

Globally distributed product development using a new project management framework

Partha Pratim Ghosh^{*}, Jacob Chandy Varghese

Lucent Technologies (India) Ltd, Golf View Campus, Wind Tunnel Road, Bangalore 560017, India

Received 23 October 2002; received in revised form 7 February 2003; accepted 11 May 2004

Abstract

There is a growing pressure on corporations to streamline operations involving multi-site development. In this article, we propose a new project management framework that can be used for managing and tracking distributed development of a large product efficiently. We assume that the development team is organized as Centers of Excellences (CoEs), which may be geographically distributed. The framework described in this article, is capable of presenting diverse views (e.g., *Feature*, *Load*, and *Release*) of a product to its stakeholders seamlessly. It also streamlines communication between the CoEs. A product plan, designed using this framework, offers high resilience to requirements changes during the development cycle. The planning issues for a large (over 200 features) product are described in detail next in the context of the framework. We conclude with a brief scope for future work. The paper chooses examples from the Software domain though the approach is general enough, and is applicable to other disciplines as well.

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Keywords: Product management; Framework; Center of excellence; Release; Loads; Features; Load contents; Requirement volatility; MS project; Circular dependency

1. Introduction

With technology leapfrogging and ushering its benefits bounteously into society, the expectation of its beneficiaries from the technology-oriented organizations is increasing more than ever before. This is forcing corporations to streamline their development strategies towards achieving faster turn-around time for product development at a much lower cost to sustain their competitive advantage. With globalization at the backdrop, capitalizing on the geographically distributed skills to achieve high quality product deliverables in a much shorter span of time is becoming a necessity today.

Literatures abound in the area of distributed project management including tools that facilitate planning. PERT/CPM approaches have been in existence for quite sometime but they are limited in terms of their analytical

power as cited by Cho [1]. Cho [1] had primarily concentrated on aspects such as *Process Restructuring* and *Process Modeling* of Distributed Project Management. Process Restructuring typically deals with the structure of the information flow in a complex project while Process Modeling captures the behavioural aspects of processes over timelines. Other efforts towards Process restructuring include approaches proposed by Steward [5] such as Design Structure Matrix or DSM that models information flow across tasks based on large-scale system decomposition.

There have been focused activities towards development of project management tools. Rojers [3] developed a computer aided design tool to support assisting in large-scale system decomposition. As cited in Stallings [15], some researchers have also come forward with an “Intelligent Agent” based project management framework. This is an integrated project management framework where plan and design may change while the plan is in execution. Notification about any change is passed as ‘messages’ to software agents, thus, minimizing human intervention. According to Petrie et al. [2], the

^{*} Corresponding author. Tel.: +91-80-2550-4834.

E-mail address: ghosh_p@hotmail.com (P.P. Ghosh).

problem of using traditional tools such as Mac Project, or MS Project, is that they are inherently based on single user model of planning, with very primitive change notification mechanisms. Centralized decision-making vs. distributed decision-making is what is highlighted in the first part of Petrie et al. [2].

One of the most important challenges in product development in a distributed environment is to ensure proper co-ordination and control [6]. Many recent studies [7,8] emphasize the use of Information Technology in tackling project management issues in a distributed environment. Others [9,10] explored the use of diverse Communications Technologies to address the co-ordination issues in a distributed environment. Less technical in nature, Lori Anschuetz [11] elaborates on how sharing of corporate culture, gaining insights into clients, building trust and bringing in professional synergy can enable efficient co-operation and effective results for ‘virtual’ organizations. Much of the work in the area of distributed Project management lacks the rigor in dealing with the concurrency issues [12–14] when the same project involves development across multiple locations.

We propose a simple approach towards distributed project management in this paper that is broadly based on Process Restructuring. We believe that, by establishing a suitable framework that helps in automating and consolidating Project Control related information, the distributed/co-located teams are better informed to take planning decisions, thus, giving them more bandwidth to focus on other issues relating to a new product. We define a protocol as well as an interface for communication between development teams for a product. By virtue of this, the existing skills and framework that an organization may have developed over the years can be readily used.

2. Organization structure and product development

One of the common ways of structuring a large product organization is to create Centers of Excellences (CoE) within, which specialize in generic areas and facilitate faster turn-around time for development. CoEs deliver their share of a product in the short-term while pursuing development of reusable modules to achieve long-term goals. Conceptually simple, this model may often lead to an avalanche of communication between CoEs related to tracking and Project control when a new product development is undertaken. The alternative is to carry out development forming dedicated product teams to contain this extra communication. But, the organization loses its competitive advantage in the long run due to the absence of “specialization”, i.e., CoE. A CoE transforms cross-product experience into coherent and repeatable body of knowledge. This enables an easily reusable approach to be adopted for new development

that eventually results in shorter time-to-market for a product consistently.

2.1. Challenges of a CoE based product development in a distributed environment

Throughout the development life cycle of a product, there are multiple stakeholders at various levels within and outside the organization. Each of these stakeholders would be interested in getting various views of the product development status. For example, an end-customer and the Product Management team view the product as a collection of features. Hence, they would be interested in getting the status of various features within the product during its development cycle. The Release Management team perceives the product as a collection of sequential releases and is concerned about the timeline for each release and the loads within. The development team, on the other hand, would be interested only in the subsystem deliverables for a load within a release. Extraction of the relevant views for the various stakeholders from the project plan is often time consuming and results in redundant information flow in the chain of management. To top it all, geographically distributed development teams add a new dimension to the already complex environment. Management of information flow in the above circumstances is a challenge often not addressed adequately. Tracking of project plans distributed across various geographical locations, tends to become unmanageable when the number of features associated with a product becomes large.

In the discussions to follow, we will depict a suitable framework that will address some of these issues.

2.2. Definition of product, its views and linkages to organization structure

Here, we introduce formalism and define the various entities involved in product development activities. An entity in the context of product development may mean the product itself, the set of features, releases and the various product loads within a release including the CoEs within an organization. These definitions will be used subsequently (Section 3) to explain the planning and tracking of a product using the proposed framework.

2.2.1. Centre of excellence

We assume an organization is structured as a collection of CoEs, i.e.,

$$O = (\text{CoE}_1, \dots, \text{CoE}_p). \quad (2.2.1.1)$$

Each CoE represents a group having a collection of skilled resources in a specific area. A CoE may either be geographically co-located with other CoEs or distributed. New product development benefits from these

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