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An integrated approach to implement Project Management Information Systems within the Extended Enterprise

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Abstract

Project Management Information Systems (PMIS) are software applications that help managers track projects from their conception to their execution. They provide them with pertinent information and collaborative tools. Currently, most businesses use disconnected instruments which are not designed for managing complex projects. Increases in complexity, both due to the extent of scope and the fact that the users who contribute to the decision making process are physically separated, have led to initiatives that deal with cooperation, teamwork and continuous improvement. This work presents an integrated approach to improve PMIS applicability within the Extended Enterprise. The study regards the definition and the building of a management framework where planning, scheduling, and communicating are made immediate and effective by the adoption of common standards, shared communication and appropriate software tools for the management of whole Supply Chains. The proposed approach has been successfully applied within the shipbuilding industry.

Keywords: Supply Chain Event Management; Project management; Extended Enterprise; PMIS

1. Introduction

Project Management Information Systems (PMIS) have grown to a great extent over the last decades and have become comprehensive systems that can be used to sustain the whole life-cycle of complex projects (Ahlemann, 2009). They are software applications that allow individuals or teams to track projects from their conception to their execution, providing project managers and other team members with pertinent information such as the scheduling of resources, budget management, supplier management, time management, task assignments, quality control, documentation and collaborative tools. The goal of PMIS is therefore to boost efficiency by making the development cycle more visible as long as all users are able to track specific tasks and can have a better understanding of how the project is going on. A key improvement is enabling a coherent flow of information between project managers and team members, which significantly helps them to keep people on task and up-to-date. All these aspects are mandatory for the "agile" supply chain, that needs quick responses to shifts in design, supply, production and delivery.

At present PMIS are shifting from single-project management systems to distributed, cooperative multi-projects planning applications with resource leveling capabilities (Pollack-Johnson and Liberatore, 1998). Surveys still confirm that only approximately 20% of available installations refer to multi-project programs. Recent tendencies clearly show that all kinds of industries are beginning to exploit PMIS to deal with a number of multifaceted project management aspects. In particular, PMIS can help practitioners to detect latent issues before they occur, meet deadlines, and collaborate more easily and at a greater extent (Raymond and Bergeron, 2008). The potential gain in efficiency can lead to significant cost savings and an increased return on investment both for small and large businesses. In brief, PMIS are

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intended to assist managers and practitioners in defining and completing projects, keeping within the available budgets, respecting deadlines and, last but not least, collaborating. They also keep involved people informed, assuring that they know what the others are doing at any given time and allowing appropriate countermeasures in the case of failures or delays. This lets project managers successfully delegate tasks, monitor progress and assess the overall risk. Finally, they help managers create working profiles and work-packages to assign the right task to the right person by means of an effective resource management.

The PMIS industry is presently dominated by a number of leading software representatives, such as Microsoft, Oracle and Metier Management Systems (a former Lockheed company), and a number of small independent companies. Demand has remained steady for years but, as companies are increasingly turning to enhanced technical solutions, it is supposed to grow up significantly in the near future. In particular, PMIS are believed to evolve towards a more integrated project lifecycle management and the extensive adoption of web-based or cloud computing tools (McCullen, 2009; Tarantilis et al., 2008).

A noticeable aspect in this context regards the data management feature. At present, most firms use different tools, such as spreadsheets and paper based data collections, which are definitely not designed for managing the evolution of complex projects. A good number of project managers use PMIS, but most of them are yet unaware of the potential benefits they could bring in. This is mainly due to a lack of an understanding of what such software really is and how it can influence projects from their conception to their completion (Archibald, 1992). In some cases managers are dissatisfied (Caniëls and Bakens, 2012) as they still have problems when used in a multi-projects and strongly collaborative environment.

The progressive affirmation of the "agile" thinking and the increase in project complexity has led to initiatives that deal even more with cooperation, teamwork and continuous improvement. Attention is therefore shifting towards the need to manage the flow of activities throughout the whole life cycle and, in particular, those that actually add value (Alshawi and Ingirige, 2003). This evidenced a number of important problems. As an example, the lack of consistency in the flow of information between individuals and/or teams generally determines additional expenditures for reworking. This is both due to inconsistent information or information that is not received in time by the right individual or team. In general this often occurs when designs are changed frequently but communication of changes is not timely and successful. At the same time, the whole supply chain is negatively affected by the lack of integration and ordering, purchasing and invoicing often go late. The case study presented in this paper focuses specifically on PMIS for shipbuilding. However, there are similarities between the shipbuilding industry and the construction industry that make the work relevant to both. In particular, both industries share a common tendency to issue hard copy documentation for recording purposes. This makes communication and coordination even more complicated and burdensome due to the necessity of completing whole cycles of amendments, revisions, confirmations and acknowledgments (Alshawi and Ingirige, 2003). These aspects are further worsened by the fact that most of the available IT solutions only focus on specific tasks, resulting in a wide spread of disconnected applications that prevent a smooth flow of information between the various players involved in the management process. This is, instead, a fundamental aspect of the management process itself, as communication consumes up to 75–90% of project managers' time (Scanlin, 1998) and can be seen as the root cause of most project failures (Biggs, 1997).

The present work presents an integrated solution that tries to give answers to most of the above mentioned issues within inter-organizational processes or, in other words, the Extended Enterprise (Dyer, 2000). In particular, the study regards the definition and the building of a management framework where planning, scheduling, communicating and sharing are made immediate and effective by the use of common standards, shared communication and appropriate software tools. This is done by adopting the Supply Chain Event Management (SCEM) paradigm (Stadtler and Kilger, 2002) as the kernel of a modular application where a Control Tower (CT) application handles, collects and addresses messages and event-triggered procedures (Butner, 2006), a PMIS plans and schedules activities, tracks their execution and levels resources overallocations, and a Product Data Management (PDM) manages designs and documents to assure that the correct release is used when needed. The approach has been chosen as is known that inter-organizational processes take place within tricky environments, exposed to failures and disturbance factors, that make them rarely execute as scheduled (Otto, 2003). The SCEM can be used to identify, as an early warning system, the existing variations between the original plans and their execution, considering the huge number of processes, the constraints and the actors in the supply chain and the continuous necessity of eliciting corrective actions, according to predefined rules.

The proposed integrated system and the corresponding and valuable implementation process have been successfully tested on the inter-organizational processes that characterize the luxury shipbuilding industry and allow a number of interesting outcomes:

- reduction of errors and reworks, by assuring that current releases of drawings and documents are used;
- time saving in the query and approval process (drawing management);
- time saving in the real-time control of activities;
- improvement of communications;
- enhancement in the planning and execution of projects;
- building of a collaborative environment where all involved actors can perform on-line interactions.

2. PMIS — features, strength and drawbacks

There are numerous different PMIS available on the market that can be used by any industry with respect to the scope of their projects and to their specific necessities. Also, some companies can purchase specifically tailored solutions. Therefore, depending upon the company and the type of projects they will be addressed to, PMIS can vary significantly