Chapter 11

Open Product Lifecycle Management (PLM) for Cloud Manufacturing and Cloud-Based Maintenance Integration Using XML

Norman Gwangwava
Botswana International University of Science and Technology, Botswana

ABSTRACT

Product lifecycle management (PLM) is concerned with managing all the processes of product transition from cradle to the grave. Phases of a product life are inception, engineering design, manufacture, service, and disposal. A product passes through different systems, organisations, and users as it completes the life cycle. Global markets of today have increased the complex nature of a product path. All the life cycle phases rely upon product data for efficient management. In order to ease the strain of managing products throughout the lifecycle, a common product data schema is needed. Currently many platforms for product design use different proprietary schemas that make it difficult to have smooth lifecycle management. The chapter illustrates applications of an open source, XML-based schema for product lifecycle management. The main focus is on the inclusion of the Cloud in order to have new generation cloud product life cycle management (CPLM). The main driver of CPLM is cloud-model-based systems engineering (CMBSE). Within the framework of CMBSE are cloud-based design (CBD), cloud manufacturing

Open Product Lifecycle Management (PLM) for Cloud Manufacturing

(CM), and cloud-based maintenance (CBM). The three subsystems of CMBSE can be combined to form a single term, cloud-based design, manufacturing, and maintenance (CBDMM). Cloud computing, manufacturing, and maintenance are not new concepts, but many enterprises have not yet embraced them because of lack of complete seamless integration across various levels and processes in the product life. Many systems are still being run in silos of automation. CPLM is a service-oriented (SOA) model comprised of a pool of technologies such as cloud computing (CC), IoT, virtualization, and service-oriented technologies to support collaboration, sharing, and management across PLM phases.

INTRODUCTION

Large enterprises that are involved in the value chains for design, manufacture and servicing of complex engineered products or systems such as aircrafts, cars, trains and ships require strong collaborations. PLM systems have been in place for some time and they continue to be upgraded in order to match the demands for seamless integration and collaboration. Christophe et al. (2014) views PLM systems as key for managing collaboration between partners and supporting business process interoperability. Managing the life cycle of complex products require a large variety of tools to support different aspects during collaborative development projects as well as data and document management. Traditionally, collaborating partners would use computer aided applications (CAx) such as CAD/CAM/CAE/CAPP/CAQC within their organisation network. The process would facilitate automated workflows of editing or modifying the product designs. Sub-softwares that encompass the PLM systems are Product Portfolio Management (PPM), CAx applications, Product Data Management (PDM), Manufacturing Process Management (MPM), and Digital Manufacturing (DM). Cloud Computing (CC) came as a game changer which is revolutionizing the traditional approach to business. CC is considered as a field of multidisciplinary research as a result of the evolution and convergence of several computer trends such as Virtualization, Distributed Computing (DC), Storage, Content Outsourcing, Grid Computing (GC) (Zeballos and Quiroga, 2017). Xu (2012) assert that in CC everything is treated as a service, i.e. (XaaS.), e.g. SaaS (Software as a Service), PaaS (Platform as a Service), IaaS (Infrastructure as a Service), Design as a Service (DaaS), and Hardware as a Service (HaaS). Unlike the traditional approach where enterprises host silos of different software systems in-house, the CC era outsources computing power, data storage and services to third parties.

Enterprises are adopting the subscription-based cloud offerings that allow customers to fund IT investments as operational expenditures, without high up-front
EBBSC: A Balanced Scorecard-Based Framework for Strategic E-Business Management
www.igi-global.com/article/ebbsc-balanced-scorecard-based-framework/1873?camid=4v1a

A Literature Review of the Emerging Field of IoT Using RFID and Its Applications in Supply Chain Management
www.igi-global.com/chapter/a-literature-review-of-the-emerging-field-of-iot-using-rfid-and-its-applications-in-supply-chain-management/180731?camid=4v1a