

Social and Collaborative internet based project management

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Abstract

Project Management is an application area well supported and covered by on the market software and open source solutions. However the focus has been on intra enterprise solutions. Innovative and internet based solutions are needed to promote project management, especially for distributed organizations, not so well covered by existing solutions. Large scale engineering projects are typical examples of distributed projects. The COIN project has identified requirements for development in the area of Collaborative Project Management.

Future success in large engineering projects builds on the combination of two paradigms; *fully automated and IT supported engineering process* and *totally networked and efficient global operation*. The COIN project develops a Project Alignment Booster for Shared project management and Delegated management responsibility.

Keywords

Collaborative Project Management, Project Alignment, Shared Work Processes, Distributed Engineering

1. Introduction

An early definition of **management** was given by Mary Parker Follett in the early twentieth century: *"the art of getting things done through people"* (Graham, 1995). Other definitions consider the management to deal with *"directing and controlling a group of one or more people or entities for the purpose of coordinating and harmonizing them towards accomplishing a goal"*. The management can consist of several dimensions, like human, financial, technological, resources etc..

Project Management is the discipline of planning, organizing, and managing resources to bring about the successful completion of specific project goals and objectives. The primary challenge of project management is to achieve all of the project goals and objectives while adhering to classic project constraints—usually scope, quality, time and budget. The secondary—and more ambitious—challenge is to optimize the allocation and integration of inputs necessary to meet pre-defined objectives.

Previous research in e.g. EU FP6 projects (ECOLEAD, DBE, VOSTER etc.) have shown that ICT solutions are not the only enablers for successful management of projects performed in distributed organizations. Important aspects are as well the “soft” issues involved in collaboration over organizational borders, e.g. trust, social networking, communication, motivation and commitment.

2. Collaborative Project Management

Project management is inevitably a social effort involving not only the project manager, but all the actors involved. This social aspect will only be emphasized when contemplating Collaborative Project Management (c-PM), where already the management itself is a social effort.

Collaborative Project Management can be interpreted in two ways

- Management of Collaborative Projects, or
- Collaborative Management of Projects

The interpretations are illustrated in the Figure 1.

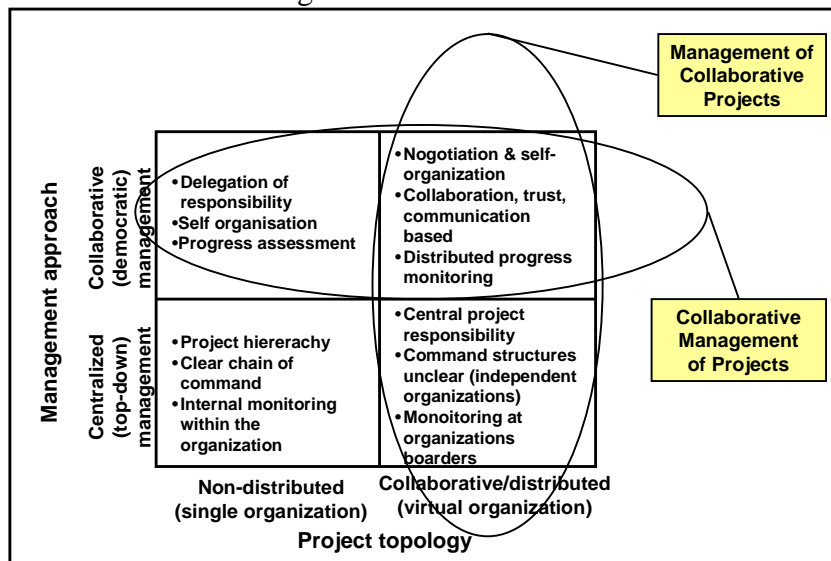


Figure 1: Two interpretations of “Collaborative Project Management”.

Collaborative Management of Projects

Shared project management

- Delegated management responsibility
- Self organised, trusted approach
- Non-hierarchical (and participative) management organization
- Results based assessment of progress

Management of Collaborative Projects

Management of projects in networked and distributed environment:

- Distributed processes
- Participants and organisations in different locations, countries, cultures etc.
- Either central project responsibility and tracking or collaborative management

Both interpretations are of interest. This paper however is more focused on approaches and methodology to enhance *Collaborative Management of Projects*. Only the “traditional” top-down management within a single organization (lower left corner in the Figure) is not considered. Naturally, the most challenging case is the collaborative and non-hierarchical management of projects distributed into several organizations, the right upper corner in Figure 1.

3. Previous research on Virtual Organizations management

The concepts “Virtual Organization” and the earlier “Virtual Enterprise” are close to the project concept, when the project is distributed among several organizations, as a Virtual Organization (VO) consists of independent entities collaborating towards a common goal. In the context of collaborative project management, we relate the term management to the operative co-ordination of the common activities. The management rely on the governance structure and agreed rules for the specific collaboration activities. In a dynamic environment, both the structures and the operations vary in different environments and situations. In the project ECOLEAD (Camarinha-Matos & Afsarmanesh

2008, Camarinha-Matos et al. 2008), one focus area was the Virtual Organizations Management (Jansson et al. 2008). The management of collaborative projects can be classified to belong to this focus area, as a distributed project can be considered as a subset of a virtual organization.

Management of collaborative projects and Virtual Organizations has so far mainly focused on monitoring the progress of the activity and its performance. Based on the perceived measurements, the manager is assumed to take suitable measure for coordinating the activities. Very little focus has been on the methods and tools to support the manager’s decision making. However, the management of inter-organizational activities is a complex task, which could be supported by formal and systematic approaches.

Management of inter-organizational activities has also mainly been considered as transactions at the interfaces between the participating organizations. The focus has been on standardization of the information exchange in order to allow communication between enterprise systems. Very little emphasis has been on the interactions between people and business processes. However, the collaboration is performed by people in the processes of their organizations.

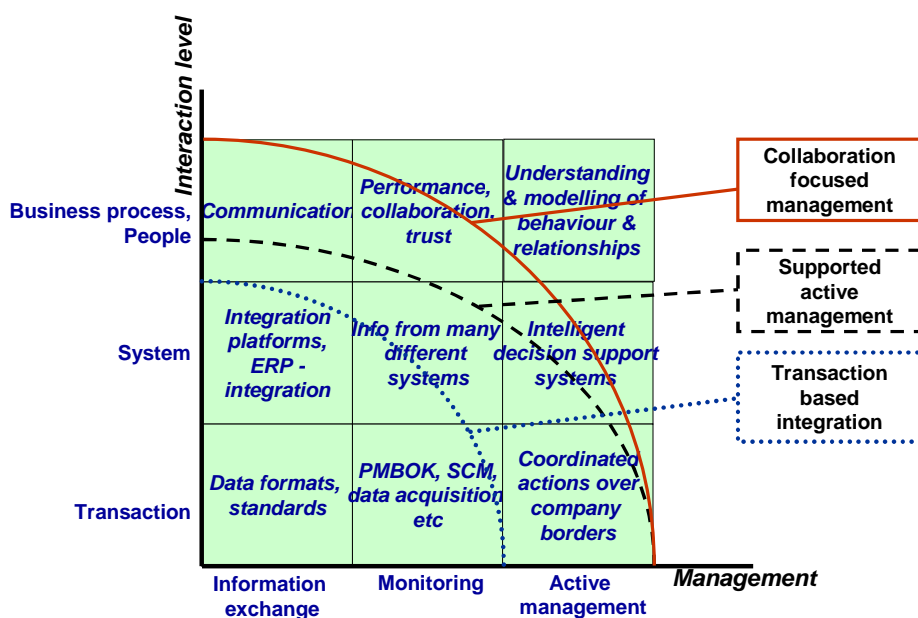


Figure 2. Some dimensions of “Collaborative Project Management”.

In Figure 2, the domain of collaborative management is illustrated from the perspective of management and interaction level. Collaboration among organizations has in many cases focused on exchange of information between partners and the level of interaction has been transaction based. Further enhancement of the collaboration has resulted in system integration and solutions for interoperability between different IT systems. To support management, approaches for progress measurement have also been developed. However, the focus has been on monitoring the progress. The managers have been supposed to be able to take appropriate measures based on the progress status. This type of solutions is shown in the Figure 2 as “transaction based management”.

The active project management can be supported for coordinated actions over company borders, if it is supported by efficient information collection systems from the participating organizations, including monitoring of past events. In addition, intelligent decision support systems can aid for the decision making by providing proactive alarms on emerging or occurred problems. Also simulation based evaluation of different possible management actions can be performed. Approaches and solutions for

this type of “supported active management” were developed and evaluated e.g. in the ECOLEAD project. Approaches for real-time, performance measurement based management of VOs were developed and demonstrated (Jansson et al. 2005, 2008). The solutions give real time monitoring, alarm and decision support for the relevant stakeholders (Negretto et al. 2008). In these solutions, the focus has been on the management aspects. Implicitly, there was the assumption of a VO manger with the final responsibility for the task or delivery, even if the stakeholders have access to relevant information about the status of the VO. In these cases, the main challenges for VO management is found to come from the characteristics of virtual organizations and their temporary nature with distribution of operations in independent but interdependent organizations with their own aim, behaviour and culture (Ollus et al. 2006, 2007).

4. Foreseen development

The COIN project has identified requirements for development in the area of Collaborative Project Management. The requirements definition is based on the analysis of the operations in several industrial companies. One of them is a global market leader in the process industry. The company provides engineering and project implementation services for investment projects worldwide, maintenance engineering and local services to process plants. According to the company outlook future success in Europe build on the combination of two paradigms;

- Fully automated and IT supported engineering process
- Totally networked and efficient global operation

The fully automated and IT supported engineering process means extreme and wide usage of emerging ICT technology resulting in radical breakthrough in efficiency, automated operations in design and project implementation with efficient tools and methods.

Totally networked and efficient global operation takes full advantage of the efficient usage of core competencies in networked organizations. Work is distributed between the most competent and cost-efficient project partners. Agreed and shared work processes and operational procedure support social and participative project execution.

The overall ambition of COIN is to develop solutions for Future Internet Enterprise Systems. To support the above mentioned paradigms the following topics are selected for further development;

- Shared working practises – **Project alignment**
- Delegated and participatory project execution – **Communication through tasks**

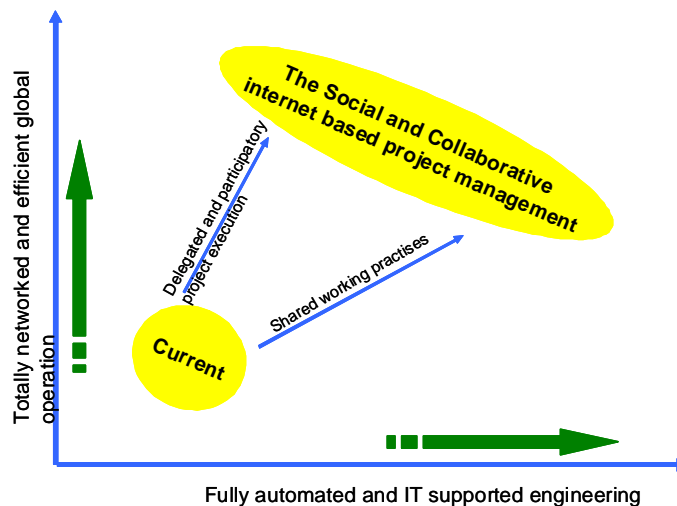


Figure 3. Development towards Social and Collaborative internet based project management

The results will be tools to support Social and Collaborative project management. The above Figure 3 illustrates how the selected development topics support the migration towards Social and Collaborative project management.

5. Project alignment

Project alignment is the process of ensuring that key stakeholders share a common understanding of project work processes, operational procedure, objectives and plans. The ideal situation is a totally unified project work process. Project alignment in Collaborative Project is even more important as partners are often geographically distributed. The distribution may involve acting in different working environments, culture, languages and even having different values. Alignment is not just a matter of agreement of certain project working habits, norms and styles. Often achieving a good level of alignments requires participation in learning process.

To build and increase the project alignment level there is a need to analyse and measure the working and experience level at project partners. Based on the alignment capabilities a suitable learning environment can be established. Consequently the measurement of partner’s alignment status and an interactive learning environment are the two building blocks in boosting project alignment.

The functions of the Participative Project Alignment Booster, currently under development, are described below. The system components will be implemented as web-services.

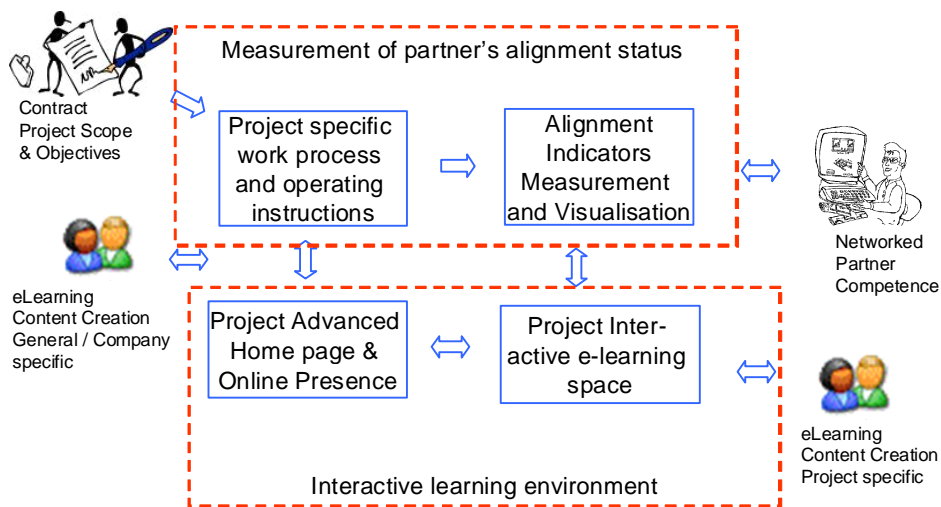


Figure 4. Proposed Participative Project Alignment Booster

5.1 Participative definition of maturity model and best practices

The definition of a maturity model is a preparatory task that has to be performed prior to the launch of any project using the Alignment Booster. A maturity model is a framework that describes, for a specific area of interest, a number of levels of sophistication at which activities are carried out. Maturity models focus on different disciplines that organizations address to improve their businesses, e.g. engineering skill and innovation potential. A maturity model defines elements that describe characteristics of effective processes. It is used mainly to help set competence improvement objectives and priorities, improve processes, and provide guidance for ensuring stable and mature engineering and innovation capabilities (Vergara 2008). A IT-based innovation and engineering maturity model is a valuable tool to assess and measure competence level and to plan improvement actions.

For a distributed large scale engineering project the modelling work can start with the definition of a Networking Maturity Model. For the process areas e.g. “Organisation and People” and “Systems and technology ICT-tools” the maturity levels has to be defined. For example regarding CAD engineering tools the maturity model levels can be e.g.; 1= basic course, 2= novice user, 3= used in project, 4= expert, 5= instructor. Likewise maturity levels are needed for all other process areas. A participative approach to define the model is preferred using “Web 2.0” principles, resulting in higher partner commitment.

5.2 Project specific work process and operating instructions

When a collaborative engineering project is initialised, the project manager analyses the required competencies in the project, geographical location and distribution. Based on customer requirements and project scope he/she defines the project work processes, tool requirements and applied technologies. The project manager uses the Alignment Booster and defines for the project the specific needed skills, competence maturity levels and resources. He/she analyses the project partners (project team) and if some of the alignment status information is out of date or missing, he/she request the partner to use the Alignment Booster to define available current skill levels etc.

As a part of project on-going quality assurance the Alignment Booster can also be used to collect maturity status level information on a regular base and to visualize the development of the project alignment status over time.

5.3 Identification of alignment training needs

To build and increase the project alignment level there is a need to analyse and measure the working experience and collaboration status at project partners as a whole. The project manager can use the Alignment Booster and performs a gap-analysis to identify missing competencies and risks associated with not matching required and available skills and resources. A request for competence development can be raised. Also the project partner and project team members can use the system to determine development and alignment training needs for their own organisation.

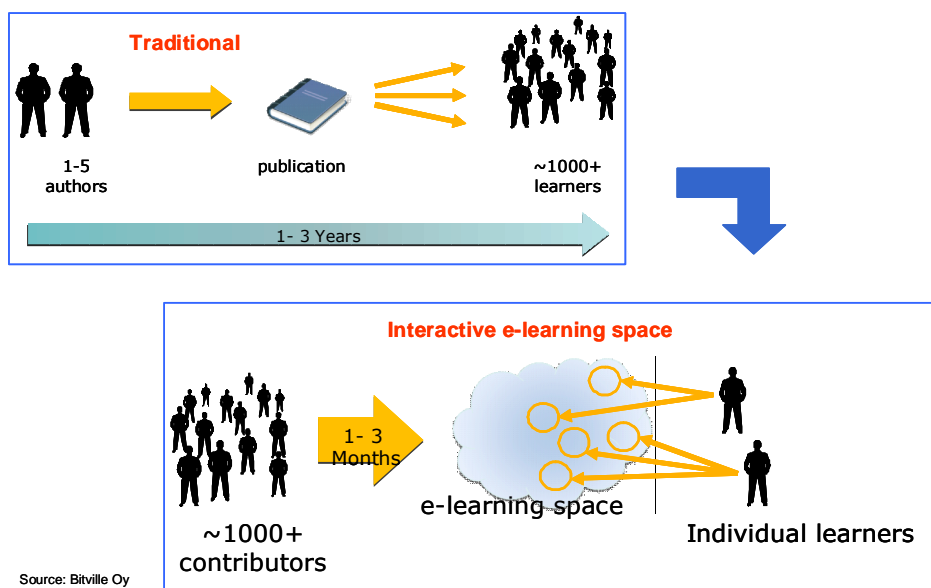
5.4 Project interactive e-learning space

The interactive e-learning space is organized into layers, e.g. motivation, general project independent and project specific. The project specific layer will be structured based on project scope. It contains e-learning material and lectures on projects specific issues, technology, communication and IT-solution selected to be used in the project. The e-learning space will be partly open for contributors coming from the project community, e.g. a wiki type solution. If the competence development notices that the e-learning portal needs to be enlarged, then a request for a new training content will be is sent to the appropriate experts.

The approach in developing support to project management is to include “Web 2.0” approaches into Collaborative Project Management. This includes e.g. to

- Build on project partners distributed contribution to learning
- Collect rich user experience and shared intelligence
- Ability for project partners and people to create and interact with content rather than just consume information.

The direction is **Towards an Interactive e-learning space** as apart of **Community-based Collaborative Workplaces**. The following figure illustrates the approach taken in adopting and including social and participatory approaches to learning environment building.



Source: Bitville Oy

Figure 5. Towards an Interactive e-learning space (Bitville)

6. Communication through tasks

To support the paradigm of **Totally networked and efficient global operation** there is a need to develop a tool for delegated and participatory project execution – Communication through tasks. The approach of totally networked and efficient global operation takes advantage of efficient usage of the core competencies of networked organizations. Work is distributed between the most competent and project cost-efficient partners. Agreed and shared operational procedure support social and participative project execution. The basic underlying principle is that the work is broken down to a detailed task level. The planning of tasks on the lowest level is accomplished by the person actually performing the work. In that way the defined task sizes, work content and duration will be fully understandable and realistically estimate.

In all the planned tool consist of services for “Collaborative and participatory project management” including

- Delegated detailed planning of project activities
- Distributed task and objectives definition based on usage of understandable task sizes
- Participatory and self managed progress control
- Shared measurement and progress monitoring
- Communication facilities for “independence of time and space”

Further details on the planned functionalities will be made available later on.

7. Conclusion

The paper has reported progress in the area of *Social and Collaborative internet based project management*. Studies have come to the conclusion that future success for large scale engineering projects build on the combination of two paradigms; *Fully automated and IT supported engineering process* and *Totally networked and efficient global operation*. IT-tools are currently under development for Shared working practises – Project alignment.

The purpose of the Project Alignment Booster tool is to help partners in a distributed and collaborative engineering environment to share a common working process. The unified work process will be defined and set up in a participative fashion. Through the Alignment Booster all partners will have a better and aligned understanding on; How to reach project objectives, How to conduct and perform engineering work, How to use engineering software and How to get, consume and create training material.

The developed software services will be evaluated in a real world cases.

The next step will be to develop IT-support for the paradigm of *Totally networked and efficient global operation* through a delegated and participatory project execution – Communication through tasks.

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