PSP support component integrated into a web project management environment

Antonio Marcos Neves Esteca, Rogéria Cristiane Gratão de Souza, Adriana Barbosa Santos, Carlos Roberto Valêncio, Vanessa dos Anjos Borges
UNESP – São Paulo State University

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Main points

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1. Overview

The quality of software development process helps in getting a quality product, besides allowing the repetition of good results.

Despite the continuous improvement of managerial techniques, studies reveal that the results obtained in software projects are still far from the expected.

Among the reasons given for the low success rate of software projects are the lack of training and commitment of human resources involved.
System to Aid Project Managing (SAPM) is a project management support web environment initially conceived to support traditional management practices within the Project Management Body of Knowledge (PMBOK).
2. Objective

The objective of this paper is to present a component that was integrated into SAPM to support the employment of Personal Software Process (PSP), which aims at helping software developers to control, manage and improve their work.

Now, besides SAPM enables the use of best management practices by project managers, each human resource counts on mechanisms to manage themselves.
3. PSP

Personal Quality Management

PSP2
- Code reviews
- Design reviews

PSP2.1
- Design templates

PSP1
- Size estimating
- Test report
- Task planning
- Schedule planning

PSP1.1
- Task planning
- Schedule planning

PSP0
- Current process
- Time recording
- Defect recording
- Defect type standard

PSP0.1
- Coding standard
- Size measurement
- Process Improvement Proposal

The Baseline Personal Process
3. PSP (cont.)

Empirical studies show that PSP provides several personal and organizational benefits, such as:

- decreased rate of defects;
- increase in the productivity;
- improvement in the estimates generated;
- reduced costs for software tests;
- increased chance of project success as a whole due to the proper achievement of the goals established at an individual level.
3. Methodology
4. Results

The following subsections present the PSP support component and the evaluation of the PSP support component.
4.1 PSP support component

The component built provides functions for each PSP level, which are briefly presented in the following slides. These functions are presented in more details in the paper.
4.1 PSP support component (cont.)

Level 0:
- registration of programs to be constructed;
- registration of tasks involved in the construction of each program;
- use of Time Recording Log;
- use of Defect Recording Log;
- sending programs to test;
- record of completion of tasks and personal programs.
4.1 PSP support component (cont.)

SAPM’s device to support employment of Time Recording Log

SAPM’s device to support employment of Defect Recording Log
4.1 PSP support component (cont.)

Level 0.1:
- registration of a coding standard for each programming language;
- registration of data obtained from software measurements;
- registration of proposals for improving the process.
4.1 PSP support component (cont.)

Level 1:
- automation of the PROBE method, which aims at generating estimates of size and time required for developing programs;
- record of estimated time to accomplish each task;
- registration of tests.
4.1 PSP support component (cont.)

Level 1.1:
- distribution of total estimated time for program development between PSP phases;
- generation of schedule for personal tasks, presenting the Cost Performance Index (CPI) and project progress;
- presentation of comparison between allocations of human resources made by project managers, and the work plan established by such resources.

<table>
<thead>
<tr>
<th>Activities of the project</th>
<th>Hours of allocation</th>
<th>Personal programs</th>
<th>Personal Estimate(hours)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Create Access Control</td>
<td>40</td>
<td>Customer registration, Login</td>
<td>31.7</td>
</tr>
<tr>
<td>Create a search system</td>
<td>21</td>
<td>Entry of keywords, Search for results, Presentation of results</td>
<td></td>
</tr>
</tbody>
</table>
4.1 PSP support component (cont.)

Level 2:

- record of checks performed by means of design review checklist and code review checklist;
- automatic calculation of indicators of quality and productivity.
4.1 PSP support component (cont.)

Example of indicators in the Personal Area

Cost of Quality Progress

Cost of Quality Average
4.1 PSP support component (cont.)

Level 2.1:

- registration of the functional, operational, logical and state specification templates for each program, which represent in tables, respectively, the class diagram, the use case diagram, the pseudo-code and the state diagrams.
4.2 Evaluation

It was performed in two steps:

1. **Comparative analysis** between the new version of SAPM and PSP support tools available in the market;
2. **Analysis of the vision of users**, including project managers and software developers
1. Comparative Analysis:

- This step consisted in the **comparative analysis between SAPM and the six tools** most cited in articles consulted during the study of related work.
- It was possible to confirm that the **component built is broader than other tools**, with the differential of bringing benefits in the context of project management.
4.2 Evaluation (cont.)

2. Vision of SAPM users:

- This step counted on the participation of 22 professionals from small and medium sized software development enterprises, being 8 project managers and 14 software developers.

- The methodological process adopted allowed to identify the strengths and weaknesses of the PSP component according to software developers and project managers.
2. Vision of SAPM users:

- According to software developers:
  - **Strengths:**
    - ease of use of Time Recording Log and Defect Recording Log;
    - ease of generation of estimates;
    - agility to generate various types of reports;
    - quality of panel with quality and productivity indicators.
  - **Weaknesses:**
    - lack of automated classifier of lines of code;
    - availability only for Mozilla Firefox.
4.2 Evaluation (cont.)

2. Vision of SAPM users:

- According to the project managers:
  - **Strengths:**
    - the tool stimulates human resources to commit themselves to the project activities
    - the comparison between managers’ and human resources’ estimates helps to identify the need for changes in the estimates.
  - **Weakness:**
    - lack of general indicators that reveal the teams’ average behavior based on individual indicators.
5. Final Considerations and Future Works

This paper presented a proposal that integrated the employment of PSP into the context of project management in order to contribute to the improvement of human resources maturity, which helps in meeting the goals of the projects.

Results evaluation allowed to confirm that SAPM is broader concerning PSP when compared to other tools available in the market. Moreover, it showed that SAPM makes users more interested in applying PSP, besides bringing benefits in the context of project management.
5. Final Considerations and Future Works

Although the results obtained were quite favourable, future studies will be developed to improve the proposed solution concerning weaknesses.

Furthermore, in order to contribute to the advancement of research in the context of project management, data collected through the individual employment of PSP will be analyzed to identify indicators that can reflect the behavior of the team involved in the project, which should be made available to project managers to guide their decisions.
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Please send your questions to the authors by e-mail.

Antonio Marcos Neves Esteca
am.esteca@sjrp.unesp.br

Rogéria Cristiane Gratão de Souza
rogeria@ibilce.unesp.br

Adriana Barbosa Santos
adriana@ibilce.unesp.br

Carlos Roberto Valêncio
valencio@ibilce.unesp.br

Vanessa dos Anjos Borges
vanessaborges123@gmail.com