METHODOLOGY ON PRODUCT LIFE CYCLE CHALLENGE MANAGEMENT FOR VIRTUAL ENTERPRISES

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There is a great need for most of the businesses to develop their product and service management in Open System Architecture. A sustainable growth of the business lies on Services that Corporations are offering. Business Concept is changing towards knowledge intensive and value critical over the life cycle. Products are increasingly embedding intelligence and product and service modules are evolving in dynamic relationship by growing value network of partners. The role of Service and Product Architecture is becoming very important when managing increasing complexity. The enterprise of today, is looking for a methodology and computer tool set that will help capture aspects of a business and analyze these to identify and compare options for meeting the business requirements. We propose in this article such methodology and introduce a case study by using toolsets, which is successfully applied at the industrial environment in the product-life-cycle challenge management. This aspect is viewed in the sense of sustainability of primary industry.

1. INTRODUCTION

Engineering industry is currently undergoing a transition from being the product provider to being the provider of value added services. Enterprises have proclaimed and tried to undergo this transition but failed in reality in several aspects. There is a paradigm shift from “ownership” to “access” and the potential sustainable growth of the business lies on Services created and captured. Business related to industrial services intends to grow out of commodity trap.

Complexity is increasing due to new generations of products, which are embedding intelligence with multiple functions in diverse operating condition. The implementation of technologies is becoming multidisciplinary and the use of knowledge base has rapidly increased. Systems interaction has become complex. Subsystems share and exchange information, communicates, restructure methods and track new tools. Service and Product Architecture is becoming very important. Corporations, which are able to manage these challenges effectively, are the ones to succeed in dynamic market places in which internal and external service providers will execute the implementation activities. The management will respond to value

recognition and networking. Clusters of networked organizations are collaborating around a specific technology and make use of a common architecture to deliver independent elements of value that grows with the number of participating organizations (Figure 1).

Figure 1 - From value chains to dynamic markets

It is possible to reduce time to market by boosting the new product introduction process. That increases efficiency in product development cycle by re-using and sharing product/parts knowledge. The idea is to achieve an optimal product mix by product modularity (Baldwin and Clark, 1997) in introducing alternative components at company driven product platforms and architectures. This influences outsourcing readiness that creates overall flexibility.

Unfortunately, at the moment, Bill of Material, BOM-dictated enterprise resource management systems, ERP, seem to be the only core of business operational management. However, there is no notable attempt to manage services offering context in business dialogue literature. In this article is introduced a model based methodology, which helps to capture various aspects of a business and analyze these through dependencies of service and product architectures to identify and compare options for meeting business requirements. A real case study from telecom industry is introduced to illustrate solution life-cycle challenge management.

2. PROBLEM STATEMENT

Both the product and service need to be defined before they can be effectively used in configuration according customer and functional requirements. An engineer assumes when produced a technical product that the product is internally maintaining a service domain. On the other hand a service provider assumes that the concept is consistently offering product and services. Both of them are misunderstanding; what is product and service. It is like fundamental laws

Coulomb's Law at states that the electric force of attraction or repulsion between two point charges in prepositional to the product of the distance between them. The force also depends on the permittivity of the medium in which the charges are placed. The force is attractive for charges of opposite sign and repulsive for charges of the same sign. In this context, it is addressed that the Product and Service has scientifically attracted. They are treated or understood or both, as one and the same. It is possible to digest it either of the way, due to a purpose paradigm.

The management of dynamic relationship in value network needs well-defined business concept and common terminology. Service level is recognized through evolving customer requirements and functional requirements (figure 2). Knowing of the dependency between these distant entities is crucial when supporting value capture in value network.

Figure 2 - Requirement management and service level guiding solution providing

When modeling product and service in a complex environment, we have to dismantle them from each other and assemble them together again. When mirroring them, we are technically screening them in one entity while holding cash flow aspect in reality. This is why the dynamic approaches to carry them forward we refer at. This background is allowing us to make the business operational view. The business process and information models are structured where the requirements are scanned to set the metamodel workable mode, or say ebXML (Electronic Business Extensible Markup Language)- type (figure 3).

Figure 3 - Business Operation view through modeling

3. MODEL-BASED REQUIREMENT AND DEPENDENCY MANAGEMENT MECHANISM

Salminen and Pillai (Salminen & Pillai, 2000) have expressed the views as to how product and service can be organized in a systematic way, where the dependency described at the product and service architectures (figure 4). The intention is also to minimize the amount of components and restructure the product platform so that all the waste resulting from overlapping of components is limited. The goal is to reach up to a rationalized and optimized product platform with configured interfaces (Salminen, Pillai, Riitahuhta, 2002). The intelligent product line offers the creation of this offering. Figure 4 links the connectivity of various players when insert the products and service in business architecture.

Companies need platform strategy to be able to benefit re-use of platforms and modules with well-defined interfaces. Product and service platforms are the foundation of derivative products/services. The platform assets consist of several physical and abstract varying item (Salminen, Yassine, Riitahuhta, 2000)

Figure 4 – Product and Service Open System Architecture

Well-defined product and service platform, technology platform or process platform enables also cost-effective production, manufacture, assembly, delivery and service of any product or service in the portfolio. Platforms are also key enablers for continuous introduction of product/service derivatives to multiple market segments (Meyer M., Utterbach J., 1997). Platforms are essential in strategic product and service planning and management. This strategy performs in minimizing the complexity of the overall business. It manages and reduces by using any software tool such as Optiwise. It is an object-oriented methodology. In using Optiwise defines re-usable solutions and manage platforms.

The System helps to integrate technology planning by unbundling and identifying technologies within the platforms, linking them in turn to technology road maps. Integrated development system manages and integrates the creation of platform elements. Product and service is organized in a systematic way, where the dependency is exploited in architecture. Platforms are key enablers for continuous introduction of product and service derivatives to multiple market segments. Furthermore the strategy is critical also when managing the complexity (Salminen & Pillai, 2001). We have used in our study the Optiwise tool ¹.

4. MODEL-BASED METHODOLOGY: A Case Study Briefing

We conduct, based on the above framework, a case study executed with a telecom Portal Provider (Salminen, Pillai, Riitahuhta, 2002). We have integrated dynamically the product and service concept into industrial reality by using above-mentioned Optiwise software tool. We have incorporated the portal provider's provisioning with the customer requirements and features. The following figures

¹ Optiwise-tool of Real Time Systems, Inc, USA [www.Optiwise.com].

will explain the use of methodology and the software tool. The created methodology of rule setting can be categorized as in figure 5.

Figure 5 - Rule Creation System

While considering the Life Cycle Challenge Management, LcC_{Mgt} of a Product and Service that in this case is invisible and faster than solid entity. Here as research team, we had problem to justify this concept in general. However, Life Cycle, is very short and fully packed with high technology. Here the challenge makes sense. Therefore, we made an archive (Library) of requirement and used trajectory for tracking to build the “Backbone”. The software tool is then applied to interpret and view the “Backbone”. It is further scanned to pick up the required information from the archive to produce 3D-figures as to how a document or component is published or released collaboratively “looks-alive” before the decision portfolio. All these steps are drawn in following figures 6 through 7. While creating methodology, we have consulted the adaptive learning and algorithm (Salminen & Pillai, 2001).

Figure 6 - The use of Requirements Library

Figure 7 - Tracking from the trajectory

5. EXPERIMENTAL RESULTS

The Industrial piloting shown that the methodology along with the software tool is matching perfectly the industrial needs. The workload of telecom provisioning system we automated. The piloting results calculated are shown in table 1 as actual representation of the telecom portal.

Experimental Results of a Telecom System

Item	Methodology Before Use	Methodology After Use	% -Time Saved	US \$/1000 K Value Generated
Semi-automated Provisioning	Man-Power Employed mainly	Electronic Format-Model-Based	40% - Regular man-hour	500
SCADA-Integration	Databased in different Sources	Easy Integrattion, no filtering, but models, Interpretation and visualization	50% - man-hour	650
Customer Re-quirements	Manually Collected , data not used and storage capacity large	Totally modeled, Integrated, Agent- Based- Browser access to view and in-tegration to Product Offering	80% - man- hour	750

Table 1 - Experimental Result of the Telecom Pilot

This project was piloted in a team of 25 employees of Portal Provider. Immense number of Database processes is off-line Integrated and/or deleted. Money value generated is simply to understand here as saving through workload of the pilot employees. Many numbers of files or documents had opened to trace a combination for certain class integration or add as default repositories. The result had shown that the result in Domain Theory, where PDM implementation Product Structuring become difficult and expensive. We stress here that the requirement has to be entrenched prior to product born in its physical mode or “invisible” format.

5. CONCLUSIONS

This article introduces a phased approach in developing model-based requirement and dependency management, which leads to product and service management. A case study of telecom Portal Provider and its business network in open system architecture is introduced. The fundamental issue here is to solve the requirements that enhance the corporate offerings. The tool experimented has a tremendous value to collaborative and transparent design, development and innovative features of the corporation. This exercise shows that by doing the way we experimented has an impact on money and time.

This system approach gives also an opportunity for efficient strategic management of complexity in distributed product development and an end-to-end solution in networked businesses.

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