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A Comparison Framework for Open Source Software Evaluation Methods

Klaas-Jan Stol¹ and Muhammad Ali Babar²

¹Lero—University of Limerick, Limerick, Ireland

²IT University of Copenhagen, Denmark

klaas-jan.stol@lero.ie, malibaba@itu.dk

<http://www.lero.ie>, <http://www.itu.dk>

Abstract. The use of Open Source Software (OSS) components has become a viable alternative to Commercial Off-The-Shelf (COTS) components in product development. Since the quality of OSS products varies widely, both industry and the research community have reported several OSS evaluation methods that are tailored to the specific characteristics of OSS. We have performed a systematic identification of these methods, and present a comparison framework to compare these methods.

Keywords: open source software, evaluation method, comparison framework

1 Introduction

Open Source Software (OSS) is increasingly being integrated into commercial products [1]. Much cited reasons for using OSS are cost savings, fast time-to-market and high-quality software [2]. OSS products can be used as components as an alternative to Commercial Off-The-Shelf (COTS) components. Like COTS evaluation and selection, one of the main challenges of using OSS is evaluation and selection [3]. For that reason, both the research community and industry have proposed evaluation and selection approaches to help practitioners to select appropriate OSS products. However, research has shown that practitioners rarely use formal selection procedures [4]. Instead, OSS products are often selected based on familiarity or recommendations by colleagues [5]. For practitioners it is difficult to choose a suitable evaluation method. We assert that the lack of adoption of these evaluation approaches by practitioners may be a result of a lack of clarity of the OSS evaluation methods landscape. There has been no systematic comparison of the existing OSS evaluation methods. David A. Wheeler lists a number of evaluation methods in [6], but does not provide a thorough comparison of existing evaluation methods. We are aware of only one paper by Deprez and Alexandre [7] that provides an in-depth comparison of two methods, namely QSOS and OpenBRR. However, it is not feasible to extend their approach to compare a large number of methods. In order to improve the state of practice, we decided to systematically identify proposed OSS evaluation methods. Furthermore, we present a comparison framework that can be used to do a systematic comparison of these OSS evaluation methods.

2 Identification of Evaluation Methods

For the identification of the various OSS evaluation methods, we relied on four different sources. Firstly, we selected a large number of publications following a systematic and rigorous search methodology as part of our ongoing extension of a systematic literature review reported in [8]. The search phase of this extension resulted in a repository of approximately 550 papers related to OSS. We screened these papers to identify any OSS evaluation method. We included all papers reporting a method, framework or any other proposed way of evaluating an OSS product. Papers presenting an approach for selecting COTS (as opposed to OSS components only) were also excluded. Secondly, we inspected the “related work” sections of the selected papers. We also noticed that a number of OSS evaluation methods were not reported in research publications, rather only appeared in books or white papers. Since those methods were often referenced in the “related work” sections of many papers, we decided to include those methods in this research. Thirdly, we manually selected publications reported in the proceedings of the five International Conferences on Open Source Systems (2005 to 2009). Lastly, we used the authors’ knowledge of the field in order to identify some approaches. We note that we deliberately did not consider any websites (such as web logs) presenting pragmatic “tips for selecting OSS”.

Following the abovementioned search process, we identified 20 approaches for OSS evaluation. Table 1 lists the identified OSS evaluation approaches in chronological order of publication. The column “Source” lists references to papers and reports that reported the method, and can be used by interested readers for further investigation. The column “Orig.” indicates whether the initiative came from (I)ndustry or from a (R)esearch setting. We considered it to be an industry initiative if it was associated with a company name; otherwise we considered it to be a researchers’ initiative. The column “Method” indicates whether it is a well-defined method outlining the required activities, tasks, inputs, and outputs, as opposed to a mere set of evaluation criteria. As can be seen from the table, only half of the approaches that we identified are methods.

Table 1. Identified OSS evaluation methods, frameworks and approaches.

No.	Name	Year	Source	Orig.	Method
1	Capgemini Open Source Maturity Model	2003	[9]	I	Yes
2	Evaluation Framework for Open Source Software	2004	[10]	R	No
3	A Model for Comparative Assessment of Open Source Products	2004	[11, 12]	R	Yes
4	Navica Open Source Maturity Model	2004	[13]	I	Yes
5	Woods and Guliani’s OSMM	2005	[14]	I	No
6	Open Business Readiness Rating (OpenBRR)	2005	[15, 16]	R/I	Yes
7	Atos Origin Method for Qualification and Selection of Open Source Software (QSOS)	2006	[17]	I	Yes
8	Evaluation Criteria for Free/Open Source Software Products	2006	[18]	R	No

No.	Name	Year	Source	Orig.	Method
9	A Quality Model for OSS Selection	2007	[19]	R	No
10	Selection Process of Open Source Software	2007	[20]	R	Yes
11	Observatory for Innovation and Technological transfer on Open Source software (OITOS)	2007	[21], [22]	R	Yes
12	Framework for OS Critical Systems Evaluation (FOCSE)	2007	[23]	R	No
13	Balanced Scorecards for OSS	2007	[24]	R	No
14	Open Business Quality Rating (OpenBQR)	2007	[25]	R	Yes
15	Evaluating OSS through Prototyping	2007	[26]	R	Yes
16	A Comprehensive Approach for Assessing Open Source Projects	2008	[27]	R	No
17	Software Quality Observatory for Open Source Software (SQO-OSS)	2008	[28]	R	Yes
18	An operational approach for selecting open source components in a software development project	2008	[29]	R	No
19	QualiPSo trustworthiness model	2008	[30, 31]	R	No
20	OpenSource Maturity Model (OMM)	2009	[32]	R	No

3 A Comparison Framework

In order to perform a systematic comparison of the selected OSS evaluation methods, we designed a comparison framework called Framework fOr Comparing Open Source software Evaluation Methods (FOCOSEM), which is presented in Table 2.

Table 2. FOCOSEM: a comparison framework for OSS evaluation approaches

Component	Element	Brief description
Method Context	Specific goal	What is the particular goal of the method?
	Functionality evaluation	Is functionality compliance part of the evaluation method?
	Results publicly available	Are evaluations of OSS products stored in a publicly accessible repository?
	Relation to other methods	How does the method relate to other methods? I.e. what methods was this method based on?
Method User	Required skills	What skills does the user need to use the method?
	Intended users	Who are the intended users of the method?
Method Process	Method's activities	What are the evaluation method's activities and steps?
	Number of criteria	How many criteria are used in the evaluation?
	Evaluation categories	What are the method's categories of criteria based on which the OSS product is evaluated?
	Output	What are the outputs of the evaluation method?
Method Evaluation	Tool support	Is the evaluation method supported by a tool?
	Validation	Has the evaluation method been validated?
	Maturity stage	What is the maturity stage of the evaluation method?

FOCOSEM is based on four different sources to justify the selection and formation of its components and elements. The first source is the NIMSAD framework, which is a general framework for understanding and evaluating any methodology [33]. NIMSAD defines four components to evaluate a methodology: the problem context, the problem solver (user), the problem-solving process, and the method's evaluation. Previously, NIMSAD has been used for the development of a number of other comparison frameworks in software engineering [34-36]. Hence, we are quite confident about NIMSAD's ability to provide a solid foundation for building an instrument for comparing and evaluating software engineering methods and tools. The second source for FOCOSEM is FOCSAAM, which is a comparison framework for software architecture analysis methods [34]. The third source is a comparison framework for software product line architecture design methods [36]. As a fourth source, we identified differences and commonalities among various OSS evaluation methods. We note that the objective of FOCOSEM is not to make any judgments about different OSS evaluation methods. Instead, we aim to provide insights that may help practitioners to select a suitable OSS evaluation method.

4 Conclusion and Future work

Open Source Software (OSS) products are increasingly being used in software development. In order to select the most suitable OSS product, various evaluation methods have been proposed. Following a systematic and rigorous search of the literature, we identified 20 different initiatives for OSS product evaluation. Furthermore, we have proposed a Framework fOr Comparing Open Source software Evaluation Methods (FOCOSEM). We emphasize that the framework is not intended to make any judgments about the quality of the studied OSS evaluation methods. In future work, we will demonstrate the application of FOCOSEM by comparing the OSS evaluation methods identified in our review. Furthermore, we do not claim our framework is complete; rather, we consider it as a first step towards systematically providing a comparative analysis of OSS evaluation methods. Additional elements can be added to our framework to compare other aspects of the evaluation methods.

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