Evaluating Open Source Project Management Tools using OSSPal Methodology

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Abstract: One of the major differences between a successful project and a failed one is the project management abilities. Project management leads to better alignment of projects within the business' strategy, so that companies can reduce their costs, accelerate product development, and focus on meeting their customers' needs. To help with that, project management tools are highly recommended, once they ease planning, scheduling, resource allocation, communication and documentation tasks. In this paper, we assess three popular open source project management tools: OpenProject, Orangescrum and ProjectLibre with the help of the OSSPal methodology. This study can help project managers and programmers on choosing an adequate, current, high quality and affordable tool to perform their projects.

1 INTRODUCTION

According PMBOK Guide (2017), projects are a source of value and benefits for organizations. Technologies changing in a fast-pace, reduced budgets, shorter deadlines, and limited amount of resources are challenges normally faced by business leaders currently. That reveals a dynamic corporate environment with increasing rate of change. Thus, in order to remain competitive, companies have adopted project management consistently. Besides that, software projects tend to present several issues and problems along their lifecycles.

The Project Management Institute, a worldwide leading non-profit professional association in the area of project management, defines project management as the application of knowledge, skills, tools and techniques to project activities to meet the project requirements (PMI, 2019). It includes 5 phases: initiating, planning, executing, monitoring and controlling and closing. Besides that, it draws on ten areas: integration, scope, time, cost, quality, procurement, human resources, communications, risk management and stakeholder management.

Consequently, project management is no elementary task and has become more and more essential. It embraces phases, areas, skills, resources and techniques which should be properly orchestrated, so that they work well together to minimize the risk of failure and ensure that is being offered the highest level of efficiency and effectiveness while carrying out a project.

To help perform that indispensable work successfully, there is available nowadays a large set of good open source project management tools. This kind of software can be one of the most helpful resources to assist project managers in being as competent as possible, regardless of the industry.

What is justified by the fact that it aims to deliver benefits related to effective team collaboration, monitoring for scope control, document sharing, standard management approach implementation, efficient project pipeline management, optimized resource allocation and decision making, enhanced customer satisfaction, centralized project reporting, and improvement of task handling and visibility.

Considering that, it is appropriate to choose the most suitable tool to our needs the best way possible.

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For that, we will make use of the OSSPal methodology.

The OSSpal methodology has recently emerged as a successor of the Business Readiness Rating (OpenBRR). It combines quantitative and qualitative measures for evaluating software in several categories, resulting in a score that allows the comparison between tools (Wasserman et al., 2017).

By using that methodology, we evaluate three popular open source project management tools: OpenProject, Orangescrum, and ProjectLibre. These tools will be scored taking into account the features we considered to be essential for an open source project management tool.

The present paper is organized as follows. Section 2 describes the three open source project management tools. Section 3 explains the OSSpal methodology. Section 4 presents the evaluation of the tools with the application of OSSpal methodology. Finally, Section 5 presents the conclusions and some future work.

2 RELATED WORK

Mishra and Mishra (2013) observed something still very current: the evolution of project management tools for both software and non-software applications had been increasing at a rapid pace, and the number of available products had grown significantly. Considering that, they compared and discussed 20 popular project management tools used by professionals, on a feature basis. Those software tools were selected from both open source and proprietary software groups. Among their conclusions, it is to be highlighted that those tools were indeed useful to access information about the project when many people are working together on one project, or when multiple teams are simultaneously working on different parts of the same project and coordination among them is important.

Deprez and Alexandre (2008) list advantages and disadvantages of two Free/Libre Open Source Software assessment models: the Open Business Readiness Rating (OpenBRR), OSSPal's predecessor, and the Qualification and Selection of Open Source software (QSOS), being stated by the authors that OpenBRR had the advantages of allowing criteria selection to adapt the model to a context and clearer scoring procedure with fewer ambiguities when compared to QSOS.

In Marinheiro and Bernardino (2013), they used OpenBRR to assess the Open Source Business Intelligence Suite Pentaho. After applying this evaluation model, the authors came to the conclusion that Pentaho Community Edition could be rated as a "good" software.

Marinheiro and Bernardino (2015) compared five remarkable Open Source Business Intelligence suites: Jaspersoft, Palo, Pentaho, SpagoBI and Vanilla, in order to verify if relevant features to BI were present on them. To do that, they adopted OpenBRR and could then conclude that, among the assessed BI solutions, SpargoBI was the one with the greatest number important functionalities according to chosen criteria set, once it obtained the highest score provided by the assessment model.

In Ferreira, Pedrosa and Bernardino (2017), to compare four of the top business intelligence applications: BIRT, Jaspersoft, Pentaho, and SpagoBI, it was used OSSPal by the authors. Thus, as a result of the tools' assessment, Pentaho had the best score and BIRT the lowest one, mainly because the latter focus less on business intelligence and more on report construction.

3 PROJECT MANAGEMENT TOOLS

As there is currently available a huge and growing number of open source project management tools, building a top 3 was no small endeavor.

Therewith, the very first criterion to build had to be popularity stated on good-reputation websites such as Capterra and Pat Research, which have made their lists of 2018 best project management tools based not only on customers' ratings but also on some unbiased methodology.

After that, the obtained list of top tools was still longer than three. Then, to shorter that, it was observed how often those programs were classified as best ones on more websites, even if the webpage was not so famous as the ones mentioned above.

Thereafter, the next criteria were cost and if it works on a client-server basis. Thus, we could evaluate a highly rated, robust, open source set of applications with at least one of these characteristics: free, partially-free, client-server application or desktop application. That would be useful for project managers who have different limitations regarding cost, installation difficulty level or teamwork form.

As a result, the top 3 became the following project management tools: OpenProject, Orangescrum, and ProjectLibre.

In the following sections, we describe the main characteristics of each solution. Besides that, major advantages and drawbacks of each tool are outlined.

3.1 OpenProject

Licensed under General Public License GNU Version 3, OpenProject is a web-based open source project management solution established in 2012.

It was initially developed due to performance, security and accessibility requirements not yet available on software of its type at that point and it has had the goal to become a powerful yet easy-to-use software from its very beginning.

It is written in Ruby on Rails and requires Linux operating system, Postgres or MySQL database and Apache web server to work. In addition, it puts out new releases at least once a month and is under consistent development by the open source community. It is recommended to any project size.

The community, free version includes task management, time tracking, team collaboration, project planning using Gantt charts, budgeting and reporting. It supports not only classical project management, but also agile. Besides that, it offers task boards, backlogs, bug tracking, and road mapping. The cloud and enterprise versions are paid and add capabilities of customization, security and support.

The main advantages of OpenProject are:

- All the features for project management itself are free;
- Paid features are inexpensive;
- Very good for teamwork with members in different geographic locations;
- Excellent documentation.

The main limitations of the tool are:

- Windows OS is not supported and to run the tool on OS X is required to set up a development environment;
- It is necessary IT staff support for installation, troubleshoot and maintenance on Linux OS or to be tech savvy enough for that.

Very intuitive and appealing user interface, powerful documentation, and enhanced features give to OpenProject remarkable popularity. It is highly suitable for location-independent team collaboration and ideal for project teams to work throughout the project's lifecycle with robust and flexible features.
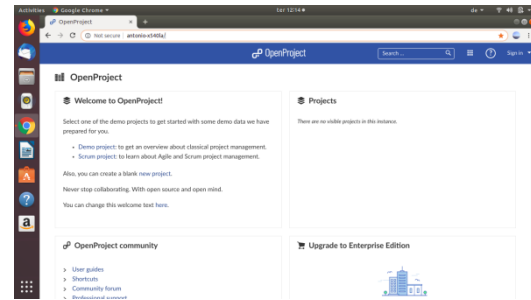
Figure 1 shows the OpenProject interface.

Figure 1: OpenProject user interface.

3.2 OrangeScrum

OrangeScrum is a web-based open source project management solution established in 2014 and licensed under General Public License GNU Version 3. It has released several patches and new features monthly since 2015.

It is based on the CakePHP framework and compatible with Windows, OS X, and Linux operating systems. It is available as a downloadable desktop application, which installs automatically Apache, PHP and MySQL to work.

Its self-hosted free version is called community and includes integration with Google Drive and Dropbox, task management using lists or a Kanban board, resource utilization, task and resource reports and analytics, mobile app, progress tracking. Besides that, agile and traditional project management are supported.

Features such as time tracking, recurring tasks, Gantt charts, project templates, client management, and user role management are premium and therefore paid. Users can purchase such features as add-ons to the free plan or they can upgrade to a paid plan or cloud, which have them already included. It is then recommended to small, medium and large enterprises.

The main advantages of OrangeScrum are:

- It runs on Windows, Linux or OS X;
- Overall good documentation;
- Global forum to help community users with troubleshoot issues;
- It allows real-time project collaboration for teams.

The main drawbacks of the tool are:

- Self-hosted installation guide not very updated and easy to follow;
- Charging for commonly free and essential features such as Gannt Charts.

OrangeScrum is one of the most feature-rich tools available currently and has hence more than enough functions for effective project management.

Furthermore, it tries to bring all communication about the project being handled together and team members can use a mobile app to stay productive on the go. That facilitates the interaction between project managers and the whole team, speeds up the distribution of tasks and allows managers to identify possible problems more quickly.
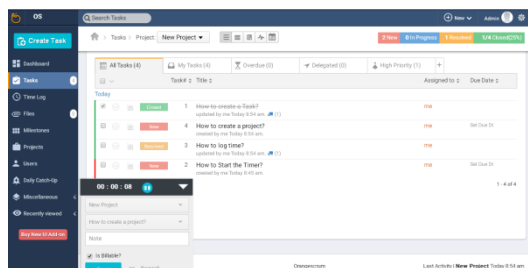
Figure 2 shows the Orangescrum interface.

Figure 2: Orangescrum user interface.

3.3 ProjectLibre

ProjectLibre is a fully free open source project management tool established in 2012 and released under Common Public Attribution License. New releases happen at least a year.

It is a desktop application written in Java and provides a similar user interface as Microsoft Project, once it was created to be an open source replacement of Microsoft Project desktop. It is suitable to projects of any size.

Its main features are: compatibility with Microsoft Project, Gantt charts, network diagrams, Work Breakdown Structure/ Risk Breakdown Structure charts, earned value costing and resource histograms.

According to the tool's official page, it will soon offer a cloud version, so that users can manage and create projects anytime and anywhere and do real-time team collaboration. That will be best for teams and multiple project management.

The main advantages of ProjectLibre are:
- It runs on Windows, Linux or OS X;
- Very easy installation process;
- It is compatible with OpenOffice, LibreOffice, and Microsoft Project 2003, 2007, and 2010.

The main drawbacks of the tool are:
- Not fully compatible with Microsoft Project 2013 or 2016 yet;
- It lacks readily available direct online customer service support as it is freeware;
- User interface is not inviting for those unfamiliar with Microsoft Project or similar tools and looks a little old;

- Due to being a desktop application, it does not allow real-time team collaboration;
- It does not have specific features for agile projects;
- It can take some time to load when the project sizes are larger.

The Projectlibre tool is light, easy to install on all 3 compatible operating systems, intuitive and absolutely a good substitute for its Microsoft competitor. It is suitable to project managers who want to escape from dependence on other bloated, expensive and complicated project management solutions. Furthermore, it will be an excellent option specially for those learning how to use a project management software for the first time.

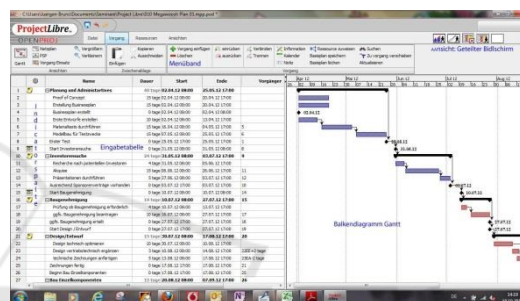Figure 3 shows the ProjectLibre interface.

Figure 3: ProjectLibre user interface.

4 OSSpal METHODOLOGY

OSSpal, originally the Business Reading Rating, is an assessment methodology which eases the work of identifying high quality open source software according to an organization's needs.

The OSSpal approach distinguishes itself from other assessment methodologies because it uses metrics to find qualified open source software projects in several categories. However, it leaves the evaluation of the quality and functionality of individual projects to external reviewers, who are also allowed to add informal comments to their scores. It adopts seven categories to rate a software (Wasserman *et al.*, 2017):

- **Functionality:** How well will the software meet the average user's requirements?
- **Operational Software Characteristics:** How secure is the software? How well does the software perform? How well does the software scale to a large environment? How good is the UI? How easy to use is the software for end-users? How easy is the software to install, configure, deploy and maintain?

- **Support and Services:** How well is the software component supported? Is there commercial and/or community support? Are there people and organizations that can provide training and consulting services?
- **Documentation:** Is there adequate tutorials and reference documentations for the software?
- **Software Technology Attributes:** How well is the software architected? How modular, portable, flexible, extensible, open, and easy to integrate is it? Is the design, the code, and the tests of high quality? How complete and error free are they?
- **Community and Adoption:** How well is the component adopted by community, market, and industry? How active and lively is the community for the software?
- **Development Process:** What is the level of the professionalism of the development process and of the project organization as a whole?

The assessment process consists of four phases:

Phase 1. First of all, construct a software component list to be analysed, to measure each component in relation to the evaluation criteria and removing from the analysis any software component that does not meet the user requirements.

Phase 2. Secondly, it should be attributed weights for the categories and for the measures:

a) Assign a percentage of importance to each category, totalling 100%;

b) For each measure within a category, it is necessary to rank the measure in accordance with its importance and assign the importance;

c) For each measure within a category assign the importance by percentage, totalling all the measures 100% of the category.

Phase 3. Then, gather data for each measure used in each category and calculate its weighting in a range between 1 to 5 (1 - Unacceptable, 2 - Poor, 3 - Acceptable, 4 - Very Good, 5 - Excellent);

Phase 4. Lastly, it is calculated the OSSpal final score based on the qualification of the category and the weighting factors that were mentioned above.

The calculation for the category 'Functionality' works in a different fashion from the rest. It aims to analyse and evaluate the capabilities that the program features or should have, as follows:

a) Select the characteristics to analyse, scoring them from 1 to 3 (less important to very important);

b) Classify the characteristics in a cumulative sum (from 1 to 3);

c) By using weighted average, standardize the previous result on a scale of 1 to 5 with the weights selected in a).

The functionality category will have the following scale:

- Under 65%, Score = 1 (Unacceptable);
- 65% - 80%, Score = 2 (Poor);
- 80% - 90%, Score = 3 (Acceptable);
- 90% - 96%, Score = 4 (Good);
- Over 96%, Score = 5 (Excellent).

5 EVALUATION

First of all, we determined a weight for each category of this methodology in order of importance (see Table 1). That needed to be based on the most important characteristics of a good software (Kohli, 2014), and characteristics that people expect from source project management tools (Giraud-Carrier and Povel, 2003).

Table 1: Assigned weights to the categories.

Category	Weight
Functionality	30%
Operational Software Characteristics	15%
Documentation	15%
Community and Adoption	15%
Software Technology Attributes	10%
Support and Service	10%
Development Process	5%

The most relevant characteristics in a software are the functionalities that it has (Kohli, 2014). For this reason, the category "Functionality" is the most important and received the highest weight, 30%.

The next three categories were assigned with the second highest weight, 15%.

"Operational Software Characteristics", which includes the software security, reliability, performance, scalability, usability, and setup. It has this weight because besides the functionality, these features are the most important quality in a good software (Courses, 2015).

In addition, there is "Documentation", once a good documentation to help with installation, configuration and maintenance processes is indispensable.

Then "Community and Adoption", due its essential role of helping users with problems. Moreover, it allows us to get feedback from people who are using the software and to see how well accepted by the market the tool has been.

With the third highest weight, 10%, are the two following categories.

"Software Technology Attributes", because the more extensible and error free the software is, the better it is. But on the other hand, that can be less of a problem, as open source software users are allowed to improve the quality of the software architecture.

Additionally, it is "Support and Service", because open source software users usually don´t require commercial support, training or consulting services; on the contrary, they try as much as possible to count on tutorials and documentation available on the internet.

"Development Process" was the least relevant category, with 5% weight, as the level of the professionalism of the development process and of the project organization are not required features in open source software.

Next, as shown in Table 2, a weight was assigned to each functionality category according to its relevance (1 - slightly important, 2 - important and 3 - very important).

Table 2: Weights for the characteristics of the functionality category.

Characteristic	Weight
Agile and Traditional Methodology Support	3
Gantt Charts	3
Wiki	1
Bug Tracking	2
Task Management	3
Bug Tracking	1
Time Tracking	3
Cost Reporting	3
Budgeting	3
Real-time collaboration	3
Number of supported languages	1
Relevance of free functionalities	3

Table 3: OSSpal score by category.

Category	Score		
	OpenProject	ProjectLibre	Orangescrum
Functionality	5	3,6	3,3
Operational Software Characteristics	4	5	3
Software Technology Attributes	5	4	5
Documentation	5	5	4
Community and Adoption	4	4	4
Support and Service	4	1	4
Development Process	3	3	3

Now, after gathering data for each measure used in each category, we calculate its score in a range between 1 to 5 (see Table 3).

As we can see in Table 3, OpenProject stood out from the rest in the "Functionality" category. It has the best performance with the maximum score of 5. In other words, it has all the considered characteristics in the that category.

It is also worth highlighting that ProjectLibre had a lower score in "Functionality" category as it does not feature wiki and real-time collaboration functionalities. Orangescrum has the lowest score because it does not offer cost reporting, budgeting and bug tracking features. Furthermore, it charges for very common and basic features like Gantt charts, what falls into the characteristic "Relevance of free functionalities" from Table 2.

Concerning the remaining categories, ProjectLibre and Orangescrum have almost the same score. Except for ProjectLibre in "Support and Service" category due to the difficulty to find professional support or updated documentation on the internet. Moreover, Orangescrum has the lowest score in "Operational Software Characteristics and Support" as it was not easy to install it by making use of the tutorial available on its official webpage.

After this step of scoring every category for all tools, the next and last part in this methodology is to calculate each tool's final score by multiplying each score by its respective category weight. Thus, it was obtained the Table 4.

OpenProject = 5 x 0.30 + 4 x 0.15 + 5 x 0.10 + 5 x 0.15 + 4 x 0.15 + 4 x 0.10 + 3 x 0.05 = **4.50**

ProjetLibre = 3.58 x 0.30 + 5 x 0.15 + 4 x 0.10 + 5 x 0.15 + 4 x 0.15 + 1 x 0.10 + 3 x 0.05 = **3.82**

OrangeScrum = 3.34 x 0.30 + 3 x 0.15 + 5 x 0.10 + 4 x 0.15 + 4 x 0.15 + 4 x 0.10 + 3 x 0.05 = **3.70**

Table 4: OSSpal final score.

	Score		
	OpenProject	ProjectLibre	Orangescrum
Total	4.50	3.82	3.70

Overall, as we can see in Table 4, OpenProject has the best final score of 4.5 (out of 5) through the application of the OSSpal methodology. ProjectLibre has next best score of 3.82, and Orangescrum the lowest score of 3.70.

6 CONCLUSIONS AND FUTURE WORK

In this paper were assessed three of the most used open source project management tools. This evaluation work made use our experience, information from technical documentation, usability of the tools, the tools' official webpages, and also third-party websites which publish reviews and rankings about the top current project management programs.

After applying the OSSPal methodology, we could classify OpenProject as "Good", due to its final score. This justifies its high popularly. Although it is not totally free, it has the great advantage of keeping for free all the necessary features to manage a project.

Next and classified as "Acceptable" is ProjectLibre. However, from our usability experience, we can see it is a good and fully free open source solution that is mostly to be penalized because it lacks support for agile projects and real-time team collaboration. Nonetheless, that is to be solved in the coming cloud version and that will increase its score. In addition, it does not have specific functionalities for agile projects.

With the lowest score and also categorized as "Acceptable" is Orangenscrum. That mainly because it was not easy to install it and the available free features are not the most relevant ones to conduct a project. Nonetheless, it was almost so good scored as ProjectLibre, which also confirms its good acceptance on the market.

As future work, we plan to broadening this study by increasing the amount of open source tools to assess, so that we can have consequently more already-evaluated ones to choose according to the kind of project we intend to manage.

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