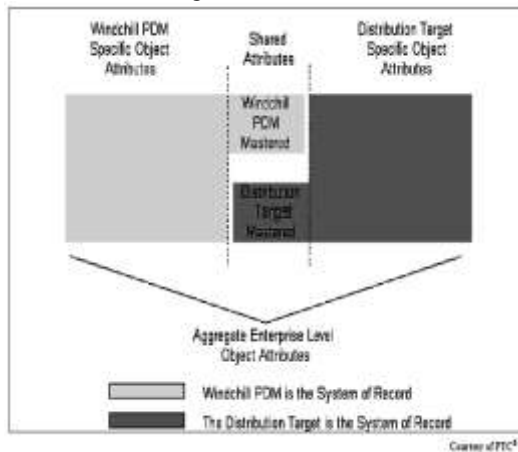


Fig. 3. System-of-Record

2.2 Constraints

ESI uses the PLM Adapter Query-Object Webject to obtain all the attributes of parts and part master objects as well as the attributes of supported documents types. If the Query-Object Webject does not return the attribute, that attribute is not available to ESI mapping logic. ESI BOM processing uses the PLM Standard WTPart Service BOM difference calculation.

Changing the existing relationships (associations) between existing PLM objects always requires customization of ESI.

Adding relationships between existing PLM objects requires customization of ESI if the relationships, relationship attributes, or objects participating in the relationship are to be included in the data that is published by ESI.

III. PRODUCT DATA EXCHANGE STANDARD AND PROTOCOL IN COMMUNICATION BETWEEN PLM AND ERP SYSTEMS

Common Business Object is a Product Data Exchange Standard which uses concepts from the Open Application Group Interface Standard, which is a self-describing, XSD-based XML schema, specifically designed for communicating and passing data between ERP, CRM, and other enterprise-level systems. A data model adopted by the PLM business logic to represent the data for each object published from PDM or PDMLink. The Common Business Object (CBO) approach promises to realize Simplicity, Reusability, Extensibility, Scalability, Heterogeneity, Portability and Interoperability of data.

Simple Object Access Protocol (SOAP) could be a light-weight protocol used for exchange of data during a suburbanized, distributed surroundings. SOAP is associate XML primarily based protocol that consists of 3 components namely: a) associate envelope that defines a framework for describing what's during a message and the way to method it, b) a group of coding rules for expressing instances of application-defined datatypes and, c) A convention for representing remote procedure calls and responses. SOAP will doubtless be utilized in combination with a spread of different protocols. The SOAP 1.1 customary was revealed by the planet Wide net association. XML Schema Definition (XSD) defines the structure of associate XML document. Figure 4, depicts the data flow between the PLM and ERP Application Servers.

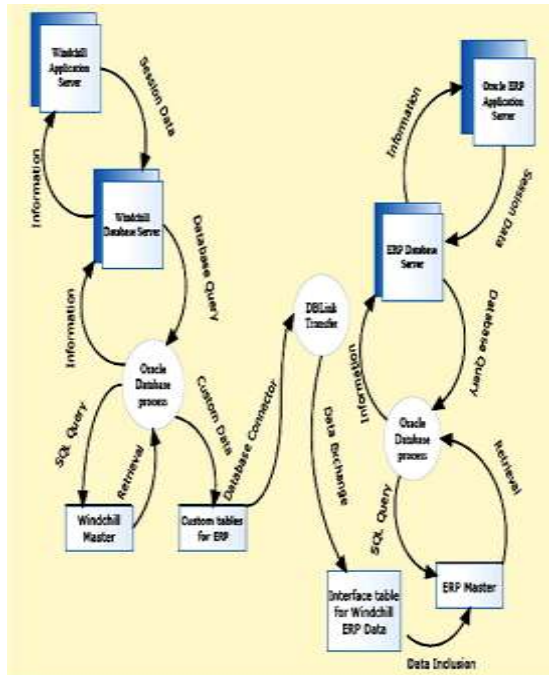


Fig. 4. Data Flow Diagram

IV. PLM AND ERP INTEGRATION

Integration phase constitutes one of the following sub-phase:

4.1 Setting up Organizations for Necessary Exchange of Data

In PLM, the top level engine will be defined as an end-item and in addition optionally, while checking in the CAD data from CAD tool to PLM system, the major assemblies or sub-assemblies will also be defined as end-items.

As per ERP requirement, every part that is being published to ERP should be associated with an organization where that part is going to be transacted. Based on the organization to which a part is associated, organization specific attributes will be defined. In PLM, the requirement is just to define the organization context at the top level end-item and optionally this can be defined to the components other than the top level end items also.

The solution for associating Organization in PLM to end-items and parts will be as follows:

a) In PLM, a sub type object for ERP organization will be created; b) The list of organizations in ERP will be given by the Client. Using this information, the list of ERP organization objects should be created in PLM. This should be done as a configuration activity before PLM goes live at the client's company. However, if any additional organizations have to be added or existing organization objects has to be modified, the same can be done by the PLM business administrator at

the client's company, c) As per client's requirement, it is important to associate the top level end-item to an ERP organization. d) However, option is also provided to associate other end items and parts to be associated with ERP organization.

V. CONCLUSION

The main objective is the development of PLM-ERP integration framework for data portability. In addition to portability, the problems of interoperability, compatibility and readability of information for the correct operating of both PLM & ERP systems are addressed as a part of the development method of product.

PLM & ERP are important elements of any strategy of application for manufacturer's, and may be taken on during a method that assists the organization bring home the bacon of their business strategy & objectives which are specific.

PLM furnish robust competencies to motivate and assist innovation of product, whether or not that innovation is concentrated on products which are newly introduced to market, response which is competitive to a different innovation of company. PLM additionally furnish competencies to scale back prices by development of low value designs and accomplishing developing the programs of product additionally effectively. ERP, on the opposite hand, furnishes robust competencies to handle the availability and business demand, executing plans to satisfy the demand & supply monetary oversight and management.

Both PLM & ERP are vital, and may be categorized and elect the need of supported business and product competencies which are relative with the comprehension that the products of ERP are additionally of a good purchase and the products of PLM are additionally numerous. PLM and ERP offer price as freelance solutions, however can even offer bigger price after they play their individual roles together to support the business.

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