

# Open Source and Agile Methods: Two worlds closer than it seems

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**Abstract.** Agile methods and open source software communities have different approaches to produce high quality and successful software. However agile methodologies are not very difused in open source communities nor the members of those communities follow many agile practices.

**Key words:** agile software development, open source software, distributed agile,

## 1 Introduction

Typical Open Source (OS) projects (the scope of of OS project will be narrowed according to Section 2.2) usually receive the collaboration of many geographically distant people [1]. At first glance, this argument could indicate that such projects are not candidates for the use of agile methods since some basic values seem to be missing. In this case, the distance and diversity separating developers deteriorates communication, a very important value within agile methods. However, it is common to identify some principles presented by the agile manifesto [2] on many open source software projects. Being ready for changes, working with continuous feedback, delivering real features, respecting collaborators and users and facing challenges are expected attitudes from agile developers naturally found in the Free and Open Source Software (FOSS) communities[5].

During a workshop [3] held at OOPSLA 2007 celebrating 20 years from the publication of “No Silver Bullets” [4], agile methods and OS software development were mentioned as two failed silver bullets having both brought great benefit to the software community. During the same workshop the question was raised whether the use of several failed silver bullets simultaneously could not raise production levels by an order of magnitude. This work is an attempt to suggest one of those merges to partially tackle software development problems.

## 2 Scopes

The FOSS environment as well as the agile both comprehend such a wide variety of projects, people and contexts that it is very hard to cover all of them. Therefore

it is necessary to first define which part of each community will be analysed in this work. Agile methods in the scope of this work are described in Section 2.1 while the OS projects discussed are described in Section 2.2.

## 2.1 Agile methods scope

Throughout this work, any software engineering method that follows the principles of the agile manifesto [2] will be considered and treated as an agile method. Focus will be given on the most known methods, such as eXtreme Programming (XP) [6], Scrum [7] and the Crystal family [8]. Closely related ideas will also be mentioned from the wider Lean philosophy [9] and its application to software development [10].

## 2.2 Open source scope

The terms “open source software” and “free software” will be considered the same in this work although they have some differences in their specific contexts [12, Ch. 1, Free Versus Open source]. Projects will be called to be open source (or free) if their source code is available and modifiable by anyone with the required technical knowledge, without prior consent from the original author and without any charge.

OS projects essentially controlled by a single company fall out of the scope of this work. The reason for such reduction of scope is that projects controlled by companies, whether they have a public source code and accept external collaboration or not, can be run with any software engineering method established in the company since it can be enforced to the employees of this company. Some methods will work better to attract external contributions but the company still controls its own team and can maintain the software without external collaboration.

Considering this scope, it is important to characterize the people involved in such kind of projects. In 2002, the FLOSS Project [13] published a report about a survey they conducted regarding FOSS contributors. Their collected data [14] shows that 78.77% of the contributors are employed or self-employed (question 42) and that only 50.82% of the OS community are software developers while 24.76% do not earn their main income with software development (question 10). In addition to those results, the survey presents the fact that 78.78% of the collaborators consider their OS tasks more joyful (question 22.2) than their regular activities and 42.3% also consider them better organized (question 22.4). As an outcome of those results, we could say that OS contributors perceive their activities both pleasurable and effective.

Another survey [15] points out that 74% of open source projects have teams with up to 5 people and 62% of the contributors work with each other over the Internet and never met physically. Considering such characterization of the FOSS community, the next section presents what is the relation between such development environment with the ideas and guidelines of agile methodologies.

### 3 How closely related are Open source and Agile?

In Martin Fowler's first version of "The New Methodology" [11], he included open source software development as part of the new methodology of software development along with now well known Agile methods. He decided to remove it from the final article because the FOSS environment is so big and spread that any attempt to characterize the development process would undoubtedly fail on a given environment. Afterwards, in 2002, Warsta [19] published a review about agile software development methods including and discussing OSS as an agile method.

However, he stresses that FOSS development is not a precise method and evolves differently for each project. Indeed, Eric Raymond's description of the development process from "The Cathedral and the Bazaar" [16] is closer to an experience report than to the description of a process with guidelines and practices. Nevertheless, Raymond's text presents several actions that could be related to the agile manifesto [2] and are common in other FOSS projects.

FOSS communities are, by definition, a group of people gathered around a FOSS project. A working and useful software project attracts individuals to collaborate to evolve the software [17]. It is the people's interactions that will define the development process, tools and even the goals of the software. FOSS projects that do not evolve to fit the needs of its community are abandoned in a highly competitive environment where the best (in certain criteria) gains adopters in a thin line between success and oblivion.

From such aspects, FOSS project share a lot in common with the values presented by agile methods. The practices are also quite similar. Eric Raymond quotes Linus Torvalds about two specific development policy for the Linux Kernel.

7. Release early. Release often. And listen to your customers.
8. Given a large enough beta-tester and co-developer base, almost every problem will be characterized quickly and the fix obvious to someone.

The first policy hints for an iterative and short development process with frequent feedback input. The second one points to a large amount of test done frequently. Those ideas are core principles for agile methods and largely applied to most successful FOSS projects.

We can, therefore, state that the FOSS community have a culture that is similar to the one of the agile community. Given that there is such proximity between agile methods and FOSS development, it must not be forgotten that the environment in which each solution outstand are quite different.

Open source software is stronger when it comes to products that "scratch a developer's itch" [18], i.e. a product in which the own developer can be the user. Such product evolve across the Internet gathering volunteers interested in such development by releasing versions of the software frequently.

Agile methods come from industry consultants with focus on business problems and customer satisfaction through frequent high quality releases. To achieve

such goal, an ideal agile team needs motivated competent people closely gathered with freedom to improve their environment and process to enable what Cockburn calls osmotic communication [20].

The most critical discrepancy is the one regarding communication. Agile methods stress out that many software development problems come from miss communication and the best way to mitigate it is to keep people close and in constant conversations. Open source software are inherently distributed and frequently run by people that only met through the Internet. Could there be a way to unite the strenght of both communities and improve development in distributed environments with changing requirements?

In order to evaluate this possibility, we decided to elaborate two surveys. The next section describes how the surveys were elaborated and what information were expected to be collected.

## 4 Surveys

Since the motivation to write was to understand if the agile community and the FOSS community could be united, one survey was directed to agile practionners while the other was aimed to FOSS contributors. Each survey intended to characterize the answering public and was available on the Internet and was spread in channels common to the desired communities.

The next subsection presents the survey created for the FLOSS community while the following one shows the one aimed to the agile community.

### 4.1 To the FLOSS community

For both surveys, part of the goal was to identify which part of the community answered the question and how representatives they were for their community. Therefore, the first set of questions were pretty similar between both surveys and inquired the participant about her year of birth and country of residence. Both surveys also tried to evaluate the experience of the participant in her community. For the FLOSS community that translated to the amount of project with which the participant had contributed with as well the first year of her contribution.

This last question as well as the following ones were only displayed if the participant had contributed to at least one FLOSS project since most questions would be meaningless otherwise. In order to narrow the environment that the participant would have to evaluate as well as her experience in such project, she was asked the name of the main project as well as her role in the project.

To understand how the project ensure communication between its collaborators, the participant was asked how big was the project team and, if there was a team (not a single person team) what was the communication channel used to communicate among the team and how good she evaluated the communication through that channel. The survey also included a similar question regarding the communication channel with the users of project and its evaluated quality.

At last, the survey inquired the participants about which of 8 tools did the project already used and how they would classify the usefulness of those tools to mitigate their problem with the project's development.

A paper version of the survey can be found in Appendix A while the online version can be accessed at <http://www.ime.usp.br/corbucci/floss-survey>. The survey was announced via twitter<sup>1</sup> by the authors and received the support of GitHub<sup>2</sup> who asked their users to fill in the survey.

The survey was also sent to other FLOSS project hosting systems such as SourceForge.net, LaunchPad.net, CodeHaus, Google Code but none answered the request or provided any sort of answers. It was also published in a few blogs related to the FLOSS community and mailing lists for the Python community as well other international mailing lists.

## 4.2 To the Agile community

The beginning of the survey directed to the Agile community was very similar to the one to the FLOSS community since its goal was to collect data to characterize the participants. After the first questions regarding the residence country and the year of birth, the agile survey inquired the participant about her agile experience asking on how many agile projects she participated in and when was her first agile project.

Similarly to the FLOSS survey, this last question as well as the following were only displayed to participants that had been in at least one of agile project. The survey kept on asking about the participant's main role in the project and the team size working with her. The participant was then asked to inform the main communication channel used to communicate with the client of that project as well as the quality of communication on that channel.

Divergence from the FLOSS survey followed with a question inquiring if the participant had any previous experience with applying agile methods in a distributed environment. If so, the participant was asked to describe the communication channel used in this distributed project and its quality.

The participant was then asked to sort the 3 most critical problems she encountered in the agile environment in which she participated. Afterwards the participant should sort the top 3 tools (out of 8) that would help her in a distributed agile environment.

Finally, the participant was asked if she was a FLOSS contributor and, if so, how agile she considered her FLOSS project and how would she sort the problems and tools in that FLOSS environment.

The paper version of this version can be found in Appendix B while the online version can be found at <http://www.ime.usp.br/corbucci/agile-survey>. This survey was announced in mailing lists related to the subject as well as blogs and twitter by various supporters. The authors also sought the support from the Agile Alliance but no answer was provided.

<sup>1</sup> <http://twitter.com>

<sup>2</sup> <http://github.com>

## 5 Survey results

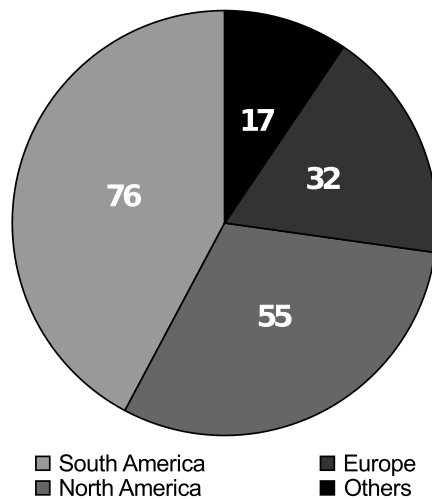
The surveys were elaborated to be answered by the participants through the Internet and used some dynamic contents to minimize the amount of answers each participants should provide. Such work was performed through Javascript but was not validated against older browsers such as Internet Explorer 6 and 7. Trying to answer the surveys using those browsers resulted in an invalid answer. This unexpected error provided an extra information regarding the browser used by each community.

The individual results of each survey provide interesting data by themselves and are described in subsections 5.1 and 5.2 for the FLOSS survey and the agile one respectively. Subsection 5.3 presents data crossed between the two surveys.

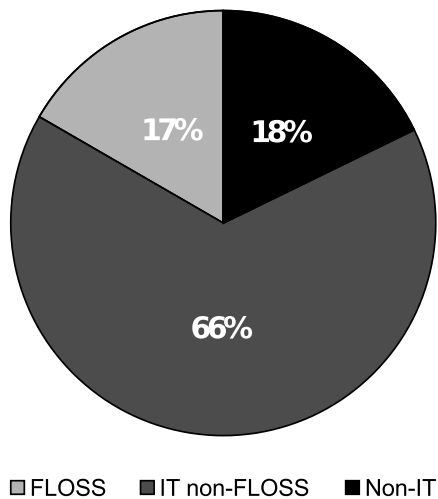
### 5.1 Individual results from the FLOSS community

The results for the FLOSS survey were collected between 2009/07/28 and 2009/11/01. The survey received 309 entries from which 3 were duplicated data (same IP address and time entry) while 4 others were invalid answers (caused by Javascript errors). This unexpected data shows that approximately 1% of people who are connected with FLOSS communities use either Internet Explorer 6 or 7.

Out of those 302 valid entries, 122 were answers in which the participant never contributed to a FLOSS project but considered herself as part of the FLOSS community. So only about 60% of the FLOSS community actually contributes with projects.

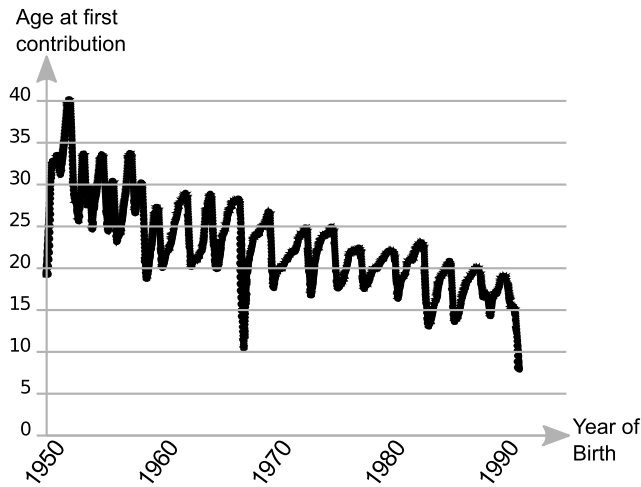


**Fig. 1.** Answers by region of the world



**Fig. 2.** Main income origin

The analysis was performed over the 180 answers left since they provided more interesting data. The figure 1 represents the distribution of the answers around the globe while the figure 2 shows the percentage main income origin for the participants. The average age of the participants was 28 years old and their first FLOSS contribution was around 22 years of age but figure 3 shows that it the average first contribution age for older people is higher than for younger ones.



**Fig. 3.** Age of first contribution by year of birth

About two thirds of the participants were project maintainers, committers or programmers. The last third was partitioned between other roles as shows figure 4. Team sizes were also fairly representative since only 6% of the project were single person team while 48% were up to 5 team members. Figure 5 shows those results and the others. It is interesting to notice that such profile is similar to the one described by Reis [15] obtained in 2003.

Regarding the main communication channels, it seems to have changed a little since the FLOSS world research or Reis' one. The main communication channels with the rest of the team are still mailing lists (27%) and Internet Relay Chat (IRC - 23%). However the amount of people using face to face communication within the team shows some increase (now at 15%). The quality of the communication in those channels was fairly similar. Mailing lists were evaluated to be 44% effective against 52% for IRC channels and 49% for face to face.

When it comes to communication with the users, mailing lists were the most used (32%) followed by the website (18%) and IRC channels, emails and issue trackers (11% each). When it comes to quality of communication in such channels, IRC channels scores again once again with 49% effectiveness against 44% for mailing lists, 37% for websites, 33% for issue tracker and mere 23% for emails.

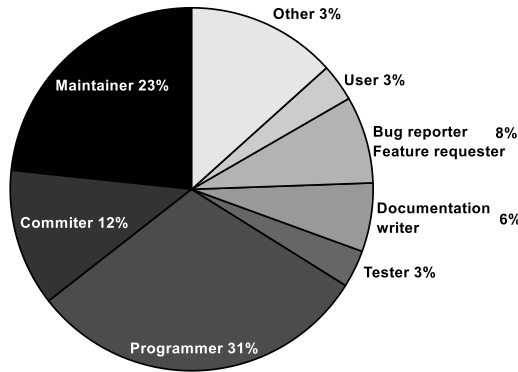


Fig. 4. Distribution of participant's roles

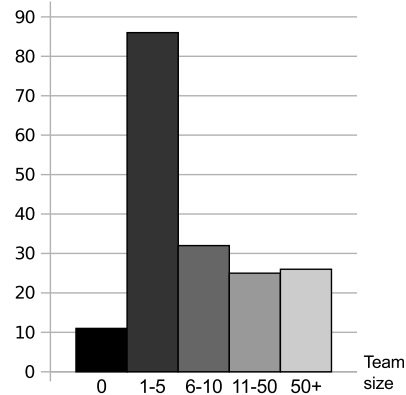


Fig. 5. Reported team sizes

For both environments, other communication channels were omitted since there were too few answers to show any significant data.

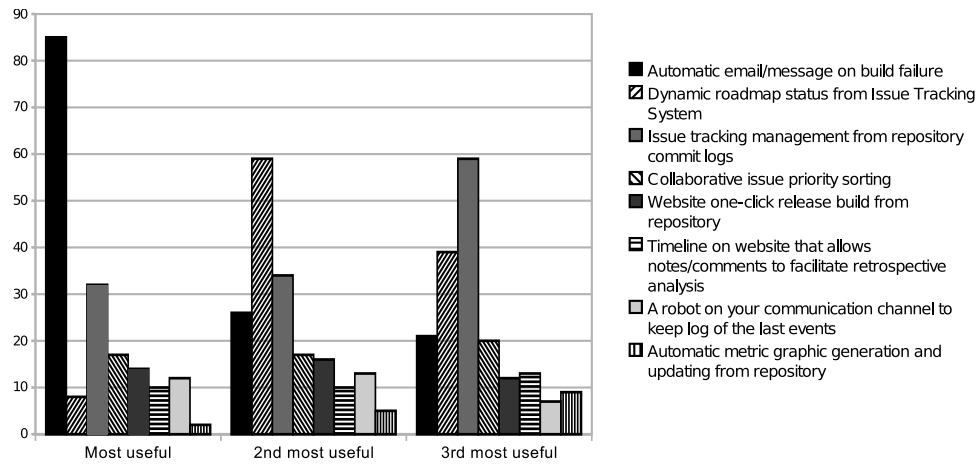


Fig. 6. Tools usefulness

Figure 6 shows the top three choices of most useful tools within a FLOSS project. Automatic email/message on build failure was considered the most useful tool by large followed by a dynamic roadmap status from the issue tracking management system and issue tracking management from repository commit logs.

## 5.2 Individual results from the Agile community

Results were collected between 2009/10/01 and 2009/12/01.



### 5.3 Crossed results

## 6 Conclusion

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## A Paper version of the survey to the FLOSS community

1. What country do you live in? \_\_\_\_\_
2. What year where you born? \_\_\_\_\_
3. How many FLOSS projects have you already contributed with?  
☐ 0 ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5-10 ☐ 11-50 ☐ 51+
4. What is the name of the FLOSS project you mostly contribute (or contributed) with? \_\_\_\_\_
5. In which year was your first contribution to that project? \_\_\_\_\_
6. What is (or was) your main role in that project?  
☐ Maintainer ☐ Documentation writer  
☐ Committer ☐ Bug reporter/Feature requester  
☐ Programmer ☐ User  
☐ Tester ☐ Other: \_\_\_\_\_
7. Do (Did) you receive any income from your FLOSS contributions? ☐ Yes ☐ No
8. If you do (did), is (was) this your main income? ☐ Yes ☐ No
9. If you do (did) not receive any income from your contributions or if those contributions were not your main income), is (was) your main income related to IT? ☐ Yes ☐ No
10. How many people work (or worked) with you on your main FLOSS project?  
☐ 0 ☐ 1-5 ☐ 6-10 ☐ 11-50 ☐ 51+
11. What is (or was) your main communication channel with your team of that FLOSS project?  
☐ Face to face ☐ Instant Message (Jabber, ICQ, etc.)  
☐ Website ☐ Email  
☐ Mailing list ☐ VoIP (Skype, Ekiga, iChat, etc.)  
☐ Issue tracker (Trac, Bugzilla, etc.) ☐ None  
☐ Internet Relay Chat (IRC) ☐ Other: \_\_\_\_\_
12. How would you evaluate the quality of your communication with that team?  
Extremely poor ----- Perfect
13. What is (or was) your main communication channel with the users of that FLOSS project?

- ## B Paper version of the survey to the agile community

1. What country do you live in? \_\_\_\_\_
2. What year were you born? \_\_\_\_\_
3. How many projects you would consider agile have you been on?  
☐ 0 ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5-10 ☐ 11-50 ☐ 51+
4. In which year was the first Agile project you participated? \_\_\_\_\_

5. What is (or was) your main role in that project?  
☐ Project manager ☐ Tester  
☐ Team leader ☐ Tracker  
☐ Programmer ☐ Documenter  
☐ Quality Analyst ☐ Other: \_\_\_\_\_
6. What is (or was) the average number of people in the agile projects you worked? ☐ 1-5 ☐ 6-10 ☐ 11-20 ☐ 21-50 ☐ 51-100 ☐ 100+
7. What is (or was) your main communication channel with the clients of that project?  
☐ Face to face ☐ Instant Message (Jabber, ICQ, etc.)  
☐ Website ☐ Email  
☐ Mailing list ☐ Telephone  
☐ Issue tracker (Trac, Bugzilla, etc.) ☐ VoIP (Skype, Ekiga, iChat, etc.)  
☐ Internet Relay Chat (IRC) ☐ None  
☐ Other: \_\_\_\_\_
8. How would you evaluate the quality of your communication with the clients?  
Extremely poor ----- Perfect
9. Have you ever been on a distributed agile project? ☐ Yes ☐ No
10. If yes, what is (or was) your main communication channel within that distributed team?  
☐ Face to face ☐ Instant Message (Jabber, ICQ, etc.)  
☐ Website ☐ Email  
☐ Mailing list ☐ Telephone  
☐ Issue tracker (Trac, Bugzilla, etc.) ☐ VoIP (Skype, Ekiga, iChat, etc.)  
☐ Internet Relay Chat (IRC) ☐ None  
☐ Other: \_\_\_\_\_
11. If you had distributed agile experience, how would you evaluate the quality of your communication with that team?  
Extremely poor ----- Perfect
12. For some of the common problems encountered by agile teams listed below, sort the 3 most critical problems in the agile environments you worked on.  
☐ Discover what the users/clients need/want  
☐ Discover what is the next task to be done  
☐ Understand how the project works from a technical point of view  
☐ Discover the current project status  
☐ Integrate the source code to the main repository  
☐ Keep the informations about the project updated in its main communication channel  
☐ Evaluate the work done to identify improvement points  
☐ Synchronize with other collaborators to achieve a common goal

13. Sort the 3 tools that would most help you in a distributed agile environment.
  - ☐ Automatic email/message on build failure
  - ☐ Dynamic roadmap status from Issue Tracking System
  - ☐ Issue tracking management from repository commit logs
  - ☐ Website one-click release build from repository
  - ☐ Automatic metric graphic generation and updating from repository
  - ☐ Collaborative issue priority sorting
  - ☐ Timeline on website that allows notes/comments to facilitate retrospective analysis
  - ☐ A robot on your communication channel to keep log of the last events
14. Have you ever contributed to Free, Libre, Open Source Software (FLOSS)?  
 ( ) Yes ( ) No
15. How would you evaluate the agile level of your FLOSS project?  
 Anti agile ----- Very agile
16. For some of the common problems encountered by agile teams listed below, sort the 3 most critical problems in the FLOSS projects you worked on.
  - ☐ Discover what the users/clients need/want
  - ☐ Discover what is the next task to be done
  - ☐ Understand how the project works from a technical point of view
  - ☐ Discover the current project status
  - ☐ Integrate the source code to the main repository
  - ☐ Keep the informations about the project updated in its main communication channel
  - ☐ Evaluate the work done to identify improvement points
  - ☐ Synchronize with other collaborators to achieve a common goal
17. Sort the 3 tools that would most help you in that FLOSS environment.
  - ☐ Automatic email/message on build failure
  - ☐ Dynamic roadmap status from Issue Tracking System
  - ☐ Issue tracking management from repository commit logs
  - ☐ Website one-click release build from repository
  - ☐ Automatic metric graphic generation and updating from repository
  - ☐ Collaborative issue priority sorting
  - ☐ Timeline on website that allows notes/comments to facilitate retrospective analysis
  - ☐ A robot on your communication channel to keep log of the last events