Standard Grimoire Report
OPNFV Project
2016-Q4

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This report would not exist without the effort of the people involved in the development of the Grimoire toolset.

Executive Summary

This report provides a quantitative analysis of the current and past situation of the OPNFV project. All the data presented in it is based on information retrieved from the software development repositories of the project. The analysis includes a summary of the general situation of the project, and specific analysis of some of its development processes (issue tracking, code review) and communication channels (mailing lists, IRC, AskBot). For comparison with the past, most of the data is shown on a quarterly basis.

Contents

Chapter 1

Project overview

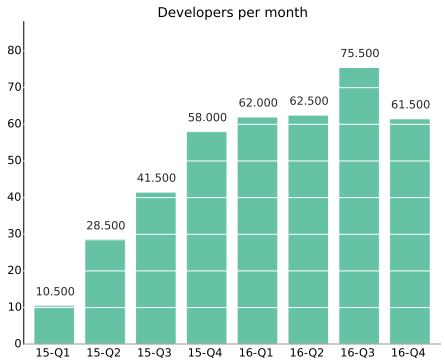
The report looks at activities across the OPNFV community during the last quarter of 2016, comparing it to previous quarters.[1].

Data source	Activity 90 days	Change (wrt to prev. 90 days)
Gits	1590 commits	-48%
Tickets	365 closed tickets	-68%
Mailing Lists	1754 sent emails	-13%
Gerrit	1808 submitted reviews	-36%
Askbot	25 posted questions	13%
IRC	44332 messages	-28%

Table 1.1: Activity during the last 90 days and its evolution

The overall development activity has decreased. Git and Gerrit activity has decreased between a 36% and a 48%. This is also in line with the Jira activity with a decrease of 68%. Besides the communication channels keep decreasing a 14% of mailing lists, 28% in the number of messages in the IRC channels. On the other hand, Askbot shows an 13% of activity increase. If compared to previous periods, this quarter shows a similar activity level than the second quarter, while the first and third quarters of 2016 show higher levels of activity in all areas.

[1]The analyzed data sources are available in appendixB



Period	Authors per month
15-Q1	10.5
15-Q2	28.5
15-Q3	41.5
15-Q4	58.0
16-Q1	62.0
16-Q2	62.5
16-Q3	75.5
16-Q4	61.5

In this quarter of 2016 the mean number of developers active per month has reached a total of 61.5. It is a decrease when compared to the previous quarter, but in line with the second quarter of 2016.

The total number of contributors divided into three sets (core, regular and casual[2]) follow a similar pattern.

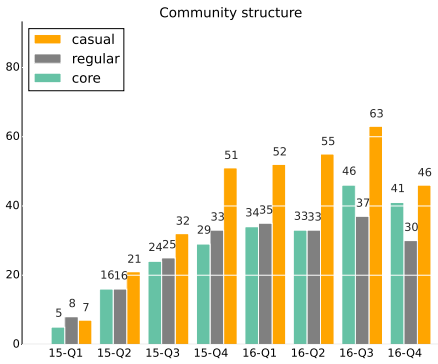


Figure 1.1: Evolution during the last quarters of core, regular and casual developers (based on git activity)

[2]Contributing developers are characterized as core, regular and casual depending on their activity in the git repositories. The classification is built by sorting contributors by their total number of commits; we sum the total commits per each individual contributors: the individuals whose commits sum up to 80% of the total number of commits in the quarter are the core contributors in that quarter. The regular contributors are those whose commits sum up to 95% of the total. The others are the casual contributors.

Period	Core	Regular	Occasional
15-Q1	5	8	7
15-Q2	16	16	21
15-Q3	24	25	32
15-Q4	29	33	51
16-Q1	34	35	52
16-Q2	33	33	55
16-Q3	46	37	63
16-Q4	41	30	46

Table 1.2: Characterization of developers by their total contribution to the project

This report aims to provide some insight into the software development process of the OPNFV community measuring efficiency and process of the community based on three metrics: the Review Efficiency Index (REI), the Time to Merge (TTM), and the Backlog Management Index (BMI). REI is measured as the number of closed (merged or abandoned) changesets out of the submitted changesets in a given period. TTM is measured as the time since a review is submitted until this is closed. The BMI is measured as the number of closed tickets out of open tickets in a given period.

REI	BMI	TTM
0.9	0.36	0.93 days

Table 1.3: Closed changesets out of opened changesets (REI), closed ticket out of opened tickets (BMI) and median time to merge in Gerrit (TTM)

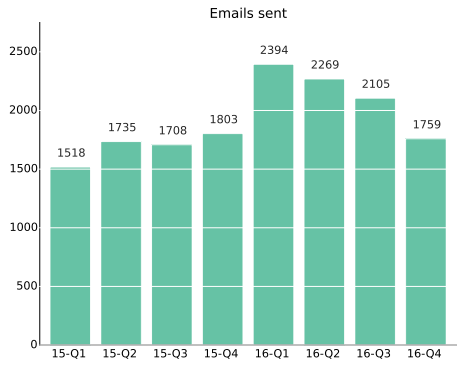
Chapter 2

Communication and support-related activities

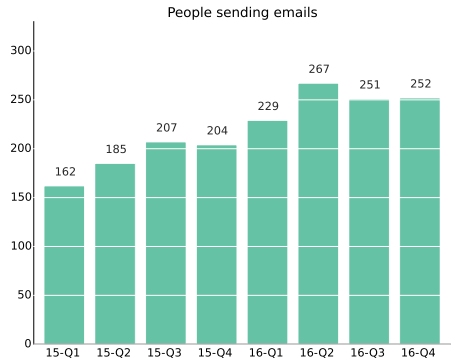
Analysis of the communication channels used for communication and support-related activities.

2.1 Mailing Lists

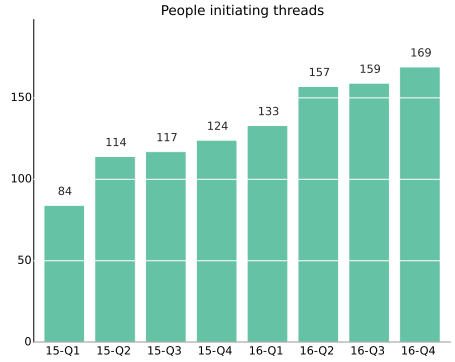
The following charts show activity in terms of emails sent, people sending emails and people initiating threads per quarter. In addition, a table is presented with the hot topics in the several analyzed mailing lists. This shows hot topics ordered by number of total posts in such thread.



Period	Emails
15-Q1	1518
15-Q2	1735
15-Q3	1708
15-Q4	1803
16-Q1	2394
16-Q2	2269
16-Q3	2105
16-Q4	1759



Period	People
15-Q1	162
15-Q2	185
15-Q3	207
15-Q4	204
16-Q1	229
16-Q2	267
16-Q3	251
16-Q4	252

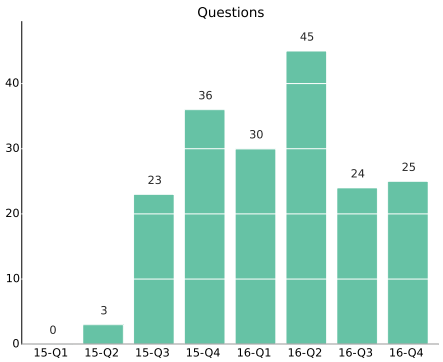


Period	People
15-Q1	84
15-Q2	114
15-Q3	117
15-Q4	124
16-Q1	133
16-Q2	157
16-Q3	159
16-Q4	169

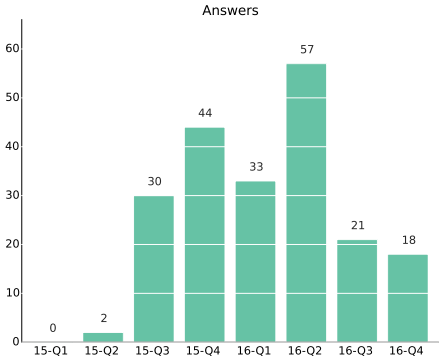
Initial Author and Date	Subject	Number Messages
sw3588 2016-10-03	[opnfv-tsc] SDN World Congress 2016 presentation on OPNFV EUAG	19
myu 2016-10-06	[opnfv-tech-discuss] OPNFV SPC Polestar WG Call 10/6/2016	17
Raymond Paik 2016-12-15	[opnfv-tech-discuss] Starting to clean-up meetings page on the wiki	15
joehuang 2016-12-14	[opnfv-tech-discuss] committer list maintainance	15
Raymond Paik 2016-10-09	[opnfv-tech-discuss] Announcing the 2016 TSC Chair election result	13
lukehinds 2016-12-19	[Opnfv-security] Security checks at Gate	12
Ryota MIBU 2016-12-04	[opnfv-tech-discuss] [doctor] doctor CI now available	12
Morgan Richomme 2016-10-27	[opnfv-tsc] sync before board/TSC meeting	11
Yujun Zhang 2016-12-15	[opnfv-tech-discuss] [all] TestPerf EcoSystem diagram now editable	11
Sindhur Malleni 2016-11-22	[opnfv-users] OPNFV Colorado 2.0 with Triple0 RPMs	11

2.2 Questions and Answers

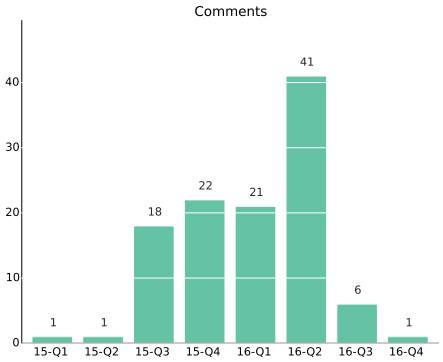
The following charts show activity in the Ask site. Total number of questions, number of answers, number of comments and people sending questions are depicted. In addition two tables represent the hot topics activity in the Ask OPNFV site. These show information about the top visited questions and questions with the highest number of people participating.



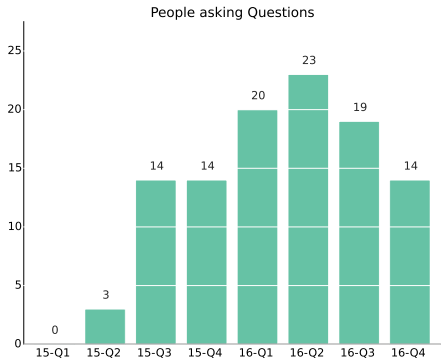
Period	Questions
15-Q1	0
15-Q2	3
15-Q3	23
15-Q4	36
16-Q1	30
16-Q2	45
16-Q3	24
16-Q4	25



Period	Answers
15-Q1	0
15-Q2	2
15-Q3	30
15-Q4	44
16-Q1	33
16-Q2	57
16-Q3	21
16-Q4	18



Period	Comments
15-Q1	1
15-Q2	1
15-Q3	18
15-Q4	22
16-Q1	21
16-Q2	41
16-Q3	6
16-Q4	1



Period	People asking
15-Q1	0
15-Q2	3
15-Q3	14
15-Q4	14
16-Q1	20
16-Q2	23
16-Q3	19
16-Q4	14

- Top visited questions.

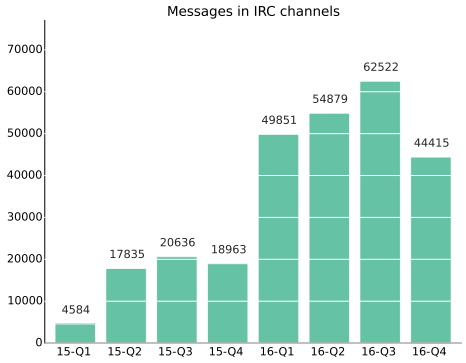
Question subject	Visits
colorado release 10 arm iso not+	18
trying to install colorado on virtualbox+	15
opnfv deployment problem+	13
error installing openstack using fuel+	9
opnfv deployment in virtual environment+	8
linux kernel version used in colorado+	7
building colorado iso for armband+	4
deploy scenario os nosdn ovs ha+	3
build fail in single node build+	2
where exactly ie at what location+	2

- Top questions with the highest number of people participating.

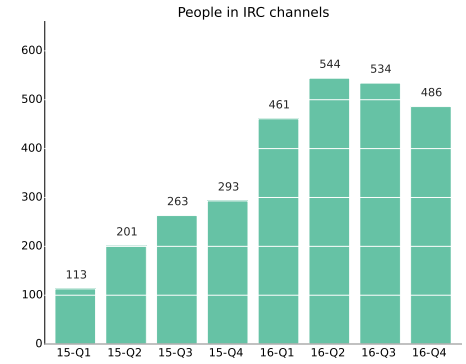
Question subject	People participating
opnfv deployment in virtual environment+	2
where exactly ie at what location+	2
error installing openstack using fuel+	2
colorado release 10 arm iso not+	2
trying to install colorado on virtualbox+	2
opnfv deployment problem+	2
error in opnfvfuel deployment error for+	1
error while installing colorado fuel from+	1
fuel not discovering nodes after pxe+	1
build fail in single node build+	1

2.3 IRC

The community uses several IRC channels for asynchronous communication. This section shows information about the total number of messages sent in the community during the last 7 quarters together with the number of people participating in such discussions.



Period	Messages
15-Q1	4584
15-Q2	17835
15-Q3	20636
15-Q4	18963
16-Q1	49851
16-Q2	54879
16-Q3	62522
16-Q4	44415



Period	People
15-Q1	113
15-Q2	201
15-Q3	263
15-Q4	293
16-Q1	461
16-Q2	544
16-Q3	534
16-Q4	486

Chapter 3

Details on OPNFV development community

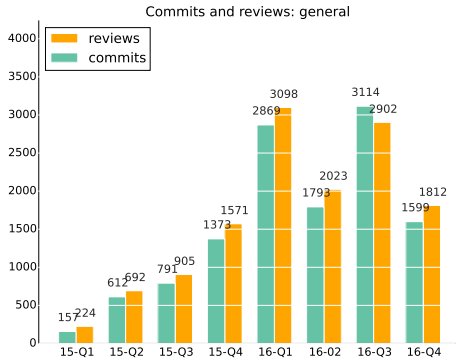
Each breakdown is divided into three sections with information from the last 6 quarters:

- activity: centered on the following metrics: commits from git activity, submitted, merge and abandoned reviews from the review system and opened and closed tickets from the issue tracking system.
- community: active core reviewers in gerrit, active authors in git and top ten developers and top ten organizations contributing to the development in the last quarter.
- process: efficiency closing tickets, efficiency closing changesets, Time to Merge (mean and median), number of patchsets (iterations) per changeset and a study on the time waiting for a reviewer or submitter action in the patchset review process.

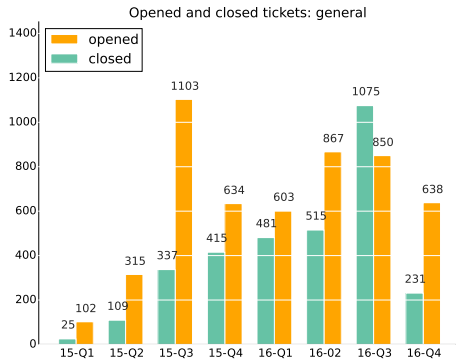
3.1 Details of the project

3.2 Activity

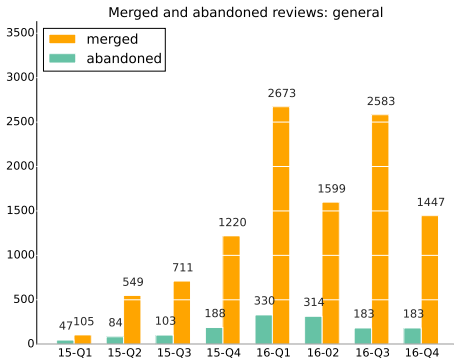
Commits in Git, submitted, merged and abandoned reviews in Gerrit and opened and closed issues in Jira.



Period	Commits	Reviews
15-Q1	157	224
15-Q2	612	692
15-Q3	791	905
15-Q4	1373	1571
16-Q1	2869	3098
16-02	1793	2023
16-Q3	3114	2902
16-Q4	1599	1812



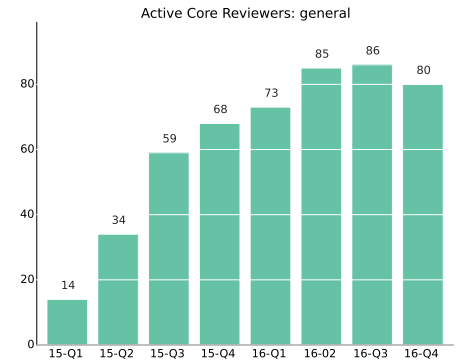
Period	Closed	Opened
15-Q1	25	102
15-Q2	109	315
15-Q3	337	1103
15-Q4	415	634
16-Q1	481	603
16-02	515	867
16-Q3	1075	850
16-Q4	231	638



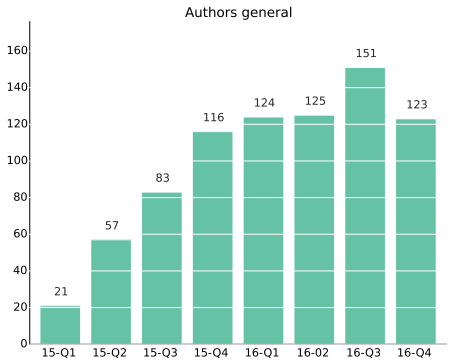
Period	Merged	Abandoned
15-Q1	105	47
15-Q2	549	84
15-Q3	711	103
15-Q4	1220	188
16-Q1	2673	330
16-02	1599	314
16-Q3	2583	183
16-Q4	1447	183

3.3 Community

Active core reviewers in Gerrit, active authors in Git, top authors and organizations in the last quarter



Period	Active Core
15-Q1	14
15-Q2	34
15-Q3	59
15-Q4	68
16-Q1	73
16-02	85
16-Q3	86
16-Q4	80



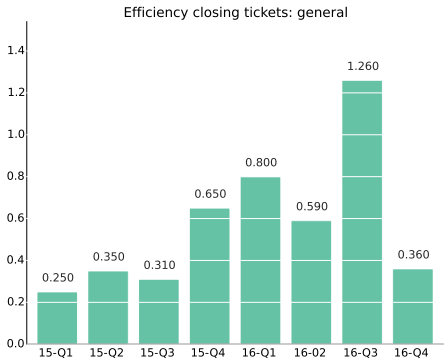
Period	Authors
15-Q1	21
15-Q2	57
15-Q3	83
15-Q4	116
16-Q1	124
16-02	125
16-Q3	151
16-Q4	123

Commit (s)	Author
143	Yujun Zhang
128	Jose Lausuch
115	Alexandru Avadanii
111	Morgan Richomme
78	Tim Rozet
71	matthew.lijun
65	Dan Radez
65	Fatih Degirmenci
65	zhihui wu
62	Serena Feng

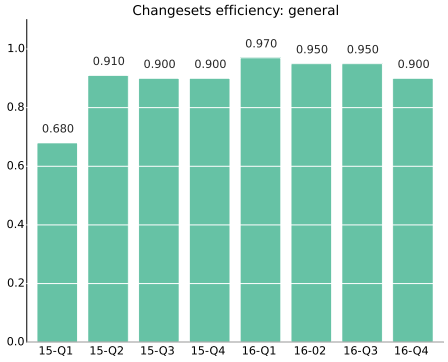
Commit (s)	Organizations
579	Huawei
326	ZTE Corporation
301	Ericsson
249	Red Hat
142	ENEA AB
141	Orange
87	Intel
75	Mirantis
42	Linux Foundation
25	NEC
23	ATT
16	SUSE
14	Dell
14	EMC
13	MontaVista
11	Juniper
7	Cisco
7	Nokia
7	Tata Consultancy

3.4 Process

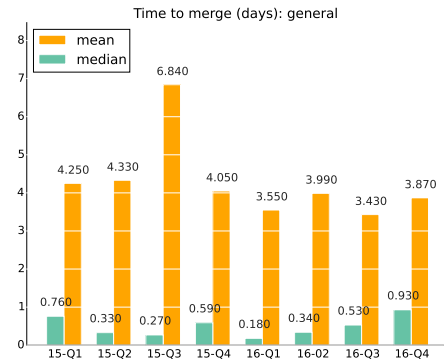
Efficiency closing changesets and tickets, time to review (mean and median), number of patchests (iterations) per changeset and study on the time waiting for a reviewer or submitter action in the patchset review process.



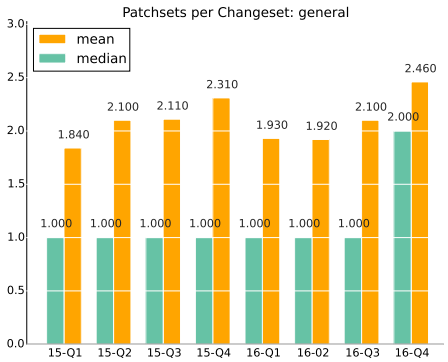
Period	Closed/Opened
15-Q1	0.25
15-Q2	0.35
15-Q3	0.31
15-Q4	0.65
16-Q1	0.8
16-02	0.59
16-Q3	1.26
16-Q4	0.36



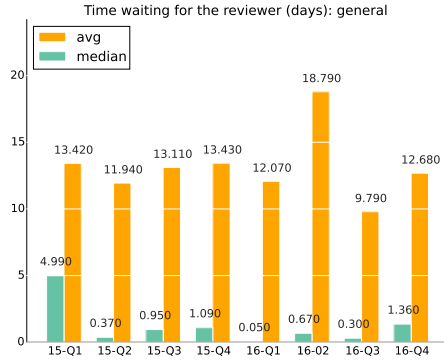
Period	(Aband. and Merg.)/Subm.
15-Q1	0.68
15-Q2	0.91
15-Q3	0.9
15-Q4	0.9
16-Q1	0.97
16-02	0.95
16-Q3	0.95
16-Q4	0.9



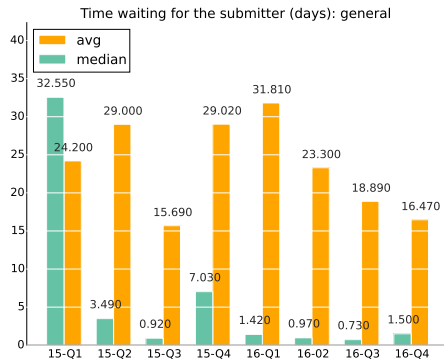
Period	Median	Mean
15-Q1	0.76	4.25
15-Q2	0.33	4.33
15-Q3	0.27	6.84
15-Q4	0.59	4.05
16-Q1	0.18	3.55
16-02	0.34	3.99
16-Q3	0.53	3.43
16-Q4	0.93	3.87



Period	Median	Mean
15-Q1	1.0	1.84
15-Q2	1.0	2.1
15-Q3	1.0	2.11
15-Q4	1.0	2.31
16-Q1	1.0	1.93
16-02	1.0	1.92
16-Q3	1.0	2.1
16-Q4	2.0	2.46



Period	Median	Mean
15-Q1	4.99	13.42
15-Q2	0.37	11.94
15-Q3	0.95	13.11
15-Q4	1.09	13.43
16-Q1	0.05	12.07
16-02	0.67	18.79
16-Q3	0.3	9.79
16-Q4	1.36	12.68



Period	Median	Mean
15-Q1	32.55	24.2
15-Q2	3.49	29.0
15-Q3	0.92	15.69
15-Q4	7.03	29.02
16-Q1	1.42	31.81
16-02	0.97	23.3
16-Q3	0.73	18.89
16-Q4	1.5	16.47

Appendix A

Metrics Definitions

- Commit: this is defined as the action(s) that performes a change in the source code. Bots, merges and other type of automatic activity is removed from the records. In addition, when aggregating several git repositories, this metric only counts unique revisions (unique hashes found in the git repositories). In addition, all branches are aggregated to the analysis.

- Submitted changeset: a changeset is the process of peer reviewing source code changes. A submitted code is not merged to the master code of a given project till this is approved for at least one core reviewer of such project. A submitted changeset is defined as any changeset submitted to the Gerrit system.

- Merged and abandoned changsets: a merge is defined as the patchset that was finally submitted to the source code. An abandoned changeset is a potential merge that was finally dismissed by developers as being part of the source code. This status is found in the status of the final patchset. However, although a patchset can be merged or abandoned, this action can be reverted. If a patchset presents several of these changes in the same period of time, only one of them is counted (the very last one). On the other hand, if those changes take place in different periods of analysis, both status would be counted.

- Open and closed ticket: a ticket in Jira is counted as closed if the status of such ticket is defined as 'Closed'. The rest of the tickets are counted as opened tickets.

- Active Core Reviewer: a core reviewer has the possibility to use +2 or

-2 actions when reviewing the code. However, if there are developers that for some period do not use those actions, those can not be measured as core reviewer. Thus, this metric provides information about 'active' core reviewers. This can be also defined as those developers that actively have used the +2 or -2 review action. This metric is also filtered by branch of activity, only using 'master'. This helps to detect actual core reviewers in each of the projects.

- Authors: a developer is defined as author if she is the owner of the patchset sent for reviewing and this is merged into the source code. As previously indicated, automatic commits such bot's are removed from this analysis.

- Efficiency closing issues: this metric is a derivation of the Backlog Management Index (BMI) that measures the number of closed tickets out of the opened tickets in a period of time. Values under 1.0 indicates that the number of closing issues is lower than the number of opened issues arriving. On the contrary, higher charts would indicate better maintenance effort by the community.

- Efficiency closing changesets: this metric is a derivation of the Backlog Management Index as it is named as Review efficiency index (REI). As similarly used in the BMI index, this metrics measures the number of closed changesets (merged or abandoned) out of the total number of new changesets.

- Time to Merge: this time consists of the time between the first upload of the first patchset (as defined as a submitted changeset) till the last patchset of the changeset is merged into the code and this is indicated in the comments side of the Gerrit tool. This metric is provided in number of days.

- Patchsets per changeset: this metric calculates the total number of iterations in a changeset till this is abandoned or merged.

- Time waiting for the reviewer or the submitter: a changeset is waiting for a reviewer action if a new patchset upload or a new changset arrives to the system. On the other hand, a submitter action is required when a specific negative verification or reviewing action takes place (Verified -1/-2 or Code-Review -1/-2). In addition, when a Code-Review +2 action takes place, it is assumed that the changset is closing and no

more times are registered either for the reviewer or the submitter. For this analysis, those patchsets flagged as work in progress are ignored.

Metrics measured in the general overview:

- Community structure, core, regular and casual developers: developers are ordered in descendant order by the number of commits authored for a given period. Core developers are defined as the list of developers that reach 80% of the total commits. Regular is the set of developers that are between that 80% and 95% of the commits. Casual developers are found in the rest of the 5%. Bots are ignored in this list of developers.
- Developer per month: average of developers per month ignoring bots.
- Emails sent: number of emails sent by people to the several mailing lists. Bots are not registered.
- People sending emails: number of people sending those emails ignoring bots.
- People initiating threads: a thread is defined as a list of emails that has the same root. There may exist threads of one email.
- Top threads: this list provides the longest threads in terms of number of emails that have a common root email.
- Questions, answers and comments in Askbot.
- People asking questions in Askbot: number of people sending a new question.
- Top visited questions.
- Messages and people in IRC: this analysis ignores as a message those entries in the IRC channels that provide information about people entering or leaving the system.

Appendix B

Source code and data sources

The source code of the scripts and templates used to produce this report are available from the GrimoireReports repository[1].

The databases used for the analysis can be obtained from the "Data sources" panel[2] of the Grimoire Dashboard for the project[3].

[1] https://github.com/VizGrimoire/GrimoireReports
[2] http://projects.bitergia.com/opnfv/browser/data_sources.html
[3] http://projects.bitergia.com/opnfv/