

A Comparison of Project Management Software Tools (PMST)

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Abstract—Using automated software tools is essential for successful planning and managing of projects. Many automated software tools have been developed in the industry. The literature on how to select the appropriate project management software tools is quite limited. This paper provides a comparison of a set of project management software tools (PMST). In this study, first, we developed criteria to determine which PMSTs would be subject to our analysis. Then, we developed criteria to compare and evaluate these PMSTs. Finally, we present our findings in a tabular format. Our findings will help project managers to assess the strengths and weaknesses of these tools.

Keywords— Project Management, Project Management Software Tools, PMST

1. Introduction

The number of automated project management tools available in the market is increasing rapidly. With significant evolution of these tools, many project managers have started using various software project management tools to manage and support their project activities. These tools are mainly used in planning, monitoring and controlling projects. The features provided with these tools vary. The project managers must choose an appropriate set of tools with necessary features among many tools found in the market. According to Capers Jones [18], in complex software projects, successful project planning highly utilizes automated project planning tools. Hence, it becomes important for project owners or managers to choose the most appropriate tool or set of tools for their project management needs.

In this study, we analyzed a set of project management software tools (PMST). Then, we compared these tools using a set of criteria. In addition to the criteria we developed, we used the criteria listed in [12]. At the end, we present our findings in a tabular form. Our goal in this study is to help project managers in choosing project management software tools.

2. Study

2.1 Selection of Tools

A huge number of PMSTs exists today. We scoped down our study to include a handful of these tools since our goal is to provide a means to compare tools but not to compare them all.

For this study, we developed the following criteria for selecting project management software tools to be included in this study:

1. Being subject to other related studies [1,18,20,21,23].
2. Being used by people other than its developers [1].
3. Popularity in project management community according to forums, blogs and other non-officials websites (Table-1).
4. Being able to reach information about the tool.

Table-1 Forums, blogs and other non-officials websites

	URL Addresses
1	http://project-management-software-review.toptenreviews.com/
2	http://www.brighthub.com/office/project-management/articles/10767.aspx
3	http://www.softwareprojects.org/free-project-management-software.htm
4	http://www.smashingmagazine.com/2008/11/13/15-useful-project-management-tools/
5	http://www.wilsonmar.com/1projs.htm#ProjTools
6	http://en.wikipedia.org/wiki/Comparison_of_project_management_software

We selected 10 PMSTs that meet our selection criteria. We believe the last criterion is also important, since project managers are not likely to select a tool they do not have sufficient knowledge about.

The list of tools subject to this study is as follows:

1. Assembla[2]
2. BaseCamp[3]
3. DotProject[4]
4. GanttProject[5]
5. LiquidPlanner[6]
6. Artemis View[7]
7. OpenWorkbench[8]
8. Open Proj[9]
9. Primavera[10]
10. MS Project[11]

We note that these tools should not be considered as the best tools or the most successful tools in the market. We do not promote any of these PMSTs mentioned. These tools are just subjects in our study.

2.2 Comparison Criteria

To evaluate these tools, we define basic functions and core features that provide the basis for the evaluation process.

In [12], twelve criteria (1-12) were selected and defined to compare and evaluate software project management tools. We added five more criteria. The final list includes 17 criteria.

1. Task Scheduling
2. Resource Management
3. Collaboration
4. Time Tracking
5. Estimation
6. Risk Assessment
7. Change Management
8. Project Analysis/Reporting
9. Document Management
10. Communication Tools
11. Process Development Method
12. Portfolio Management
13. Access Control
14. Quality Management
15. Web Based
16. License
17. Issue Tracking

Task Scheduling: Task scheduling is the activity of defining the start and end times for each activity. The result of task scheduling is a feasible project schedule. Most project management tools have features to support task scheduling. The project schedule helps project managers to monitor project milestones, and activities. Furthermore, project schedule often changes in projects. Therefore, it is helpful

when PMSTs provide ease of modifications in the project schedule.

Resource Management: With this feature, project managers allocate proper resources to activities and tasks to meet project requirements. Such resources may include financial resources, inventory, human skills, production resources, etc.

Collaboration: Collaboration awareness is important for managing inter-team development activities. These activities often lead to shared artifacts that requires careful handling. Successful collaboration provides the opportunity to detect potential integration problems in time. Furthermore, it helps to take proactive steps to avoid conflicts [15] and enables sharing of knowledge and best practices. Collaboration can be implemented by integrated e-mail, web pages or wiki pages.

Time Tracking: Time tracking enables recording, analyzing, estimating, and reporting the time spent on project activities. With the help of time tracking employers' timesheets and expenses is managed. A significant cost item, personnel salaries, are calculated. In addition, time tracking leads to a detailed breakdown of project tasks.

Estimation: It is the activity leading to estimates on project effort, cost and schedule. Project managers can generate, manage and validate estimates of effort on projects.

Risk Assessment: A successful risk analysis reduces long-term expenses and prevents project failures [17]. Risk assessment enables the project manager to recognize and schedule risk countermeasures during project execution.

Change Management: It is the controlling of project plans, resources, products and cost of project development process. By change management, the effects of changes on requirements and above issues can be easily observed and managed.

Project Analysis/Reporting: It is an analysis of product, process, person or organization related project development effectiveness by Gantt, PERT, CERT or other custom formats.

Document Management: It enables managers or necessary project members to customize, share, distribute, recover,

authenticate, secure and also manage versions of the documents.

Communication Tools: They are used for informing stakeholders and project members about the status of the project and published documents. Communication tools may use e-mail notifications and other means. These tools constitute the foundation for collaborative activities [16].

Process Development Method: With this feature standardized scheduling of tasks can be implemented. Project manager can manage various tasks or activities during product development process using these methods.

Portfolio Management: Project portfolio management (PPM) methods are used for choosing the right projects for producing the deliverables beneficial to the organization [21]. It enables managing multiple related projects and hence resource allocation among them.

Access Control: It is controlling access to the resources of the software tool to authorized users and restricting access to unauthorized users.

Quality Management: Managing all activities, tasks, documents etc. related to ensuring a certain level of quality such as quality policy description, quality planning, quality assurance, quality control, and quality improvement.

Web Based: Some tools are accessible via a network such as the Internet or a LAN.

Issue Tracking: Creating, maintaining and managing lists of issues related to the project.

2.3 An Overview of PMSTs

In this section, we provide an overview of PMSTs. Information in this section was collected from the official web sites of the tools subject to this study.

Assembla: It is an open-source, collaborative project management tool that is used for commercial purposes. It allows companies to hire its PM applications online [13], and thus helps companies to lessen their software development expenses.[14]

BaseCamp: A web-based project management tool developed by 37signals. It presents to-do lists, wiki-style web-based text documents, milestone management, file

sharing, time tracking, and a messaging system. It also focuses on communication and collaboration [3].

DotProject: It is a web-based project management tool developed by dot Marketing Inc. In order to address a wide user community, it has multi-language support[4].

It emerged as an open-source alternative to Microsoft Project. According to its official web site [4] its features are:

- Simple user interface
- Project management functionality such as collaboration
- Open access, free usage
- User management
- E-mail based trouble ticket system, (Integrated voxel.net's ticketsmith)
- Client/Company management
- Project listings
- Hierarchical task list
- File repository
- Contact list
- Calendar
- Discussion forum
- Resource based permissions

GanttProject: It is an open-source Java based project management software that runs under Windows, Linux and Mac OS X operating systems [5].

Team members and their information like e-mail accounts, phone numbers can be added to the tool and tasks can be assigned to each of the team members. The key feature of GanttProject is that it saves files with an .xml format, thus makes them accessible via web. Its features are[19]:

- Task hierarchy and dependencies
- Gantt chart
- Resource load chart
- Generation of PERT chart
- PDF and HTML reports
- MS Project import/export
- Exchange data with spreadsheet applications
- WebDAV based groupwork.

LiquidPlanner: It is a web-based, platform-independent tool that uses probabilistic estimation approaches to manage uncertainty. According to the official web site [6] its features are:

- Multiple projects
- Smart scheduling
- Painless time tracking
- File sharing
- Email integration

- Project portals

Artemis Views: Artemis Views is an integrated enterprise project and resource management application. It is advertised as being able to offer project planning, scheduling, resource allocation and tracking, earned value management, and time reporting through a single, synchronized product suite. It is a suite of applications used for managing multiple projects from any level of project, activity or resource.

It has logically designed modules enabling the creation of custom solutions addressing any organization's specific objectives for a project. Artemis runs on Windows and web based platforms and works with Microsoft SQL Server and Oracle databases. Its main features are [23]:

- Project management
- Advanced planning
- Advanced MSP planning
- Time reporting
- Earned value management
- Management reporting

OpenWorkbench: It is an open source tool developed as an alternative to Microsoft Project that presents robust project planning and management schedule. The main difference from Microsoft Project is that Open Workbench makes scheduling based on effort while MS Project scheduling focuses on duration.

In its official web site [8] following features are stated:

- Project Planning and Managing
- Resource management
- Project Scheduling
- Project Review

Open Proj: It is an open-source desktop project management tool. A great deal of features match with MS Project. The main difference from MS Project is that it is designed to address the needs of small teams. OpenProj is a Java-based, platform independent application. According to its official web site [9] its features are:

- Earned value costing
- Gantt chart
- PERT graph
- Resource breakdown structure (RBS) chart
- Task usage reports
- Work breakdown structure (WBS) chart
- Network diagram
- Simple reporting on tasks and resources
- Import / Export project files with MS Project

Primavera: Primavera Project Planner (P3) is a non-web based management tool targeting big and complex projects.

It is mostly used in engineering and construction businesses. Primavera was developed by Oracle. Other related applications like Project Portfolio Management were also released. With its secure access, P3 enables managing multiple projects in a multi-user environment.

Features stated in the official web site [10] are:

- Select the right strategic mix of projects
- Assure project, corporate governance
- Enhance processes and methods
- Improve project team collaboration
- Measure progress toward objectives
- Ensure project are align with the strategy
- Complete more projects successfully and with the intended payback.

MS Project: This project management tool, developed by Microsoft, aims to offer project managers to develop project plans and requirements, assign employers tasks, and monitor status of projects. Additionally, in MS Project, users are separated into groups based on their assigned tasks or positions. Hence, users can have different access levels to various project documents.

With MS Project Server add-on, MS Project can be used via web easing collaboration. As a summary, as advertised in the official web site [11] its features are:

- Collaboration
- Communication
- Task management
- Project management
- Quick access to information
- Improved interface
- Portfolio management
- Document management

3. Analysis

We summarize our findings in Table 2. For each of the tools, we investigated whether the tool supports the functionality or features listed earlier as the 17 criteria developed for this study. If a tool supports a particular functionality or feature, we put a check (✓); otherwise we put a no (✗). Some of the features require experimentation with the tool. Thus, we put a "N.E." to the corresponding cell in the table. One of the tools supports online scrum meetings. We put a "S.M." to indicate this feature.

Our analysis indicates that none of the tools provides all the functionality or features. Some of the features exist in most all of the tools. These include task scheduling, resource management, collaboration, and document management. In addition most tools are web-based. We would like to note that there are also a quite number of open-source project management software tools available to practitioners. Half of the tools we analyzed are open-source or do not require

licenses. Some of the functionality requires further investigation. These include change management, process development method, and quality management.

In this study, we merely identified whether these tools support the listed features or functionality to some extent. Of course, the quality of the functionality provided with these tools varies and we believe this issue requires further study.

4. Conclusions and Future Work

While the number of Project Management Software Tools (PMSTs) is increasing, managers must choose a suitable tool for their projects. In this study, we chose a set of PMSTs and investigated them. We further identified criteria that can be used to compare these and other tools in the market. Finally, we present our findings in Table 2.

This study enables project managers and team members to get a quick understanding of the tools subject to our study and to assess the strengths and weaknesses of them. Furthermore, we aim to help project managers in choosing appropriate PMSTs by providing a set of criteria.

This study is the first step in our forthcoming series of studies. As the next step, we would like to conduct survey studies among project managers and project team members on how they choose PMSTs. In addition, we would like to identify their needs in a project management software tool. The identification of these needs will help tool developers. Another line of study may be development of a framework for PMSTs. With this framework, we will be able to categorize the tools and further enhance our understanding of how these tools are actually used. Another study would be the identification and development of metrics for PMSTs.

5. Acknowledgments and Disclaimer

The views and conclusions contained herein are those of the authors and should not be interpreted as necessarily representing the official policies or endorsements, either expressed or implied, of any affiliated organization or government.

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Table 2 – A Comparison of PMSTs Subject to This Study

	Assambla	BaseCamp	DotProject	GanttProject	LiquidPlanner	Artemis View	OpenWorkbench	OpenProj	Primavera	MS Project (with Server)
Task Scheduling	✓	N.E.	✓	✓	✓	✓	✓	✓	✓	✓
Resource Management	✓	✓	✗	✓	✓	✓	✓	✓	✓	✓
Collaboration	✓	✓	✓	✓	✓	✓	✗	✗	✓	✓
Time Tracking	N.E.	✓	N.E.	N.E.	✓	✓	✓	N.E.	N.E.	N.E.
Estimation	N.E.	N.E.	N.E.	N.E.	✓	N.E.	✓	N.E.	N.E.	N.E.
Risk Assessment	N.E.	N.E.	N.E.	N.E.	N.E.	✓	N.E.	N.E.	✓	N.E.
Change Management	N.E.	N.E.	N.E.	N.E.	N.E.	N.E.	N.E.	N.E.	N.E.	N.E.
Project Analysis/Report	N.E.	N.E.	N.E.	N.E.	✓	✓	✓	✓	✓	✓
Document Management	N.E.	✓	✓	✓	✓	✓	N.E.	✗	✓	✓
Communication Tools	N.E.	✓	✓	N.E.	✓	✓	✗	N.E.	N.E.	N.E.
Process Development Method	S.M	N.E.	N.E.	N.E.	N.E.	N.E.	N.E.	N.E.	N.E.	N.E.
Portfolio Management	✓	✗	✓	✗	✓	✓	N.E.	N.E.	✓	N.E.
Access Control	N.E.	✓	N.E.	N.E.	N.E.	N.E.	✓	✓	✓	✓
Quality Management	N.E.	N.E.	✗	N.E.	N.E.	N.E.	N.E.	N.E.	N.E.	✗
Web-based	✓	✓	✓	✗	✓	✓	✗	✗	✓	✓
Open Source / Licensed	O.S.	L	O.S.	O.S.	L	L	O.S.	O.S.	L	L
Issue Tracking	✗	✗	✓	✗	✗	✓	✗	✗	✓	N.E.

S.M.: Scrum Meeting

O.S.:Open Source

L:Licenced

N.E.:Need Further Experimentation