

Boosting Collaborative Project Alignment

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Abstract: Managing a large-scale distributed engineering project needs skilled, motivated and committed personnel. Unified and aligned working methods are needed. Project alignment is the process of ensuring that key stakeholders share a common understanding of the project mission, goals, objectives, tactics, work processes and plans and have the required competences and skills. Based on current advances in the area of collaborative networked organizations, project management and Internet web 2.0 technologies, the authors have identified further needs and opportunities for development in the area of Collaborative Project Management. The Project Alignment Booster is a set of software services used to promote collaborative project management. The tool has been developed to suit industrial requirements in the area of large and complicated engineering project management. The paper reports the results of developing a toolkit to support collaborative project alignment.

Key words: Collaborative project management, networked organizations, software as a service, internet web 2.0.

1. Introduction

Large-scale one-of-a-kind facilities, like power plants, process factories, ships or communication infrastructure are created through projects. Today, engineering projects are often geographically distributed. In addition to the geographical distribution among the customers, the delivering (project) organization itself can be widely decentralized. In complicated large engineering projects, the required skills and competencies may not be available in single organizations. Collaboration over organizational and geographical borders can give access to complementary necessary expertise, which may vary between projects depending on customer requirements, local characteristics, legislation, etc.

Enterprise collaboration is the well-known and obvious way to provide the needed capabilities in dynamic and distributed environments. To achieve the planned outcome of a distributed project, the collaborative ability and commitment towards the goals among the participants are emphasized [1].

Collaborative project alignment is the process of ensuring that project partners share a common understanding of project goals, objectives, used work processes and plans.

Based on a combination of advancement in the area of collaborative networked organizations, project management and Internet Web 2.0 technologies, we have identified further needs and opportunities for development in the area of Collaborative Project Management (CPM), which have been realized as a set of IT services to support CPM. The aim of this paper is to describe these services, which we call Project Alignment Booster. Some first experiences of the booster are also described.

The paper is organized as follows: Section 2 discusses previous research in the area. Section 3 introduces the concept of Collaborative Project Alignment and Section 4 presents the supporting tool. Section 5 gives the evaluation based on a case study. Section 6 presents conclusions and future work.

2. Previous Research

Collaborative Networked Organizations (CNO) have been the subject of intensive research during the

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last decade. The research object spans traditional supply chains, collaborative networks and business eco-systems. Several international and EU-funded initiatives, e.g., ECOLEAD, ATHENA and COIN have developed reference models, collaboration platforms and software tools to support CNOs.

The collaboration within CNOs fits into the concept of a business eco-system introduced by James F. Moore already in the 1990s [2]: “An economic community supported by a foundation of interacting organizations and individuals—the organisms of the business world. This economic community produces goods and services of value to customers, who are themselves members of the eco-system.”

In the European CNO research cluster VOSTER, two main concepts for inter-enterprise collaboration were identified according to the objective and duration of the collaboration [3].

Network/Breeding Environment is a more stable, though not static, group of organizations which have developed a preparedness to co-operate.

Virtual organization (VO)/virtual enterprises which is a temporary consortium of partners from different organizations established to fulfill a value-adding task, for example a product or service to a customer.

A VO is usually created within a network composed of organizations committed to collaborate. To achieve efficient collaboration, some degree of preparedness and sufficient preparations are needed. This preparation takes place within the Breeding Environment. The concept of the Breeding Environment is used to characterize the network behind a VO. The Virtual Organizations Breeding Environment (VBE) represents a long-term “strategic” alliance, cluster, association, or pool of organizations that provides the needed conditions for collaboration [4].

Based on the above definitions, a VO has similarities with a distributed, inter-organizational project, and the business eco-system is one kind of a network. The level of preparedness within the networks may vary. The

business eco-systems are usually considered less tight organizations than breeding environments [1].

The ARCON Reference model for Collaborative Networks, created in the ECOLEAD-project, has enhanced previous frameworks for understanding the relationships between entities in a CNO [4]. An earlier reference model is VERAM—Virtual Enterprise Reference Architecture and Methodology [5]. The VERAM reference model is based on the Generalized Enterprise Reference Architecture and Methodology, GERAM, which was developed for modeling of single enterprises and has been accepted as an ISO standard [6]. In VERAM, this model was extended for modeling virtual and networked enterprises. According to GERAM, the processes of an entity can be distinguished into two different types:

- Service to the customer (creating the value; product or service). The operational processes of a project are of this type;
- Management and control process (coordinating and managing the value creation). Project management belongs to this type of processes.

The processes are interdependent. The more complex and time or cost-critical the operational processes are, the more challenging is the management process. The outcome of a project can be improved either by investing in the project management or by developing the project operations. Naturally, both efficient management and processes are preferable.

The discipline of project management (PM) is well established. Several professional PM organizations have done considerable work in developing guidelines, methods and tools for the PM profession. The best known of these organizations, The Project Management Institute, has defined the Project Management Body of Knowledge [7]. Professional associations are active and the diversity of Project Management IT-applications available in the market is huge.

In this paper, we use the term CPM more with the meaning “Collaborative Management of Projects” and less with the traditional interpretation “Management of

Collaborative Projects” [8]. Sharing management responsibilities is seen as one necessary approach to improve performance in global distributed projects [1].

Collaborative Management of Projects involves shared and delegated project management responsibility, often self-organized and trusted approaches, and a non-hierarchical and participative management organization. CPM requires that the participating organizations and people share a common commitment and understanding of project objectives, requirements and practices, and that the partners have sufficient competencies and skills for the project tasks. This is a challenging requirement even in the case of projects performed in collaborative networks, having created common preparedness for collaboration. It is even more challenging in a global business eco-system with lower preparation levels.

PM software is a term commonly used to cover software targeted to aid the project managers in managing their projects. Available PM software solutions have traditionally focused on scheduling (tasks, durations and dependencies) and resource management (resources, availability, workload and criticality), providing functions for both planning and follow-up.

Based on industrial requirements and from analyzing the current state of the art and research progress in the area of CNO, PM and Web 2.0, we have concluded that there is a need for development in the CPM area. Recent development within internet technology, social media, participative co-creation, and Web 2.0 applications enables new modern and viable approaches to support “Web 2.0” applications within CPM, including the ability to build on project partners’ distributed contribution to learning, and to collect rich user experience and shared intelligence. The technology could allow dealing with and creation of content rather than just consuming information.

Strengthening only the project control process is not enough. Also the distributed operational processes must be developed into more inherently reliable

processes. Collaborative project alignment is seen as a beneficial approach to support the CPM by contributing to smooth collaboration and decreasing project risks.

The development of a “Project Alignment Booster” is a response to such requirements. The following section describes the rationale for the development and results available so far.

3. Collaborative Project Alignment

There is no well-established meaning or definition of “project alignment”. In the current development work, we use the following interpretation: Collaborative project alignment is a participatory activity of aligning the practices, processes, tool usage and competencies of the project partners and stakeholders to fulfill the project requirements, support efficient collaboration and achieve the project objectives [9]. Project alignment in CPM is even more important as it may involve acting in different working environments, culture, latitudes, languages and even values.

Professional project management literature contains different approaches for project alignment. Box and Platts [10] present research that has been conducted to develop a model for establishing and maintaining alignment of purpose in business change projects. Lewis [11] analyzed large-scale IT projects and how to align the top project leaders, based on the Birkman Method [12]. The Birkman Method is an integrated assessment and report system that analyses and describes individual needs that drive and motivate workplace behavior. Martins and da Silva [13] present a methodology for Process and Project Alignment. It is an approach for Software Process Improvement and refers to the well-known SPI improvement methodologies, e.g., CMMI [14] and identifies shortcomings. The Outset Consulting Group [15] provides an own project alignment service. The OCG suggests inclusion of project alignment as a best practice in strategic project management.

Villachica et al. [16] conclude that no performance

improvement project should begin without its own alignment phase, meeting and packet. Alignment should furthermore continue throughout the remainder of the project as requirements and organization changes. Skulmoski and Hartman [17] present a “Priority Triangle” approach for Project Alignment. The most important benefit from the triangle is that the project team and stakeholders have a shared understanding of the ranking of the project constraints. Abreu [18] introduces a methodology to measure the alignment of value systems in CNOs. A comparison of the approaches mentioned above can be found in COIN [19]. As a summary, of the reviewed literature, we conclude that project alignment is used for

- Aligning change-project objectives with business strategy, in change management;
 - Alignment of understanding in a project;
 - Alignment of organizational and personal goals;
 - Aligning value systems;
 - Aligning projects with success factors;
 - Aligning a (software) project with processes.
- Process and project alignment;
- Program alignment, aligning project objectives within a project program.

The analyzed literature mostly concentrates on internal processes within an organization. Methodologies and models are reported and no software tools have been identified.

The focus of this paper is on the alignment between different organizations and on the need for IT support for aligning CPM. To realize Collaborative Project Management, the project partners need to be able to take responsibility both for their own work and for their collaboration and communication with other partners in the project. The objective of collaborative project alignment is to ensure that the understanding, competencies, processes and practices of the different organizations participating in the project are aligned with the project needs and customer requirements. As the requirements may be project-specific, a partner capable for one project may not necessarily be capable

for another project. The project alignment aims to identify the alignment gaps and to define the measures that should be taken to fill the gaps.

Fig. 1 [1] gives an overview of the project alignment inputs and outputs. The alignment is based on a Project Alignment Model which includes information about the different items or elements (competencies, practices, etc.) that need to be aligned and checked. The model can evolve over time and accumulate experience with usage. It is expected to contain eco-system specific information about both intangible and tangible assets. When new partners enter the eco-system, their relevant information could be inserted, e.g. based on self-assessment.

In addition to partner information, another source of information for alignment is the requirements of a specific project. These may depend on the project size, complexity and novelty, but also on the customer requirements, tools to be used, etc.

In the collaborative project alignment activity, the alignment status of the partners is identified. If there are gaps between the requirements and the status, actions to strengthen the alignment are needed. The actions may include additional training, collaborative definition of working practices, modification of the project schedule or specific risk management efforts. A good level of alignment often implies participation in learning processes. The gap identification should be performed at the beginning of the project but if there are many gaps, the identification should be repeated during the project. The benefits from using such an approach are manifold, from decreased costs and risks to increased quality and customer satisfaction.

Fig. 2 displays the positioning of the project alignment “steps” in the environment of a business eco-system and projects. As described above in chapter 2, CPM has analogies with VOs and Virtual Organization Management as studied in the ECOLEAD project [20]. A Virtual Organization consists of independent organizations, which have agreed to collaborate for a specific task. To the outer

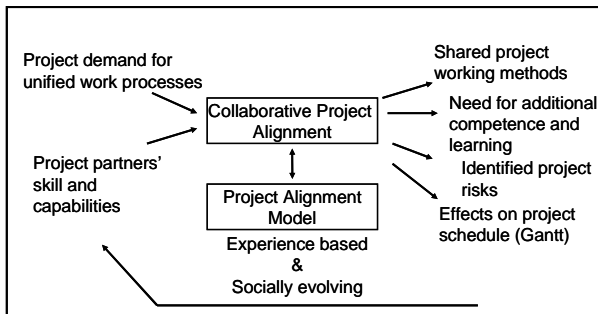


Fig. 1 Inputs and outputs of collaborative project alignment.

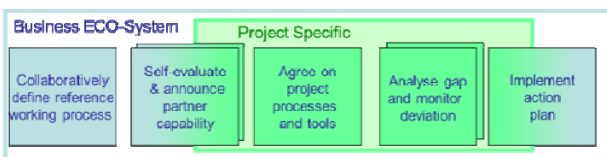


Fig. 2 Positioning the project alignment “steps” in the business ecosystem.

world, VOs in many senses look and behave like a single organization. Partner organizations in a VO have their own objectives, internal processes and cultures. A VO cannot thus necessarily be managed like a single organization. The management means are not the same ones as in a single organization [21].

The analogy between the VBE/VO paradigm and CPM is obvious. The “Business Eco-System” area in Fig. 2 represents a more static part and the “Project Specific” area represents the temporary and dynamic parts. Accordingly, projects are launched within Business Eco-systems. The necessary project alignment preparedness is established already prior to the launching a project. The project specific alignment can then be established and detailed during the project life cycle.

4. The Project Alignment Booster

Project alignment support is being developed in the European FP7 IP COIN project 216256 as part of Innovative Enterprise Collaboration services. The developed “Project Alignment Booster” (PAB) is a part of the larger COIN System. The COIN project sees Enterprise Collaboration (EC) and Enterprise Interoperability (EI) as different concepts, which cannot be merged but that they are so interdependent

and simultaneously present in every networked enterprise, that they can be really considered as the two sides of the same coin (COIN).

EC comes from a business perspective and identifies the process of enterprises—to set up and manage cross-enterprise win-win business relations in response to business opportunities. EI originates from the IT world and identifies a capability of enterprise software and applications to exchange information and to mutually understand the information exchanged at the level of data, applications, processes and enterprise models involved.

A PAB software tool has been developed, as a part of the EC services. The PAB is a set of software services used to promote project alignment. As mentioned earlier, collaborative project alignment aims at aligning the practices, processes, tool usage and competencies of the project partners. It is about agreeing in a participative fashion how to organize project plans and work processes. To build and increase the project alignment level, there is a need to analyze the working experience, competencies and capabilities at project partners. The project alignment demands are compared with the partners’ alignment status. Based on an evaluation of missing alignment capabilities a suitable development program can be established. A central element is the alignment model.

The PAB software has been implemented as a prototype system. Currently the prototype contains a set of project alignment services through which the above indicated steps can be achieved. The first four steps, in Fig. 2, are supported by

- Configuration of alignment model service;
- Project alignment profile service;
- Partner alignment profile service;
- Project alignment deviation service.

The purpose of the Configuration of alignment model service is to populate and maintain the structure and content of the project alignment model. The service enables a participative configuration of general and project-independent processes, skill and maturity

levels and other items. The application domain, specific working methods and processes change slowly over time and can thus be configured prior to launching any projects. The PAB users are actors in the Business eco-system. The defined model structure is generic enough to allow configuration of all types of project used in the Business Ecosystem.

The Partner alignment indicator service is used by project partners to self-evaluate and update their alignment profile. The organizations can update their alignment profile prior to launching a project, after launching a project or after taking an action to improve a partner's capability.

The Project alignment profile service involves the shared definition of project-specific work processes, tool requirements, applied technologies and their levels. The service is applied to identify required engineering maturity levels in the project and to define the project work processes and checklists, tool requirements and applied technologies based on customer requirements and project scope. The function is performed early in the project life cycle. The definitions can be updated as the project advances.

The Project alignment deviation service performs a gap analysis, for example to identify missing capabilities, and offered skills and resources that do not matching project demands. Additionally potential risk due to resource and competences mismatch or scheduling problems can be detected. The service is used throughout the project life cycle as project demands can change over time and partners' capabilities develop.

Currently no services have been implemented for the fifth step in Fig. 2. It is up to the project partners to develop their collaboration alignment capability and status.

5. Evaluation of the Project Alignment Booster in a Global Engineering Company

The developed PAB software has been evaluated in a global engineering company. The company is active in

the pulp and paper, energy and infrastructure engineering domains. It employs over 7000 experts in about 50 countries and has project experience from more than 100 countries. The total size of a typical pulp and paper mill engineering project, which represented the first evaluation cases, is in the range 100-1000 million Euros, involving engineering design work of 1-10 million Euros. The business eco-system consists of 10-30 different organizations (owners, suppliers, engineering consultants, authorities etc.), which are globally distributed to the most competent and cost-efficient project partners available.

The company builds its future success on state-of-the-art engineering IT solutions deployed over an efficient network of partners. Project partners and participants must be able to communicate and announce their skills, knowledge and other intangible assets. Communication and sharing of this knowledge is the path towards a social and participative working process for the project. Well-aligned processes can be achieved through a "Web 2.0" type approach for CPM. By using the PAB, the company seeks to promote agreed and shared work processes and operational procedures, thus increasing social and participative project execution.

The evaluation work started by collecting "elements" that need to be aligned. The identified elements were grouped and the alignment model was configured based on the grouping. The enhancement of the model started from a predefined "generic" engineering domain alignment model, which was further modified to become a specific model for this particular "pulp and paper" eco-system. The needs of the eco-system specific model were identified in discussions with project managers and engineers. The following list is a short extract from the model and illustrates typical groups of alignment elements:

- Project management tasks;
- Collaboration and networking readiness;
- Work process;
- Engineering discipline;

- Systems and technology;
- IC-tools usage;
- Communication;
- Organization culture;
- National culture;
- Language skill;
- Checklist.

Existing Maturity Models such as the Capability Maturity Model Integration (CMMI) from the Carnegie Mellon University Software Engineering Institute [14] have been one starting point. According to the SEI, CMMI helps “integrate traditionally separate organizational functions, set process improvement goals and priorities, provide guidance for quality processes, and provide a point of reference for appraising current processes”. Each alignment group and their sub-groups can be associated with a scheme of levels. The schemes define levels at which the alignment can be performed. For example “Automation Engineering” work can be performed at four levels: 1—Basic, 2—Novice, 3—Expert and 4—Innovating; and “Self-monitoring readiness” can be on three levels: 1—Low, 2—Neutral and 3—High. A special type of alignment elements are the “Checklists” that can be only on 2 levels: 0—Open and 1—Completed. The model is fully configurable and can contain descriptions of any number of alignment element levels and the related processes. Examples of “Checklist” type alignment elements can be seen below:

- Project scope definition;
- Detailed schedule;
- IT Usage plan;
- Tools and software plan;
- Communication management plan, external;
- Communication management plan, internal;
- Coordination with customer planning;
- Change in management plan;
- Security plan;
- Sustainability objectives;
- Document management processes;
- Inspection and approval process;

- Progress monitoring method;
- Progress monitoring responsibility;
- Engineering area interface definitions;
- Quality management;
- Site specific conditions.

The benefit of using the PAB tool in the pulp and paper distributed project environment are

- Shared and unified views on how to reach project objectives;
- Shared and aligned working methods and processes, including agreement on how to conduct and perform engineering work and how to use engineering software tools, and identification of learning needs;
- Identification of required external skills and knowledge;
- Providing a checklist for c-PM collaboration activities;
- Raised awareness of potential risks and scheduling weakness;
- Positioning and comparing project partners’ attitudes and organizational cultures.

6. Conclusions and Foreseen Further Development

Globally distributed projects and large and complex products require improved collaboration and smooth processes between different organizations. This paper has presented one approach, collaborative project alignment, to ensure that the project partners have a similar understanding of the project goals and practices and sufficient capabilities to perform their tasks and participate in the project management. Also a software tool and an alignment model have been developed to support the approach.

The motivation for the development came from industrial needs. Practical experiences of project managers were used to identify the main elements needed for the alignment. The pilot users considered the developed service beneficial and gave some proposals for further development. One area of development is making data input easier.

The management and population of the alignment model could be further developed. A path forward is using knowledge and semantics-based techniques. A knowledgebase consisting of project alignment elements suitable for different project domains can be collected into an ontology, which is specialized for eco-system specific alignment models. Partner skills, capabilities and competencies could then automatically be assessed based on their public information, web pages and company's specific documents [22].

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