Supporting time planning by enhancing an Open Source Software in Alignment with CMMI-DEV and PMBOK

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Introduction

Many software development projects still have problems to be delivered on time, budget and with the complete scope defined [CHAOS 2009].

One of the reasons:
• The Lack of project management.
• Establishing effective and efficient a project management practices is still a challenge for many organizations [Wangenheim et al. 2010].

As an attempt to improve this situation, "best practices" models have been developed.

CMMI-DEV (Capability Maturity Model Integration for Development): that guides the improvement and appraisal of a software organization’s processes [SEI 2010].

PMBOK Guide to the Project Management Body of Knowledge: describes the life cycle of managing a project and respective knowledge areas [PMI 2008].

Although, these models do not require the adoption of software tools, such tools can help to support and partially automate steps, increasing efficiency and improving the maturity of the process [Young, Fang, and Hu 2006].
Introduction

Today, there exist a wide range of project management tools, including commercial as well as open source and free tools [Young, Fang, and Hu 2006].

Especially in the context of small and medium software organizations (SME), free/open source tools represent an interesting alternative.

* According to SEBRAE (2010), 95% software enterprises are characterized as SME.

The purpose of this work is to present the enhancements realized on dotProject, an open source tool for project management, to supports the time planning aligned with PMBOK process and CMMI-DEV specific practices, covering processes as:

✓ Activities definitions
✓ Activities sequencing
✓ Effort estimations
✓ Resources estimation,
✓ Duration estimation
✓ Schedule development.
Background - PMBOK

Project management is the application of knowledge, skills, tools and techniques to project activities to meet their requirements [PMI 2008].

A worldwide reference for project management is the PMBOK that defines a lifecycle and knowledge areas for successful project management.

PMBOK defines project management as a set of 42 processes.

Processes related to time planning:
- Define Activities
- Sequence activities
- Estimate activities resources
- Estimated activities duration
- Develop schedule
Background - CMMI

The Capability Maturity Model Integration (CMMI) is a framework for process improvement for the development of software products and services.

For CMMI-DEV the time planning specific practices:
- PP/SP 1.1 Estimate the Scope of the Project
- PP/SP 1.2 Establish Estimates of Work Product and Task Attributes
- PP/SP 2.1 Establish the Budget and Schedule:
  - PP/SP 2.4 Plan for Project Resources
  - PP/SP 1.4 Determine Estimates of Effort and Cost

DotProject

DotProject (www.dotproject.net) is a web-based tool for project management.

The software uses MYSQL database, and has been developed using PHP as programming language.

The tool is designed in modules. Its basic features are supported by core modules and new features can be built and installed as add-on modules using the tool's development framework.
Evaluation Criteria

The evaluation criteria adopted to evaluate dotProject are based on PMBOK processes and CMMI-DEV practices using an earlier research of the authors on unifying and harmonizing CMMI-DEV v1.2 (PP, PMC, SAM) and PMBOK processes.

<table>
<thead>
<tr>
<th>Rating Description</th>
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<tbody>
<tr>
<td>- Does not provide any support.</td>
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<tr>
<td>* Offers basic support, covering less than half of the UBP.</td>
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<tr>
<td>** Covers more than half of the UBP.</td>
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<tr>
<td>*** Offers a complete set of elaborate functionalities for this UBP.</td>
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Evaluation of dotProject version 2.1.5

<table>
<thead>
<tr>
<th>UBP</th>
<th>dotProject version 2.1.5</th>
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<tr>
<td>P1 Define Activities</td>
<td>**</td>
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<td>P2 Establish Estimates of Work Product and Task Attributes</td>
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<td>P3 Sequence Activities</td>
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<td>P4 Plan for Project Resources</td>
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<td>P5 Estimate Activity Durations</td>
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<td>P6 Estimate Effort</td>
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<td>P7 Develop Schedule</td>
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Enhancements on dotProject

- Defining Work Breakdown Structure (WBS/EAP):

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<thead>
<tr>
<th>ID</th>
<th>Order</th>
<th>Identification</th>
<th>WBS Item</th>
<th>WBS</th>
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<td>1.1.2*</td>
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<td></td>
<td>PMBOK process for time planning</td>
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Deriving activities from work packages

Activities Definition:

- Activities Definition:
  - Sequence activities using PDM (Precedence diagram method):

<table>
<thead>
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<th>Tasks (Inactive)</th>
<th>Forums</th>
<th>Gantt Chart</th>
<th>Task Logs</th>
<th>Events</th>
<th>Files</th>
<th>WBS</th>
<th>Derivation</th>
<th>PDM</th>
<th>Estimations</th>
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<td><strong>Description</strong></td>
<td><strong>Move</strong></td>
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Creating a minute for estimations meetings

Registering estimations for size, effort, duration and resources.

- Estimations are documented and registered.
- The project estimations are maintained.
Schedule development

Schedule semi-auto building based on CPM technique.

Discussion and results
### Download

The add-on module for time planning is an **official add-on** dotProject module.

It is available on [dotmods](https://sourceforge.net/projects/dotmods/):

Within the section: “Alignment with PMBOK and CMMI-DEV”.

It is also under **GPL v3** license, what means it could be customized and redistributed.

### Conclusions

The enhancements of open source tools for project management aligned to “best practices” models are considered of **great importance**.

It could assists organizations that use these tools to increase the quality of their time planning, and consequently the quality of products delivered.

The importance of this work is that the enhancements were done based in “best practices” models, accepted and validated worldwide.

Other researches already are under development, as the alignment of dotProject with for others project management processes, as monitoring and controlling, human resources management, project closure, project initiating, and project communication.
References