Integrating a Collaborative Management Model into a Project Scorecard for efficient Cross-Company Project Management

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Summary
Higher competition on the international market leads to an increasing number of cross-company projects in the automotive industry. Chances and opportunities arise due to new possibilities to improve the efficiency of globally dispersed project teams and partner networks. These opportunities can also be accompanied by problems and difficulties, such as common goal agreement and a lack of project transparency. The Collaborative Project Scorecard aims to improve the common understanding of project goals and to increase the transparency of complex interdependencies by defining common measures and corrective actions with project partners in advance. The integration of ProSTEP iViP's collaborative project management reference model enables the scorecard to monitor and control cross-company projects more efficiently and effectively due to a consolidated and standardised set of tools and processes. This paper presents the concept of the scorecard and the reference model, and demonstrates how the combined concepts can improve collaboration in a networked project environment.

Keywords: *Cross-Company Project Management; Balanced Scorecard; ProSTEP iViP Collaborative Project Management Reference Model, Collaborative Project Scorecard*

Abstract

With an increasing complexity of products and high competition on the international automotive market, the number of cross-company projects with development and manufacturing partners rises. The stronger focus on collaboration in the management of projects enables new chances to improve a company's efficiency but also leads to several problems among the project partners. Typically, the project status and project activities are difficult to monitor and the managers on both sides lack sufficiently integrated and agreed control measures. More difficulties arise when project goals and relevant processes are not adequately defined in advance. The Collaborative Project Scorecard, based on the Balanced Scorecard, aims to improve the common understanding and transparency of a project by identifying consolidated project objectives, and measures to monitor and control them. By applying the impact matrix method to develop strategy maps, the identification and visualisation of relevant goal and measure interdependencies support the project leaders in their decision where to intervene and control. By integrating a collaborative project management model, the Collaborative Project Scorecard also provides a framework to monitor and control partner relevant processes, for time, task, and communication management. This paper presents the concept of the Collaborative

Project Scorecard and demonstrates on the basis of ProSTEP iViP Collaborative Project Management Reference Model how the efficiency of cross-company project management can be improved. Additionally, the paper identifies advantages but also barriers and limitations of the framework based on interviews, surveys and workshops within automotive industry sector.

Introduction

Cross-company and virtual teams have become increasingly important for the success of product development projects. Although, the use of virtual teams is not entirely new, the demand and opportunities for an efficient management have increased due to improved communication technologies (Gierhardt 2001). The growth of virtual project environments requires the development of new methods to manage barriers due to distance of project teams but also due to cultural aspects (Kahn 2005). Projects with geographically dispersed team members have emerged in order to reduce costs and the duration of projects while still being able to control the quality and scope of the projects accordingly (Rad 2003). A new concept, the Collaborative Project Scorecard (CPS), based on the Balanced Scorecard (BSC), aims to reduce difficulties in a cross-company project (Wagner *et al*. 2008). The ProSTEP iViP CPM Reference Model (ProSTEP iViP 2007a), that was developed by 15 industry partners provides a set of processes and tools to manage time, tasks, and communication. This paper presents a combined concept based on the CPS and the ProSTEP iViP CPM Reference Model that was published as “Collaborative Project Management (CPM) – Reference Model” (PSI 1-1). It also demonstrates how project transparency and communication can be improved by defining and monitoring commonly agreed goals and consolidated processes. The CPS and CPM Reference Models were both developed due to recently identified difficulties in the management of automotive projects. Therefore, this paper describes the recent structural development in the automotive industry and the resulting difficulties in project management. The ProSTEP iViP CPM Reference Model and the CPS are presented and followed by a discussion how both concepts can be jointly applied for higher efficiency in project collaboration. Benefits, advantages but also limitations and barriers are identified that need to be considered for a sustainable and successful adoption of the concepts.

Development towards Complex Network Structures in the Automotive Industry

The automotive industry is one of the most significant industry sectors worldwide, especially in countries such as the USA, Japan, and Western Europe. However, there is stagnation in these markets that cannot be compensated by emerging markets such as China or India yet (Ebel et al. 2004). The saturation of the market caused a development of numerous new models, versions and special editions to attract customers. Whereas the strategy has been successful for some manufacturers, it has also caused an increased complexity within the product development processes and after-sales-services (Hab et al. 2006). Manufacturers and suppliers are forced to work together to stay competitive on the international market. Due to a difficult economic situation and high competition, the project structures have changed to a complex network where a significant part of the value creation moved towards a number of project partners. Decentralized and cross-company project management has become and will become more important in the product development of automotive projects (Kurek 2004).

Difficulties in Managing Automotive Projects

Network management has become one of the core competencies of the Original Equipment Manufacturers (OEM) in the automotive industry. The integration of project partners is a great challenge as each partner has own processes and time lines, which need to be synchronised and consolidated. An early discussion about common project goals and technical concepts is essential to manage the complexity of such projects. The traditional concepts of simultaneous engineering, line and project management need to be adapted to the new environment. There is a shift from functional teams in line projects towards autonomous project teams. The situation in automotive projects can only be improved with a holistic consideration of all impact factors. Based on the system theory (Patzak 1982), Pander and Wagner developed a framework that includes a target system to describe and specify project goals, a process system that defines activities to achieve these goals, an action system for the organisational structure, and an object system that has a focus on the car development. Based on the model, a study within the automotive industry identified five major difficulties in cross-company project management (Pander *et al*. 2005).

- Deficiencies in defining and clarifying project goals;
- Low transparency and flexibility in project organization;
- Insufficient control power of project manager;
- Difficulties in change management have impact on process control; and
- Different understanding of applied technologies impedes the collaboration in the car development.

The ProSTEP iViP Collaborative Project Management Reference Model

The shift of project and development responsibility towards partner companies and temporary networked structures requires a stronger connection between information exchange and project coordination. Shorter development cycles and higher product complexity can only be managed by an effective cooperation with partners. The coordination and integration of mechanics, electronics and software become increasingly detailed and lead to a growing number of project partners with different corporate cultures and development methods (Plischke *et al*. 2007). The situation has initiated the project group “Collaborative Project Management (CPM)” of the ProSTEP iViP Association in 2005 that consisted of 15 industry partners mostly from the automotive industry. The objective was to develop solutions for communication and documentation of project data, and for the control of time lines and activities in development networks.

The ProSTEP iViP CPM Recommendation describes the project management tasks, processes, roles, prescribed terminology, and methods to manage time, tasks and communication collaboratively (ProSTEP iViP 2007a). Next to a reference model, the project group developed a data exchange model that defines the data objects used to exchange project management information between different project management systems related to the reference model (ProSTEP-iViP 2007b). Additionally, the impact of cultural factors in a collaborative project is also addressed and described in the CPM usage guide (ProSTEP iViP 2007c). The scope of the Reference Model is shown in Figure 2.

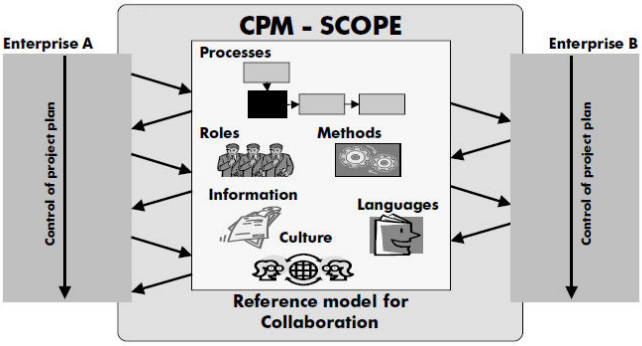

Figure 2: CPM Reference Model Scope (ProSTEP iViP 2007a, p.III)

The Reference Model aims to achieve the following objectives:

- Common agreements on collaborative aspects including documentation of project activities, such as communication, documentation, and milestone agreements;
- Neutral interfaces to exchange project documents, such as time plans and activity lists;
- A transmission path to communicate project changes to enable quick analysis of possible impacts and understanding of causes; and
- Synchronised processes to monitor project status and to transmit real time project information with multi project reporting option.

The reference model is structured into three sections, the base model that includes an introduction to the methods, the application model that describes the events that initiate processes and the processes, role descriptions, and methods and tools, which are necessary to transfer the project information between the partners. The reference model describes two different process levels: the product oriented processes that specify and create the product, and the project management processes that describe and organise project specific work. “These two process levels constantly interact during the course of a project. The product development process (PDP) synchronizes activities between the two process levels and project management provides the processes for bringing the project to a successful conclusion” (ProSTEP iViP 2007a, p. 9). Figure 3 shows the relation between these two processes.

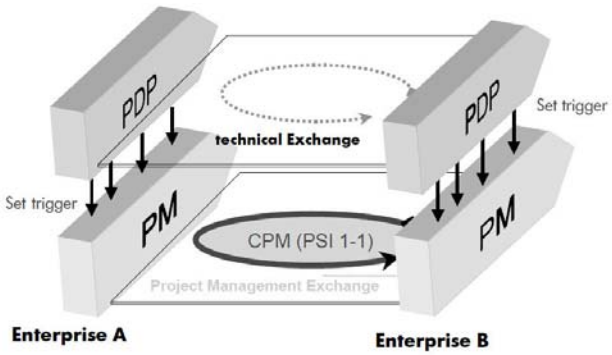

Figure 3: Relation between Product Development Process and Project Management on a Collaborative Level (ProSTEP iViP 2007a, p. 9)

The base model includes the interaction model that integrates the “handshake principle”. This means that each project partner is required to agree on all exchanged project information explicitly before proceeding with the project.

Methods, Tools and Processes for Cross-Company Project Management

The methods included in the ProSTEP iViP CPM Recommendation describe how to apply the tools and give recommendations on an efficient application of the processes. The three main tools of the reference model are the interaction plan, the communication matrix, and the issue list. The interaction plan is a tool for time management, whereas the communication matrix facilitates the identification of the appropriate project member to contact for a certain topic and maps company-internal roles to the roles described in the recommendation. The issue list is a common list that is used to monitor minor deviations from the original common plan and that have an impact on one of the project partners. The reference model also describes relevant processes and process workflows for project planning, execution, and control. Figure 4 shows the process description for “Execute escalation”.

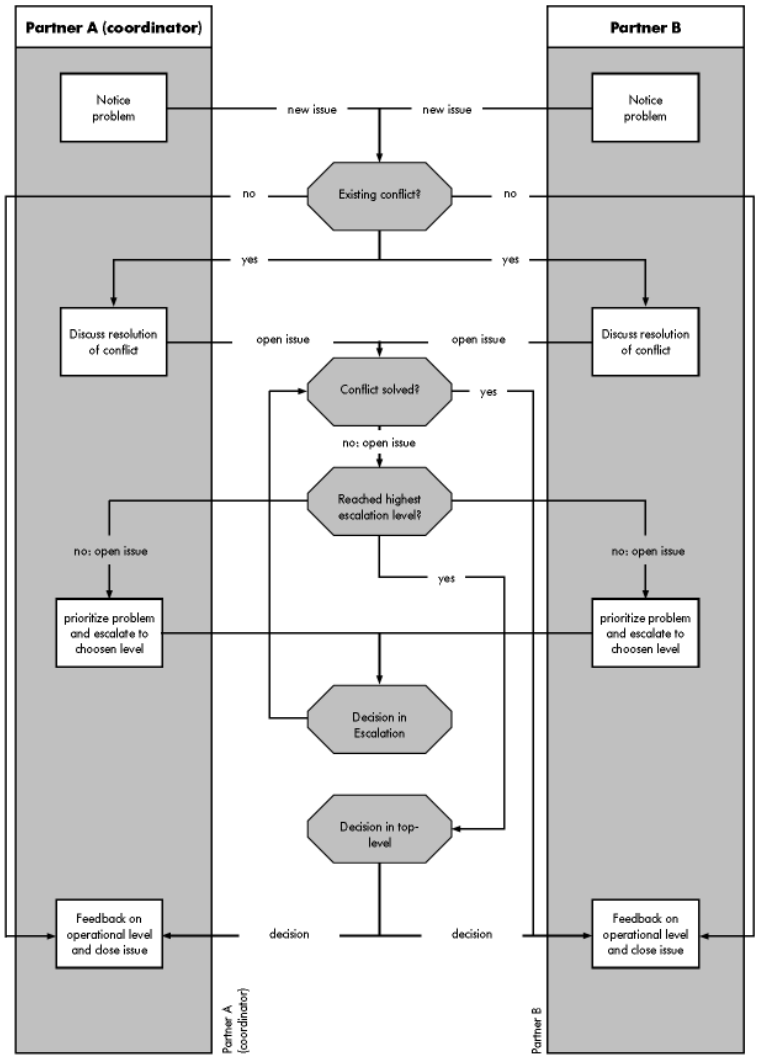

Figure 4: Process Workflow “Execute escalation” (ProSTEP iViP 2007a, p. 51)

By applying the CPM Reference Model, project costs can be decreased as communication errors and errors when transmitting information between partners are avoided, and errors resulting from partners having incomplete project information are reduced. Time can be reduced by the use of existing, proven tools and processes, avoidance of outlay required for coordination between the partners, and faster problem solving. Finally, quality can be supported by a common understanding of project management, and the timely initiation of interaction between the project partners (Boy *et al*. 2008).

The Data Exchange Model is the fundament to extend project management systems for a CPM application. It consists of two elements: the base data model and the definitions regarding exchange as part of an exchange model (ProSTEP iViP 2007b).

The Collaborative Project Scorecard

For successful business management, a company needs to clarify and define its vision and strategy, and then communicate and link the strategic objectives and measures. The Balanced Scorecard categorises these objectives into four perspectives: the financial, customer, internal-business-process, and learning and growth perspective. For each objective several measures and their target values or corridors are defined. Kaplan and Norton's approach was new as it also included soft facts, which support the monitoring of long-term goals rather than mere financial measures (Kaplan *et al*. 1996). Recently the Balanced Scorecard has also been applied to project management to align project goals with business strategies and to support sustainable success by monitoring and controlling also non-financial aspects of a project, such as project team trust and satisfaction or project related employee training. It could be demonstrated that the operational performance of project teams can be improved with the application of a BSC to project management (Norrie *et al*. 2004).

Going a step further, the project focused Balanced Scorecard concept can also be developed and applied together with a project partner in one or a variety of cross-company projects. The project partner can either be a supplier, another department, or a joint venture company. To develop a common understanding of common goals in a cross-company project, the project team has to discuss and clarify their common project goals before the project start. The partners identify common key performance indicators (KPIs) to measure their project targets, and they define corrective actions in the planning stage of the project. That enables the teams to react quicker on issues and to manage risks more effectively (Niebecker *et al*. 2008).

Typical problems in the goal definition process are that goals often are defined too late in the project stage, objectives and measures are unclear, and that there is ambiguity in common goal understanding and distrust between partners (Pander *et al*. 2005). Figure 5 shows the CPS perspectives adapted to a collaborative project environment.

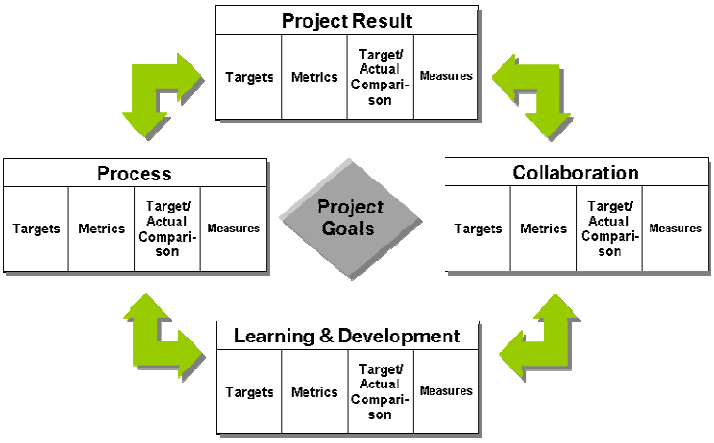

Figure 5: Perspectives of the Collaborative Project Scorecard (Wagner *et al*. 2008)

The interdependencies of relevant project targets and metrics can be identified by applying a project impact matrix analysis and may be visualised with a collaborative project strategy map (Niebecker *et al*. 2008). An example of a project strategy map is shown in Figure 6.

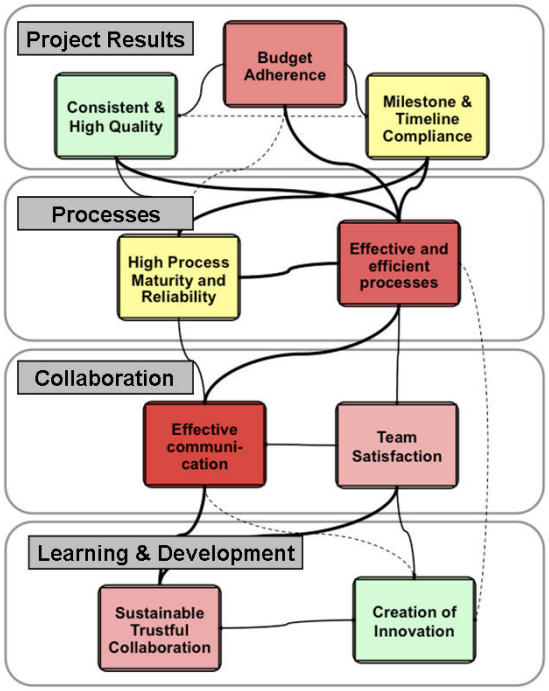

Figure 6: Collaborative Project Strategy Map

A project scorecard for internal management of the project can be derived from the Business Scorecard, typically the BSC, and the CPS can then be developed based on the common goals of a particular cross-company project. The Strategic Collaborative Scorecard (SCS) includes a collaborative vision of both companies that is translated into strategic objectives categorised into the four perspectives. The assumption is that most of the project goals in a certain partnership are not unique and there are typically some basic objectives the partners can find in most of their collaborative projects. This SCS can be applied to a specific project and supports the team in finding

the relevant project goals and measures for their CPS more efficiently. For all relevant project phases, the concept, definition, series development and the series production phase, the CPS needs to be periodically updated with respect to the project goals and KPIs within each phase and from one phase to another. Figure 7 illustrates the organisational integration of the SCS and the CPS applied to each project phase in a collaborative framework.

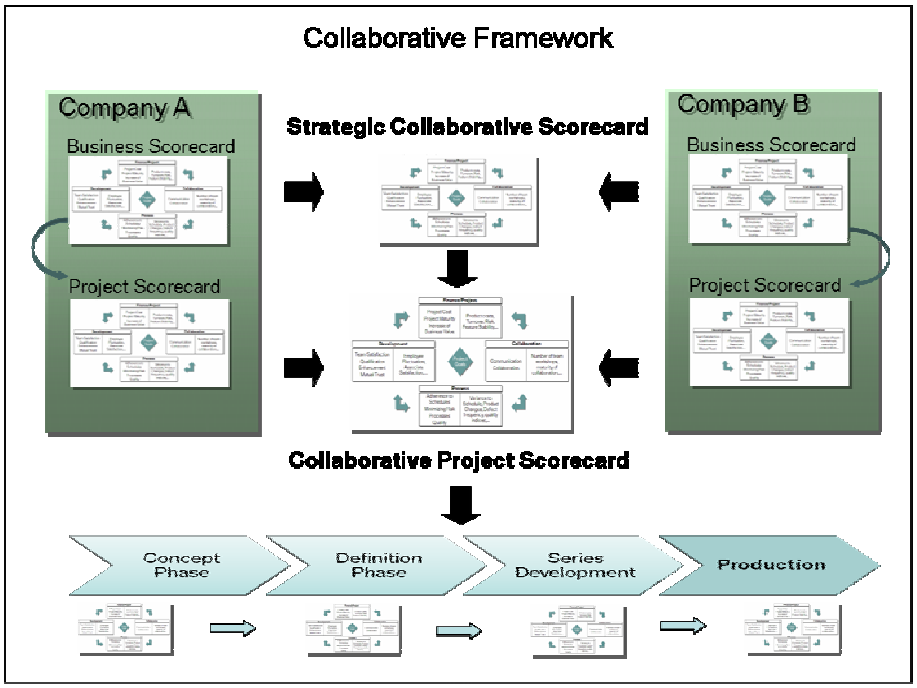

Figure 7: The Collaborative Framework

Although, Figure 7 shows an ideal situation, it cannot be assumed that every company has already adopted a BSC for their business management or a project scorecard for internal project management that is based and derived from a Balanced Scorecard. Therefore, a CPS can also be developed on the basis project goals only. Both companies typically define their individual project goals first and then identify and consolidate common goals with their partner. Figure 8 shows a SCS that includes strategic goals shared between an OEM and a supplier.

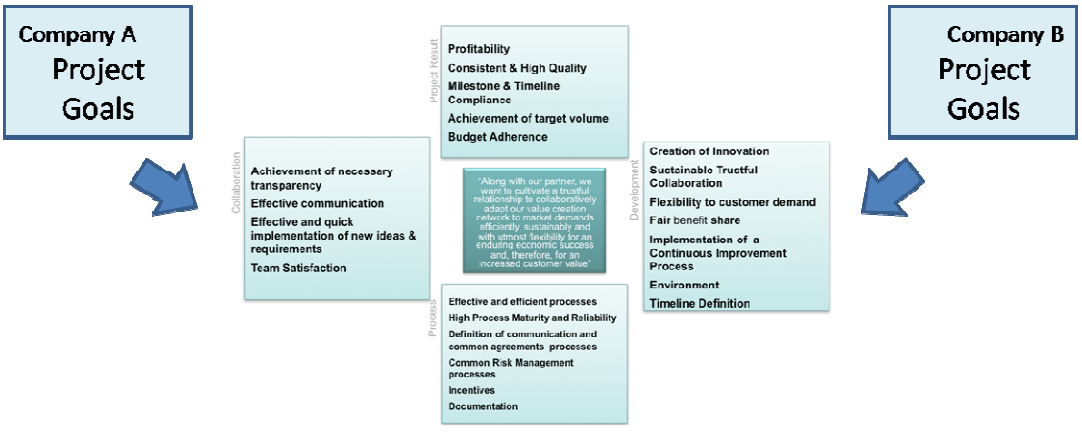

Figure 8: Example for a Strategic Collaborative Scorecard (Supplier-OEM Relation)

The goals agreed in the SCS need to be translated into project specific goals and measured with key performance indicators. The definition of corrective measures on discrepancies of an actual project status from defined targets or target corridors is the final step to complete the CPS development.

Benefits of the CPS methodology identified by project members of an OEM and a supplier in the USA are that it opens up opportunities for collaboration improvements and aligns the whole team to the agreed common goals. It improves communication between the OEM and supplier, and the clarification of dependencies between goals facilitates the identification of cost lead factors. That holds team members accountable to their cost targets. Defining common goals could avoid mistakes and unnecessary tasks. On the other hand, it is difficult to find KPIs for what we do and to translate soft facts in measurable hard facts. The installation and maintenance of an IT system could be difficult and the training of project members to use and maintain the new system leads to additional effort. Key to success will be a regular ongoing review of agreed goals, measures and corrective actions.

Integrating the ProSTEP iViP Model into the Collaborative Project Scorecard

The software implementation of the ProSTEP iViP CPM Data Exchange Model, published as "Collaborative Project Management (CPM) – Data Exchange Model" (PSI 1-2), and its processes and tools is a prerequisite for a successful application to daily collaborative project management. Within the CPM project group several system vendors developed tool specific solutions to demonstrate how the processes and tools can be integrated into existing project management software with little modifications. The solutions were presented to different users with positive feedback. On the basis of an application scenario, the selected users were convinced that the CPM procedure model can improve collaboration considerably assumed it is integrated into a system (Boy *et al*. 2008).

The system integration of the CPM model opens a wide range of opportunities to derive valuable information and KPIs to monitor and control a collaborative project that can be integrated into a CPS. Therewith, the CPM model provides a standardised framework and source of project data to support project management and to be able to assess performance of several cross-company projects on a comparable level. Relevant processes are already defined so that the project partners have a set of consolidated procedures when issues arise. When a milestone cannot be adhered, the KPI for milestone adherence may turn red and an escalation process is initiated. All project members are then aware of the process and know who needs to be informed.

Project result relevant information, such as common milestones and synchronisation points are included in the CPM interaction chain, and the number of points in the issue list with red traffic lights indicates whether the synchronisation points or milestones can be met and can, therefore, serve as an indication of the project status. Another KPI for the project status is the number of project changes that are monitored on the basis of the project change process. Deviations from this process indicate whether the project partner comply with the defined processes or not and is a KPI to be monitored in the process perspective of the CPS. There are more than ten processes defined in the CPM Reference Model that can be included in the KPI for process deviations. As an example, project role changes can have an impact on the team satisfaction and the number is, therefore, a leading indicator to measure collaboration and also long-term goals, such as team trust in the development

perspective. Role changes may also influence the project result perspective directly as a new team member needs time to get familiar with the project. This may be a threat for the achievement of the next milestone.

Next to the CPM processes, the provided tools can be integrated into the scorecard. The communication matrix not only defines the project members relevant for an escalation but also for particular project tasks. This facilitates the definition of the responsible persons to deliver certain KPIs and also the assignment of predefined corrective measures. The issue list is used to monitor deviations from the original plan that affects both partners. Figure 9 shows the issue list template.

Project	
Version (date/ time):	
Distribute to:	

						Role/person responsible				Role/person responsible	
ID	**Related interac-tion task**	**topic**	**issue titel**	**Descrip-tion**	**Source** (e.g. status meeting)	**Partner A**	**Partner B**	**Deadline**	**Traffic signal**	**Partner A**	**Partner B**
1											
2											
3											
4											

Figure 9: Part of CPM Issue List Template (ProSTEP iViP 2007a, p.53)

A deviation is initiated by a change with a related interaction task. The issues are a source to define corrective action for the deviations from the CPS targets. The CPS model supports the CPS in the area of time, task, and communication management and creates opportunities for integrating collaborative risk management. Figure 10 illustrates how the CPS can monitor and control CPM processes, milestones, and issues on the basis of CPM related KPIs for time, task, and communication management.

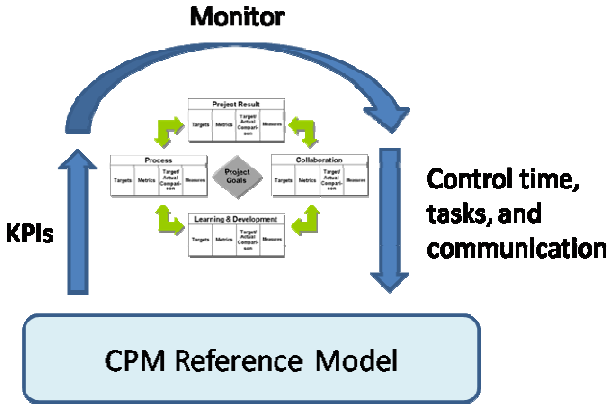

Figure 10: Monitoring and control of Time, Tasks, and Communication

The identification of possible risks related to the defined corrective actions and identified leading indicators is facilitated by an existing collaborative system and predefined processes that project managers can monitor and control in real time and with consistent and consolidated data. First results and feedback of the CPS and the CPM model has been obtained and there is reason to belief that

both concepts have great impact on the efficiency and effectiveness of future collaborative project management. However, the barriers and limitations need to be considered carefully and further pilot projects are necessary to investigate the benefits and opportunities the combined concepts can create in more detail.

Conclusion

The Collaborative Project Scorecard is a concept that supports cross-company project teams to define, monitor and control common project goals on the basis of key performance indicators. It also increases the project transparency due to a holistic view over the project goals and their dependencies by applying a project impact matrix and developing a collaborative strategy map. Communication can be improved as project members have to discuss their common goals in advance. The definition of corrective action based on consolidated goals and KPIs helps the project team to quickly react on project changes and issues that need to be solved in order to complete the project. The integration of leading indicators enables a collaborative and preventive risk management so that problems can be solved before they occur. The ProSTEP iViP CPM Reference Model supports the CPS in providing collaboration relevant KPIs and standardised tools for communication, time, and task management. A software implementation of the data model is a prerequisite for its success and a basis to produce data that are integrated into a CPS. Both concepts have been developed recently within the automotive industry and require further pilot projects to obtain more knowledge about their impact on cross-company project management. First evaluation and results based on interviews and surveys within the industry partners are that the CPM model is likely to improve the quality of collaboration between cross-company project teams. The CPS improves communication and increases project transparency between two project partners but the definition of KPIs to measure common goals may be difficult when it comes to soft facts in a collaborative environment.

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