
NSS in Project Management Enterprise Wide Technologies: The Case of PMOffice™

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Jacques Ajenstat*, Jaime Benchimol**

(ajenstat.jacques@ugam.ca, jaimeb@ibm.net)

***MIS Dept., Business School, University of Quebec at Montreal, Quebec, Canada,
H3C-4R2**

****Systemcorp, Ville St-Laurent, Quebec, Canada, K4T-V8**

Abstract

Negotiation takes place through the entire life cycle of a project. Negotiation Support Systems are particularly justified in Enterprise Wide projects management applications where spacial, functional and temporal co-ordination are very complex. The purpose of the article is to analyse negotiation capabilities of project management technologies and to use NSS as the ultimate test of the maturity of a Project management tool. A testing framework is developed within the Co-operative Distributed Problem Solving (CPDS) perspective questioning how loosely coupled network of problem solvers within project management process can negotiate to solve problems. The article illustrates this type of benchmarking on "PMOffice", a new Web enabled tool resulting from a joint effort of a software development corporation specialising in PSS (Performance Support Systems) and PMI (Project Management Association), the largest association of project managers. Some generalisations are proposed as to the use of NSS features as selection criteria for project management technology.

NSS in Enterprise Wide Project Management Technologies: The Case of MOffice™

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Jacques Ajenstat*, Jaime Benchimol**

(ajenstat.jacques@ugam.ca , jaimeb@ibm.net)

***MIS Dept., Business School, University of Quebec at Montreal, Quebec, Canada
,H3C-4R2**

****Systemcorp., Ville St-Laurent, Quebec , Canada, postal code**

1. Introduction

According to most definitions the essential features of a project are its uniqueness a novel organisation to achieve a beneficial change. Project Management Associations presents project management with its own body of knowledge. The certification to the practice requires acquisition of skills and methods to participate in the project organisation. The European UK based Association of Project Managers insists on the structure of topics which constitutes the discipline : project management , organisation and People, Techniques and Procedures , General management The US based PMI topics within a Project management framework focus on scope , time , cost , quality, communication and risk management as part of Project Management Body of Knowledge (PMBOK) . The project organisation comprises its own terminology and structure that bring conflicts to the functional structure of a company. One of the key roles of a project manager is to co-operate and negotiate with functional managers for resource as he seldom has the authority to command resources. Project deviations from its original objectives is also very frequent in large Enterprise wide Project Organisations due to the inherent risks , but also lack of clarity in objective statements , communication among actors in the project , inadequate structure and control methods . Once detected adjustment issues have to be discussed and changes have to be negotiated , approved , implemented without compromising the project organisation. Large ranges of Project management tools are offered to assist the project organisation in achieving a beneficial change as defined by quantitative and qualitative objectives. Traditionally these tools were limited to scheduling and cost control features with techniques such as PERT or CPM . The current trend is toward Structured Project management techniques that provide a framework for the project management tools to operate. They assist in the definition of project elements (scope, time ...) and on the distribution of pertinent "just in time" information to the right level of the project structure. These spacial and temporal dimensions are expanded to co-ordination of knowledge that is needed to make project management actors proficient in their tasks. Therefore the tools are only useful if they enhance the project actors understanding and ability to manage changing project outcomes. The motivation for such stand is well supported by thematic papers in the up - coming October 1998 PMI Symposium (PMI98). A large number of topics covered in the programme deal with tools that can cope with the requirements imposed by the increasingly complex and dramatically changing environment . The claim of this paper is that the suitability of such tools can be tested in "critical bottleneck situations " that are often related to managing change. More specifically, aside the traditional cost , time and quality factors the most advanced technologies aim at processes such as " Review/Approval/Inspection" , managing pending issues and risk management . Because negotiation is present at each phase of these change processes the idea is to test the tools from that perspective as the ultimate criteria..

2. The Testing Framework : CDPS

The Co-operative Distributed Problem solving (CDPS) was originally proposed as a way to study how a loosely coupled network of problem solvers can work together to solve problems that are beyond their individual capabilities [1]. Negotiation is among one of the approaches of CDPS. Using that framework the project organisation structure can be considered as a network where each node is capable of sophisticated problem solving and can work independently, but the problems faced by the organisation overall cannot be completed without co-operation. This is typical in Enterprise Wide project management problems since no single node has sufficient expertise, resources, information and knowledge to solve a problem. The nodes represent actors such as Executive stakeholders, Project managers, Team members and more and more Intelligent Agents. Each of them has only the capabilities to solve parts of the overall problem. Physically, the nodes are separated in time, space and by function. The new trend in project management tools is to offer an Internet solution for Global Project Management. According to the framework, the general approach toward the resolution of the overall problem (global problem) is to use the Internet communication platform to distribute knowledge and information individually to resolve sub-problems and then to integrate individual solutions to resolve the overall problem. Several constraints are apparent. First, the individual solutions have to be compatible to “fit” into the overall solution. The second limitation is in the communication and co-ordinations of the critical inter – relations between the nodes. Today’s “Web” enabled technologies using Internet, Intranet or Extranet renders the traditional physical separation of actors more virtual thus greatly limiting these constraints to a very technical level..

One of the approaches of CDPS that is of interest in this paper is negotiation. It consists of using technology-mediated dialogue between nodes to resolve inconsistent views, conflicts that result from environmental changes. Negotiation consists of resolving issues that interfere with co-operative behaviour. For example one can capitalise on insight about human negotiation to build intelligent agent to negotiate for him. Various scenarios are proposed in the literature to explore that perspective for shopping, bidding, multistage negotiation etc. To date little interest was addressed to project management processes despite the advantage it represents. Also from a purely anecdotal source the developers of project management tools have a limited knowledge of the literature on NSS and often reinvent the wheel..

3. Assessing NSS in Project Management tools

In project management tools the prevailing approach consists to specify the rules that direct the negotiation between the nodes. At individual level the criteria would be to assess as to how the tool reduces the cognitive effort required in negotiation. At inter – nodes or network level the tool should assist in the process motivated exchanges between the nodes. For a more complete benchmarking we are proposing to analyse how project management tools address the major issues of GDSS in general and NSS in particular. In the literature we have identified the issues of

- Organisational memory: At the network level negotiators may change, and actors at each node have cognitive limitations in regards to the complexities in Enterprise Wide projects. ARBAS (Action - Resources based Argumentation) [2](Bui, 1996) provide an argumentation support as part of its NSS module. This technology allows members of an organisation to document information exchanges. With its argumentation definition and manipulation languages the system assists in the implementation of organisational memory for negotiation purposes.[2]. The GDSS perspective offers at first level tools that range from as e-mail for storing exchanges between the nodes, schedulers, and bloc notes as assistants of the memorisation to finally idea generators to amplify judgement.
- Structure to deal with space and time distribution of actors. In INSPIRE, previously known as InterNeg [3], a messaging system is provided for specifying preferences and assessments of offers. It supports negotiations through a dedicated Web site. For the GDSS perspective, a set of tools is suggested to deal with the scenarios of time asynchronism and geographic dispersion.

- Decision making to reach agreement . Most GDSS provide assistance for decision making process ranging from level one information exchange to level two analytical modelling and rules and finally a “facilitator” to control the process . NSS tools such as MEDIATOR, COOP and NEGO provide a set of methodologies including voting , multicriteria analysis that combine individual preferences of each node to a global level to reach agreement..

Implementation is another important issue for new technologies . By incorporating new dimensions such as negotiation or by adding to the complexity of technologies based solutions implementation and use can be compromised . In a case study of implementation of Lotus Notes Orlikowski found that mental models were among the most impotent factors that influence and use. Specifically the findings suggest that in the absence of mental models such technologies might interpreted in terms of more familiar personal and stand alone technology such as spreadsheet (Lotus 1,2,3 or Excel)

Methodologies such as brainstorming , morphological analysis, nominal group and Delphi techniques are also more or less applied in Group Support Tools. From this discussion we have elaborated a benchmarking framework to assess NSS maturity in an application involving a network of actors and agents. On one dimension we propose an evaluation in terms of GDSS maturity somehow adapted from DeSanctis and al. taxonomy by levels [4] exploited above , on the other we use NSS issues pertinent to the application (Table 1)

Table 1 : Benchmarking framework for network based technologies

ISSUES in NSS	GDSS maturity		
	Information exchange	Analytical modelling	“facilitator”
Memory			
Structure			
Decision making			
Implementation			

We will examine the merits of this framework on Enterprise wide project management technologies. We have selected PMOffice by commodity and also as a tool claimed as the state of the art solution to management by project of the new millennium organisations

4. PMOffice™ and NSS

PMOffice is the result of a joint effort of a software company specialised in PSS technologies and PMI (Project Management Association) the largest association of project managers. The technology has taken advantage from both orientations. The PSS focus on “juste in time” delivery of competencies using workgroup technologies of the first is combined with the body of knowledge on project management of the second.

Workgroup applications, which claim to improve communication efforts, do not define the framework in which managers and their teams should develop, sequence, coordinate or route project data. **PMOffice™** as a workgroup standardizes and organizes the project management efforts using the PMI’s framework to give individual managers, project managers and their teams the methodology and structure required to support management by projects. It is a fully integrated Web-based project management information server, customizable and adaptable to any organizational infrastructure.

Using a centralized Web repository and a distributed Java thin client structure, all designated team members can coordinate and collaborate in the planning and execution processes of a project and track team activities. It saves time by consolidating a complete view of all project information and documentation in one place that can be accessed by all team members regardless of their geographical location. It is composed of both a traditional Project Scheduler and more advanced Review/Approval/Inspection cycle, issue discussion and Risk management process.



Project Schedulers and PMOffice:

Program managers can consolidate their **CPM** and/or task driven schedules for multiple project resource scheduling and levelling. In a matrix organisation that shares common resource pools, task inter-dependencies among projects are common. Often, a scheduled task lagging in one project will affect another. **PMOffice™** permits program managers to create task dependencies across multiple projects. Once these dependencies are established, program managers can export the tasks back to their scheduler to be consolidated into a **Master Project**.

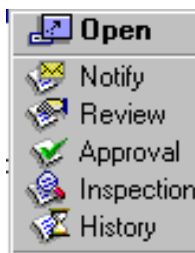
A project repository fosters a structure where the creation, review and approval of information can be done not only sequentially or in parallel but also in a collaborative

fashion among individuals on-site and off-site. For example it forms the basis for group discussion and for reporting issues. Those form the knowledge base for negotiation. Finally, a project repository is able to exchange schedule information with all leading project management scheduling tools. The repository provides the structure for negotiation in time and space. We will retain that project repository provides the organisational memory for negotiation memory that is useful for negotiation:

Project repository – Organisational memory

Review/Approval/Inspection

PMOffice provides project team members and project managers with the ability to initiate, plan, assign, execute and control all project information within one central repository.



Just as important, is the capability to modify and negotiate acceptance of modifications as well as the ability to seek revisions and approvals. To accomplish this, **PMOffice** makes use of the knowledge-enabled workflow features of **Review**, **Approval** and **Inspection** that are accessible at any element of the work breakdown structure (WBS) or document.

The software is very friendly to encourage use. For example to access these features, the end user selects the element from the work breakdown structure comprising Issue Module, Change Request Module, Risk Module or Document Module.

The pop-up menu will display the three feature selections. Selecting either **Review**, **Approval**, **Inspection** will display the appropriate window that is essentially the same for the three features. The approval is based on a set of rules for approval. For instance an organisation can base the approval on a majority vote. For example with a 75% rule, an agreement will be reached if three among four decision nodes approves it. The Review/Approval/Inspection module provides the structure that is used for negotiation within the decision making process:

Review/Approval/Inspection - structure for decision making

Managing Issues and Changes

There is scant evidence of any project happening exactly as planned. Changes are inevitable and should be expected. Typically, a Control Management plan would be developed and implemented when required. Identifying issues and communicating change requests is only part of managing issues and changes module; **PMOffice** has been designed to provide the project manager and team members a platform to collaborate. At the project manager levels the tool provides the ability to create response tasks and incorporate them into the existing WBS.

The major benefit is that all team members and stakeholders are provided with a change and control methodology that is consistent with all the other collaborative workflow and notification features of **PMOffice**, making not only easy to use but encourages its use. Changes and issues are handled quickly, reducing their impact on the project. Communication should, in theory, be improved and all team members are aware of the performance. Once a team member has generated a Change Request or an Issue, the project manager may determine that actions and activities should take place in order to accommodate the changes requested or deal with the issues as required as per the figure below.

Team members may be required to participate and collaborate in this process. PMOffice facilitates this collaboration by allowing the project manager to establish response tasks against Change Requests and Issues and assign them to a team member in the same manner as main component of the WBS. Team members then collaborate on acceptance of the new task based on their availability and skills. Once the new task is negotiated and eventually accepted, the project manager then can incorporate it into the body of the Main WBS. If the schedule is impacted, the project manager may have to re-level the project and re-negotiate the affected tasks with the team members. Either process is initiated and responded to,

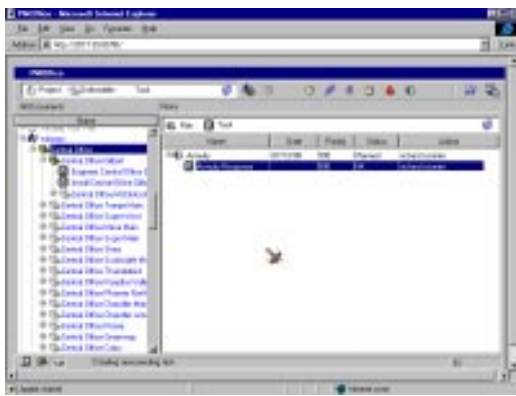
communicated and documented from within the central repository. PMOffice also historically records all these activities for future reference.

All Change Requests and Issues as well as the response tasks and activities roll up and are summarised at the project level. In any case the issue management and change module will act as a “facilitator” during an eventual negotiation:

Issue and change management - “facilitator” role

Risk Management

Before dealing with risks, the end user must identify what they are. In order to allow the project manager and project team members to implement a risk management plan, or contingency scenario, and to deal with risks as they are identified and/or occur,



The **Risk Management Module** is a repository for all your risk management data. Included in this module is a method for monitoring and keeping track of **Risk ID/Description, Trigger/Detection, Risk Attributes, and Closure Criteria**. Additionally the Risk management module allows the project manager to enter Estimated Impact Costs, Calculated Impact Costs and the Estimated Response Cost.

Of these, the most important in risk planning is the **Trigger/Detection** field. It is this field where information is input which will allow project

managers and team members to qualify the conditions of an occurrence or potential occurrence. Subsequently, it is then possible to quantify the potential impact.

The **Risk Ranking Matrix** is also included in the **Risk Management Module**. As an analytical approach it uses a matrix that evaluates risks based on their probability, impact and precision rankings fields. Selections in each field, from low to high, produce a position result in the Ranking Matrix. The matrix is divided into three zones: green, yellow and red. While business and project organisations may interpret the results differently, typically results that are located in the green zone will have a minor impact on the project. These risks must be monitored, but there may be no need for any positive actions at present. The yellow zones contain medium risks. Aggressive management within current project plans should keep these risks under control. The red zones contain major risks. These risks generally require a change in your baseline plans or the implementation of new management processes to control them. This is a signal for major changes such as the possibility that senior management should be alerted. The use of graphical representation is a way to represent and locate the intensity of conflict and thus from a negotiation point of view it is helping in resolving it

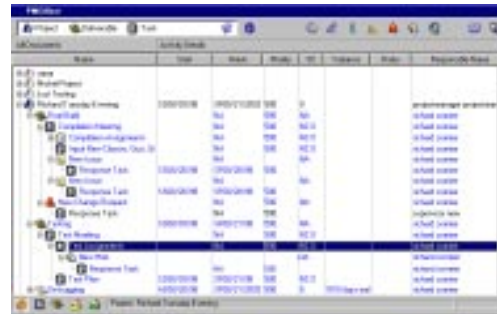
The **Risk Response Development (Avoidance/Mitigation)** area suggests what to do about the risk. The whole point of risk management is to manage risks out of existence. This can be accomplished by reducing the risks to zero, or by incorporating their mitigated effects into the project plan. The **Closure Criteria** is the criteria that must be met in order for the risk to be considered closed.

Implied in Risk Planning and Risk Management is the ability to identify responses and response tasks in order to mitigate or avoid the risk if/when it occurs. **PMOffice** allows the project manager to create response tasks, validate and collaborate on the scope definition, assign and collaborate on resource assignment and once the response task has been accepted, incorporate the new task into the main body of the WBS.

Once the existence of a **Risk** has been acknowledged, and a response task or series of response tasks has been developed, it is possible for the Project Manager to **transfer** the **Risk** to the main body of the **work breakdown structure**.

Once a **Risk** has been transferred, it becomes a **Deliverable**, inheriting all of the properties of a **Deliverable** including the roll ups of dates, time reported, budgets, costs and percentage complete.

The newly created **Deliverable** will display the **Risk** icon in order that the Project Manager and team members can readily identify the **Risk** in the main work breakdown structure and the impacts on existing activities.



As with **Issues** and **Change Requests**, **Risks** that have been transferred from the parent module are the only **Deliverables** that may become a sub-set of a task in the main work breakdown structure. Risk deals with most of the issues of negotiation, that is organizational memory, structure and decision making. It is partially an analytical tool to evaluate risk:

Risk management – negotiation issues and analytical modeling

Despite the presence of many features of NSS inside the PMOffice design of the tool was not based on knowledge of the field. Though the statement is based on anecdotal evidence the diffusion of that knowledge is at play.

5. Conclusion

We have found that the CPDS combined with GDSS approach was very useful in conceptualising the issues related to negotiation in enterprise wide project management. It helped developing a benchmarking framework that seems to apply to networked type of problematic. In particular it proved in a case study that PMOffice technology has a high maturity in terms of NSS up to decision level and at the same time providing a "facilitator" role in group decision making. It is claimed that this approach could apply to the selection of technology for any type of network based problematic. Further testing is however required to validate this framework. The question of debate that was guiding the designer of the system was to reduce the added complexity of new technology to ensure successful implementation and use. The idea of a NSS integrated in a transparent way within the project tool as opposed to separate complementary tool is justified in that respect.

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