Evaluating Gant Project, Orange Scrum, and ProjeQtOr Open Source Project Management Tools using QSOS

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Abstract: The task of managing a software project is an extremely complex job, drawing on many personal, team, and organizational resources. We realized that exist many project management tools and software being developed every day to help managers to automate the administration of individual projects or groups of projects during their life-cycle. Therefore, it is important to identify the software functionalities and compare them to the intended requirements of the company, to select which software complements the expectations. This paper presents a comparison between three of the most popular open source project management tools: Gantt Project, OrangeScrum, ProjeQtOr. To assess these project management tools is used the Qualification and Selection Open Source (QSOS) methodology.

1 INTRODUCTION

Managing projects involving different groups of people and complex tasks can be challenging. The solution is to use project management software, which allows more efficient management of projects.

Today, there is a large amount of available project management tools that try to improve project management by organizing all the necessary information. According to Capers Jones (Jones, 2004), 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 for their project management needs.

In this paper, we evaluate only open source alternatives, because there are a vast number of tools that provide similar features and can compete with proprietary software. The quality of Open Source Software products is affected by many variables and it varies strongly in different products, so is important to have a structured set of criteria to use to assess the quality of these projects (Adão and Bernardino, 2013). Since the open source field has a very broad scope, it is necessary to use a qualification method that

differentiates between numerous candidates to meet technical, functional and strategic requirements. For such we apply the Qualification and Selection Open Source (QSOS) methodology to the open source project management tools. The QSOS methodology describes a formal process to evaluate, compare and select open source solutions.

The contribution of this paper is to evaluate three Open Source Project Management Tools: Gantt Project, Orange Scrum, and ProjeQtOr, determining which tool has the best score according to the criteria establish in the methodology. This choice was supported on our research and tools popularity based on the number of publications that mention that software (SourceForge, 2015).

The rest of this paper is organized as follows. Section 2 describes the three open source tools that will be evaluated. Section 3 presents a synthesis and the respective application of each step of the methodology QSOS at the three open source tools. Finally, Section 4 presents the conclusions and future work.

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2 OPEN SOURCE PROJECT MANAGEMENT TOOLS

Project Management refers to the planning, monitoring and controlling of all aspects of a project, with the people involved in the project aiming to achieve the objectives on time and on a budget to a specific quality standard (Margea and Margea, 2011).

There is a variety of project management alternatives that provide many useful features during project development, starting from time and task tracking (scheduling) and up to cost and resource management (Abramova, Pires and Bernardino, 2016).

In this work, we have selected and studied three of the most popular Open Source Project Management Tools. The search was made in several documents like (Blazevic, 2012), (SourceForge, 2015), (Burger, 2017), (13 best free project management software programs 2016 _ Techworld, no date) and others. And the results of the search were Gantt Project, Orange Scrum and ProjeQtOr because all present important and necessary features for a project of information systems and also have good documentation to help and support the users.

In the next sections, we describe the main characteristics of three open source management tools, as well as its advantages and limitations.

2.1 Gantt Project

Gantt Project (https://www.ganttproject.biz/) was founded in January of 2013 and is a project management software ideal for small business. It is open source and freely available on SourceForge. Gantt Project is written in Java and it´s compatible with Windows, OSX, and Linux operating systems.

It provides a variety of tools to manage staff and keep track of projects like Gantt's free project scheduling and management software. Can be used to define milestones and generate breakdowns of work and arrange them in chart format to be easier to understand visually. These charts can then be exported in various file formats such as PNG images, PDF files, and HTML files. It is compatible with Microsoft Project and allows to create Gantt Charts, which include Work Breakdown Structure, dependencies, and defining milestones.

It also allows assign human resources to tasks and creates PERT charts. In addition, there's WebDAV support which helps share projects directly with others (Margea and Margea, 2011).

Its features are Task hierarchy and dependencies; Gantt chart; Milestone tracking; Project planning;

Task management; Resource load chart; Generation of PERT chart; PDF and HTML reports; MS Project import/export; Exchange data with spreadsheet applications; WebDAV based group work.

Advantages: allows to visualize projects in a graphic way; can work offline on the desktop; set goals to improvement; can assign human resources to work on each task; includes PERT and Gantt charts.

Weaknesses: can´t show the critical path; can't measure task duration in hours (only days); doesn't present Scrum and Kanban support.

Gantt project has a work breakdown structure, where is possible organize all tasks in one place and create a hierarchy tree to summarize and track dates, costs, progress, and all the lower level information that must be handled when there is a task in the works. Allows a better-organized project and make sure that all the essential tasks are easy to see.
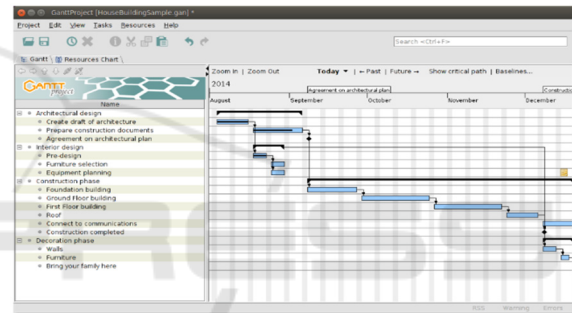
Figure 1 shows the interface of Gantt Project.

Figure 1: Interface Gantt Project. (Source: https://www. capterra.com/p/136586/GanttProject/).

2.2 Orange Scrum

Orange Scrum (https://www.orangescrum.org/) is an open source tool engineered to manage and delegate tasks, communicate and collaborate on projects and track costs for smaller organizations – freelancers, agencies and small and midsize business.

Orange Scrum Community was established in 2014. It is written in Cake PHP and is compatible with Windows, OSX, and Linux operating systems.

This tool provides professional advice for project management requirements. Also includes improving user experience, integrating projects, business automation, collaborative management, enterprise solutions for business and deep-dive business analysis.

Gantt charts are provided with the software to define the logical sequence of tasks and dependencies, with a view of milestones to map assignments. The time and resource management tool allow users to view an entire team's availability to task assignments,

long spend time against tasks and monitor the time taken on each task.

OrangeScrum's dashboard is interactive with projects metrics such as budget, timelines, and resource utilization in real time. The intuitive chart view shows an entire day's progress in a quick card view while being able to gain insights to progress on projects.

Its features are: Interactive summary of projects, Visual representation, All in one screen, Task management, Project planning, Gantt charts, Collaboration, Time tracking, Resource management, Schedule management, Kanban view.

Advantages: include a mobile app; progress tracking; real-time updates; installation guide and email; Skype, and phone support; and we can access to a global forum and documentation to solve problems or doubts.

Weaknesses: some resources are paid, confusing for first time users; doesn't have PERT or Gantt charts; and can't show critical path management.

This tool simplifies the way project managers handle all aspects of their projects, from managing and delegating tasks, empowering team members to communicate and collaborate with each other, assigning the right resources to the right people and purpose, ensuring that budget is strictly implemented. By combining project management, collaboration, and task management into a centralized platform. Figure 2 shows the interface of Orange Scrum.
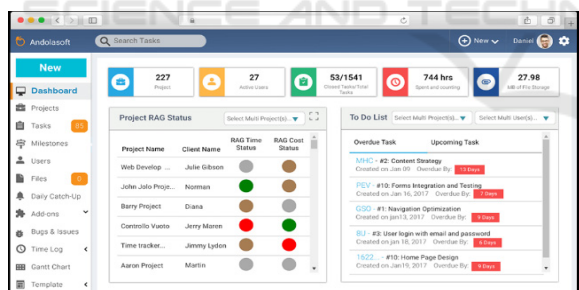

Figure 2: Interface Orange Scrum. (Source: https://www. orangescrum.org/).

2.3 ProjeQtOr

ProjeQtOr (https://www.projeqtor.org/en/) was founded in June of 2009 and is an open source project management software initially developed by Pascal Bernard.

It is a Web-based tool, very easy to use, which include every feature needed to the management of projects, such as: Management of tasks and milestones; Management of work and teams; Incident management; Multi-project management;

Implementation of resources in machines to be served when necessary; Storage of all project documents in an easily accessible space; Risk management; Management of budgets and expenses; Collaborative Web Architecture; Multi-platform (Windows and Linux).

In addition to other features, the evidence is that it is quality oriented, that is, it integrates best practices to meet pre-established quality requirements. To assure that, ProjeQtOr generates workflows, indicators, issues alerts and reports. It also allows to record all the events that occur during the project, and thus simplify an indication with the main management quality standards (ISSO, CMMI, ITIL, etc).

Advantages: ProjeQtOr is completely free; professional training and developing custom features; the system is regularly updated; the community forum is also very active and can provide plug-ins on special needs.

Weaknesses: can´t show the critical path; confusing for first time users; updates can be a problem; doesn't have PERT charts.

ProjeQtOr is an open source management tool completely free product and operational. It´s possible to adapt ProjeQtOr if we stay within the license. The version available for download is fully functional, without limitations, and without needing to pay for a premium license to access all the features. Figure 3 shows the interface of ProjeQtOr.
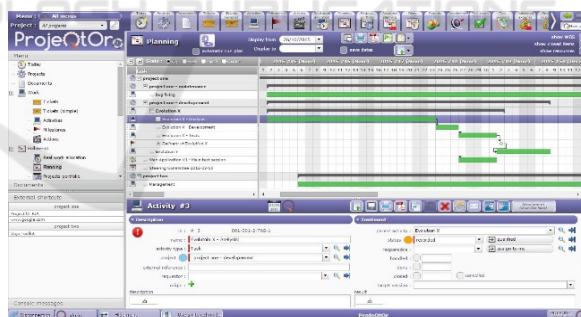
Figure 3: Interface ProjeQtOr. (Source: https://sourceforge. net/p/projectorria/wiki/Home/).

3 QSOS METHODOLOGY

The general approach of the QSOS Method is composed of four interdependent steps (QSOS edoc repository - Method of Qualification and Selection of Open Source software (QSOS), no date): Define, Evaluate, Qualify, and Select. The steps of the QSOS method will be analyzed for the following tools: Gantt Project, Orange Scrum, and ProjeQtOr.

Figure 4 - General approach of QSOS. (Source: http://edoc. qsos.org/en/qsos-2.0_en).

3.1 Step 1 – Define

This step defines different elements that will be used during the next three steps of process. Through research on websites was collecting information about, the community responsible for the project, the type and the license of the software and the location to download. Each of this information is presented, in Table 1.

Table 1: Information about the tools.

Software	Type of software	Type of Community	Type of License	Website
Gantt Project	Project management software	Dmitry Barashev and others	GNU GPL v3	www.ganttproject.biz
Orange Scrum	Project management software	Andolaoft	GNU GPL v3	www.orangescrum.com
ProjeQtOr	Project management software	Pascal Bernard and others	AGPL	www.projeqtor.org

3.2 Step 2 – Evaluate

The purpose of this step is to evaluate free and open source software. Information on the open source community are retrieved to score the software based on the criteria from the previous step. The evaluation criteria of the maturity and functionality of the project are imposed by the method and described further. They are completed by criteria describing expected features of the type of the evaluated software.

Functionality Criteria. Through research the characteristics that we considered most relevant to the project to be developed were selected, in this step, these were evaluated as follows: (0) means that the

functionality is not present in the platform, (1) is partially present, (2) is fully present. In Table 2 are the Functionality criteria and the score. This functionality criteria were chosen by us, according to the main requirements of a software project.

Table 2: Functionality criteria and score.

Criteria	GanttProject	OrangeScrum	ProjeQtOr
	Points	Points	Points
Hierarchical tasks	Yes **2**	No **0**	Yes **0**
Milestone tracking	Yes **2**	Yes **2**	Yes **2**
Critical path mgmt.	Yes **2**	No **0**	No **0**
Gantt charts	Yes **2**	No **0**	Yes **2**
Time tracking	No **0**	Yes **2**	Yes **2**
Cost tracking	Yes **2**	No **0**	Yes **2**
Risk mgmt.	No **0**	No **0**	Yes **2**

Of the features presented in Table 2, only one is present in the three tools, the milestone tracking. Hierarchical tasks and Critical path management are present only in the Gantt Project. The ProjeQtOr have Milestones tracking, Gantt charts, Time tracking, Cost tracking, and risk management. The feature present only on ProjeQtOr is risk management, that is a support for identifying and keeping track of project risks and risk-related activities.

Maturity Criteria. Each of the criteria determined by the QSOS model was punctuated from the information collected on the sites.

Table 3: Maturity criteria and score.

Criteria	GanttProject	Orange Scrum	ProjeQtOr
	Points	Points	Points
Age of the project	**2**	**1**	**1**
Support	**2**	**2**	**2**
Popularity	**2**	**1**	**1**
Documentation	**1**	**2**	**2**
Updates and versions new	**1**	**1**	**2**

The points were distributed according to the information collected during the research. For example, in the age of the project, the oldest is Gantt project, therefore, was attributed 2 points. In support, all have the maximum score because they offer continuous support.

As illustrated in Table 3, is possible to see that ProjeQtOr and Gantt Project have the best scores for maturity criteria. ProjeQtOr has a score of 2 in Documentation, Support, Updates, and versions new, this is an important mark because it gives users confidence and aims for continuous improvement.

3.3 Step 3 – Qualify

This stage considers the context in which the software will be used and the relevance of each of the criteria in that context, so it is possible to assign a weighting value for all the criteria.

Functionality Criteria. In this step, we must return to the theoretical basis for verifying the importance of each functionality criteria for the context under study, so it is possible to attribute a weighting value for each criterion. Being (0) when the criterion is not necessary, (1) when it is optional and (3) when it is essential to the presence on tools (it´s critical).

Table 4: Functionality criteria and respective weight.

Criteria	Weight
Hierarchical tasks	1
Milestone tracking	3
Critical path management	1
Gantt charts	3
Time tracking	3
Cost tracking	3
Risk management	3

It was considered important to the study, the fact to existing milestone tracking because indicates the completion of major deliverables, normally by completing a set of tasks. Gantt charts to visualize a project´s tasks and milestone schedule. Time and cost tracking for estimating and monitoring the time spent on the project´s tasks and to monitor the expenses. And in the last, the risk management to identifying and keeping track of project risks and risk-related activities.

Maturity Criteria. Each of the criteria is evaluated by the institution according to its relevance to the implementation and maintenance of the tool.

Table 5: Maturity criteria and respective weight.

Criteria	Weight
Age of the project	0
Support	3
Popularity	1
Documentation	3
Updates and versions new	3

It can be considered that the criterion of the age of the project, is not relevant for deployment since a project maybe new, but it has consistency in the other criteria, therefore this criterion received weight (0).

The criteria of Support and Documentation are critical because they are the sources of information that are consulted during the implementation process and maintenance, therefore were given weight (3). And Updates and new versions because show the commitment of the project team to refine the tool always looking for continuous improvement.

3.4 Step 4 - Select

The purpose of this step is to select the software matching the user´s needs and choose which we will use in our project.

With the information of the points and weights of the criterion, it calculated the weighted average, which is the sum of the multiplication (Weight x Point) divided by the sum of the weights. In the following Tables (6 and 7), the initial calculation is presented, where the weights are multiplied by the points.

Table 6: Functionality criteria.

Criteria	Weight	GanttProject		OrangeScrum		ProjeQtOr	
		P	W*P	P	W*P	P	W*P
Hierarchical tasks	1	2	2	0	0	0	0
Milest. track.	3	2	6	2	6	2	6
Critical path mgmt.	1	2	2	0	0	0	0
Gantt charts	3	2	6	0	0	2	6
Time track.	3	0	0	2	6	2	6
Cost track.	3	2	6	0	0	2	6
Risk mgmt.	3	0	0	0	0	2	6

Table 7: Maturity criteria.

Criteria	Weight	GanttProject		OrangeScrum		ProjeQtOr	
		Points	W*P	Points	W*P	Points	W*P
Age of the project	0	2	0	1	0	1	0
Support	3	2	6	2	6	2	6
Popularity	1	2	2	1	2	1	2

Table 7: Maturity criteria (Cont).

Documenta tion	3	1	3	2	6	2	6
Updates / new vers.	3	1	3	1	3	2	6

To complete the calculation of the weighted average, we done the sum of the multiplication of the weights and points (W*P) and the sum of the values of the weights. Then the sum of the multiplication of the weights and points are divided to the sum of the values of the weights. As shown in Table 8.

Table 8: Weighted average result.

Criteria	GanttProject		Orange		ProjeQtOr	
	Avg	Res.	Avg	Res.	Avg	Res.
Functio nality	22/17	1.29	12/17	0.71	30/17	1.77
Maturity	14/10	1.4	17/10	1.7	20/10	2

To comprehend better the results of Table 8, we present the bar chart in Figure 5.
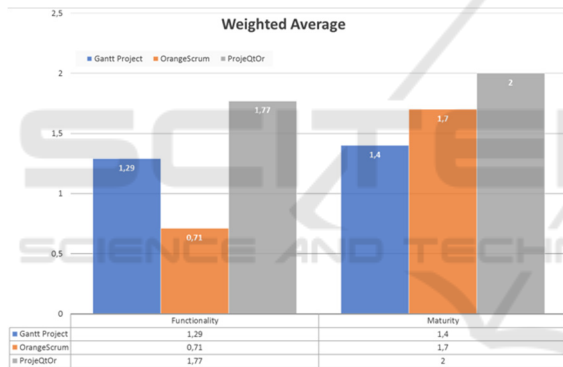

Figure 5: Weight average chart.

As it is possible to realize in Figure 5, the tool that most suits the study is the ProjeQtOr, such as Functionality criteria as Maturity criteria. Has a score in Functionality criteria as 1.77, while Gantt Project occupies the second position with 1.29 and Orange Scrum is the last with 0.71. In Maturity criteria ProjeQtOr continued in first place with 2 of a score, then OrangeScrum climbs up to second place with 1.7 and finally Gantt Project with 1.4.

This occurred because in functionality and maturity criteria ProjeQtOr has the 3 criteria with more weight and the others are missing some of that or doesn´t have enough points in that criterion.

ProjeQtOr presents more punctuation in both criteria, therefore, it was selected as the best open source project management tool.

4 CONCLUSIONS AND FUTURE WORK

The main objective of the research was to apply a model for selecting a project management tool. As a result, several procedures were used to build the knowledge necessary to achieve the objective. Starting with the theoretical foundation where it was possible to deepen the knowledge in the area under study.

This paper presented the four steps of the QSOS model, which can be applied for qualification and selection of free software of open code. The steps have proved to be flexible and can be used for the selection of any type of free software being only the functionality criteria, which depending on the software type.

The QSOS model was adapted for evaluation and selection of project management tools, and each of its four steps was presented and developed according to the intended requirements. Being the first the Definition of the chosen tools, followed by the Evaluation stage where the criteria are scored, after Qualification where the criteria are weighted, concluding with the Selection stage where the platforms are compared according to the weighted average.

Each step of this model is important for qualifying and select the tool, but you also need to have a clear understanding of the importance of each functionality criteria within the context of the research, only so it is possible to weigh accurately resulting in a which can be replicated in other studies.

In conclusion, the QSOS model used to select the tool is efficient because it was possible to determine the criteria necessary to evaluate the tools and comparing them for project maturity and functionalities important for the project. So is possible to perceive that ProjeQtOr meets more criteria and have higher scores in all studies performed so, it is the best tool to be used in a project.

As future work, we intend to apply a greater number of criteria that are relevant to the project and to perceive the changes that will follow. One goal will also be to keep the study updated according to the future upgrades that will emerge in the tools and developing a real case study scenario.

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