

Alambic: An Open-Source Platform for Software Engineering Data Management

The Case of Embedded Software Development



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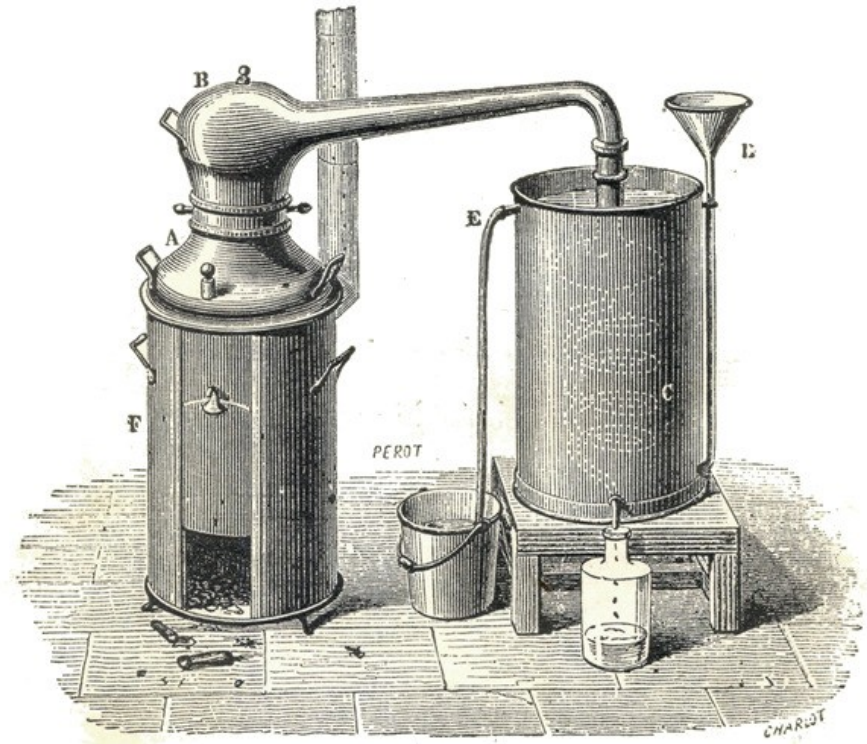
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Plan

- Software quality, open data, and Alambic
- Alambic
 - Introduction: why Alambic
 - Architecture
 - Plugins: MetricsGrimoire, Hudson CI, PMD, Stack Overflow
- Use Cases
 - The PolarSys dashboard
 - The Eclipse forge
- Alambic 3.0 – one step forward
- Conclusion & Perspectives



Software quality, open data and Alambic

Software quality has different meanings for different contexts :

- Open-source projects (e.g. includes community attributes),
- Embedded software (e.g. stresses reliability and testability),
- Desktop software (e.g. stresses usability and maintainability).

► Defining a **quality model** helps people realise what quality is in their context, and how to measure and improve it.

Transparency (open data) is a key feature of software development.

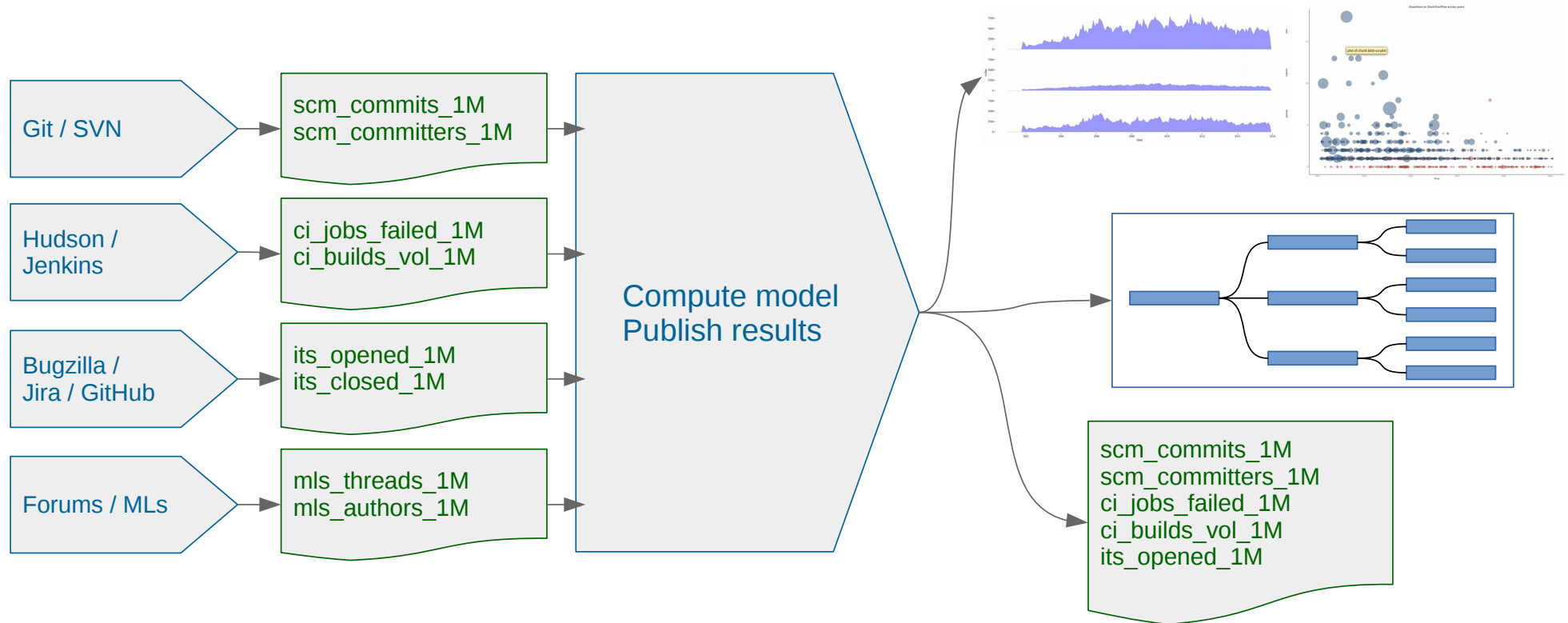
- For open-source projects,
- For proprietary projects – Agile methodology explicitly promotes it.

Alambic – Introduction

Why Alambic?

- A fairly big amount of data is generated along the development process, including requirements, code, issues, builds, delivery, support, and more...
- Alambic automatically retrieves, curates, and organises information from these data sources and presents it to the user in a unified vision:
 - Dedicated plugins can run checks, actions, and reports.
 - Visualisations show various aspects of the project behaviour.
 - Recommendations are proposed to improve practices and quality.
- All data is made available in a neat format (JSON, CSV) so data enthusiasts can easily play with it, and use external tools for reporting, visualisation, data mining, post-processing..

Alambic – Architecture



Alambic outputs

Alambic provides:

- A dashboard to browse all information online.
- Downloads for metrics, attributes, recommendations (JSON, CSV).
- Exportable figures: PNG/SVG, HTML snippets, interactive plots.
- Visualisations: quality model, data, history, specific data sources analysis.

Alambic 3.0

- PDF reports.
- Plotly graphics for online editing.

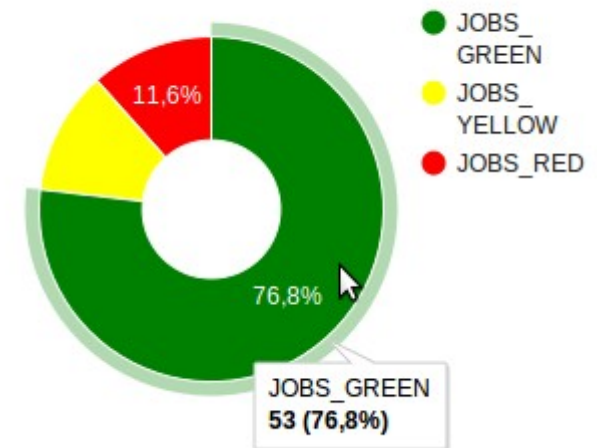


Alambic plugins – Hudson CI engine

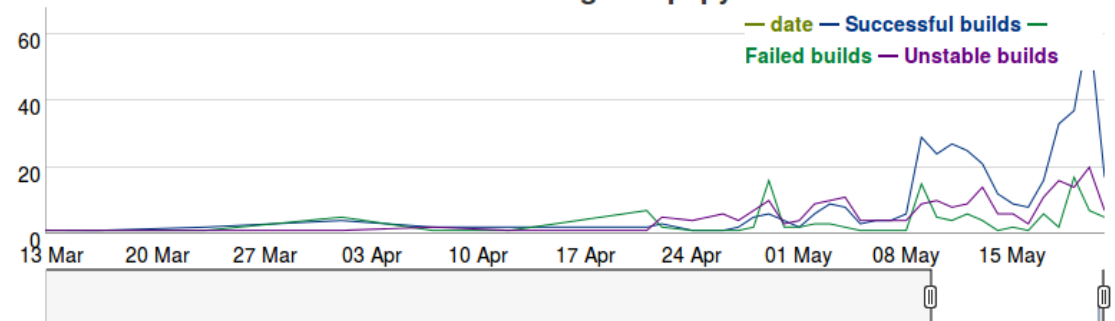
This plugin connects to a Hudson CI instance and provides

- Metrics
number of jobs, jobs failed/successful/unstable, builds failure rate..
- Figures
builds history, jobs results
- Data
builds, jobs (JSON, CSV)
- Recommendations.

Hudson CI Builds for modeling.mdt.papyrus



CI builds for modeling.mdt.papyrus



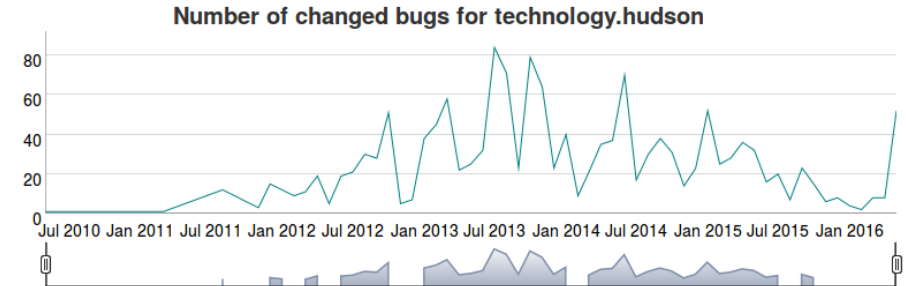
Alambic plugins: Eclipse ITS, SCM, MLS

A set of plugins to retrieve information from the Eclipse dashboard [EDA].

Community metrics are computed using Bitergia's MetricsGrimoire [BMG], a generic tool to analyse software development repositories and tools metadata.

- **Issue Tracking System (ITS)**

- Metrics: its_closed_7, its_closed_30, its_closed_365, its_bugs_closed, its_bugs_changed, ...
- Figures, visualisation
- Recommendations



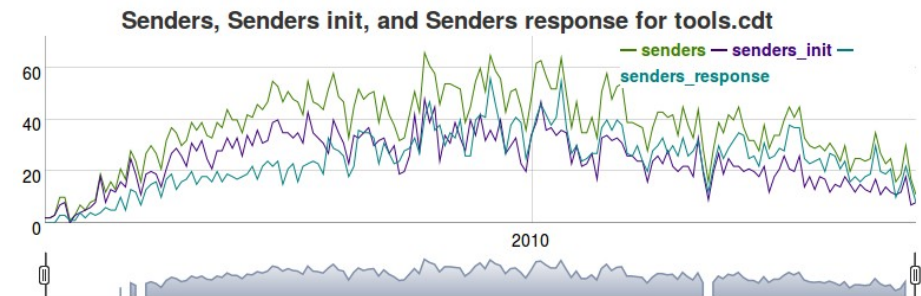
[EDA] <http://dashboard.eclipse.org>

[BMG] <https://metricsgrimoire.github.io>

Alambic plugins: Eclipse ITS, SCM, MLS

A set of plugins for community metrics.

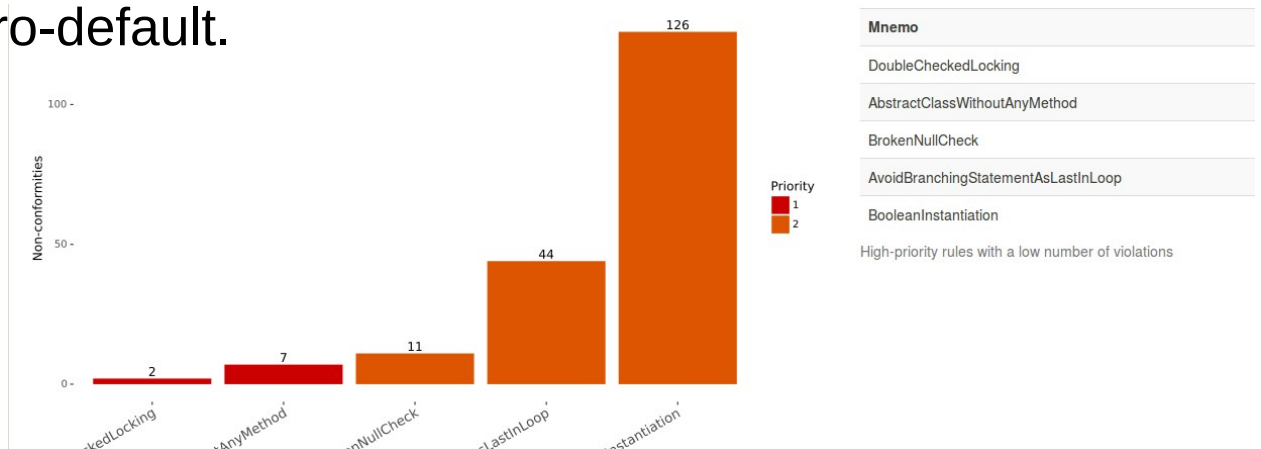
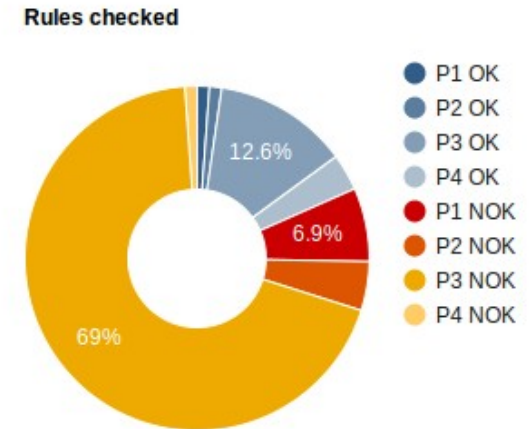
- **Software Configuration Management (SCM)**
 - Metrics: scm_commits_7, scm_commits_30, scm_commits_365, scm_authors_7, scm_committers, scm_files, ...
 - Figures, visualisation
 - Recommendations
- **Mailing Lists (MLS)**
 - Metrics: mls_senders_7, mls_senders_30, mls_senders_365, mls_sent_7, mls_threads, mls_senders_response, ...
 - Figures, visualisation
 - Recommendations



Alambic plugins – PMD Analysis & Configuration

A plugin to help users understand the output of PMD and configure the tool.

- PMD Analysis
 - Get a summary of violations found by PMD
 - Identify the most important violations to resolve.
- PMD Configuration:
 - Use only most important rules, with fewer violations.
 - Target *conscious* zero-default.



Use Cases: The PolarSys dashboard

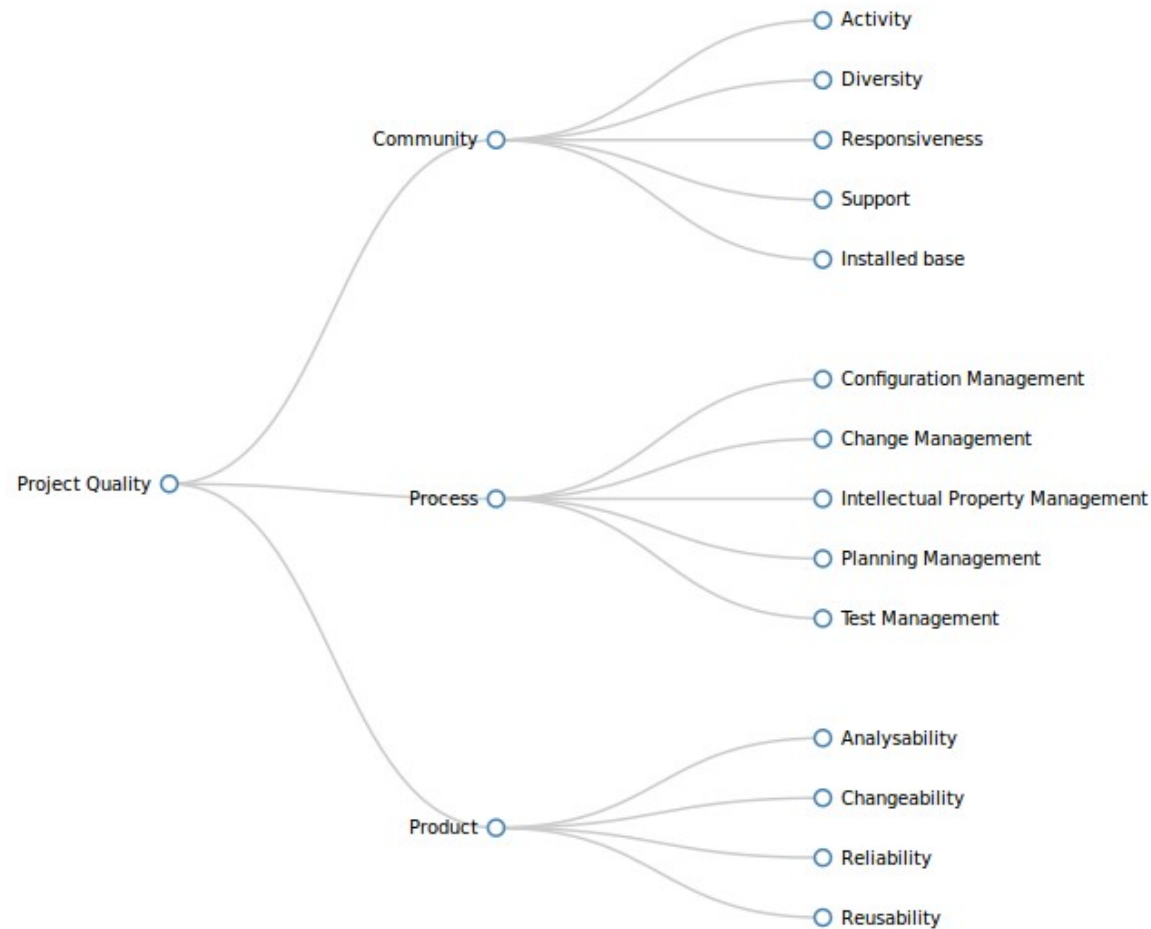
PolarSys is an Eclipse Industry Working Group that provides an open-source tool chain for embedded systems.

A maturity assessment task force was initiated to ensure the overall consistency of projects regarding quality:

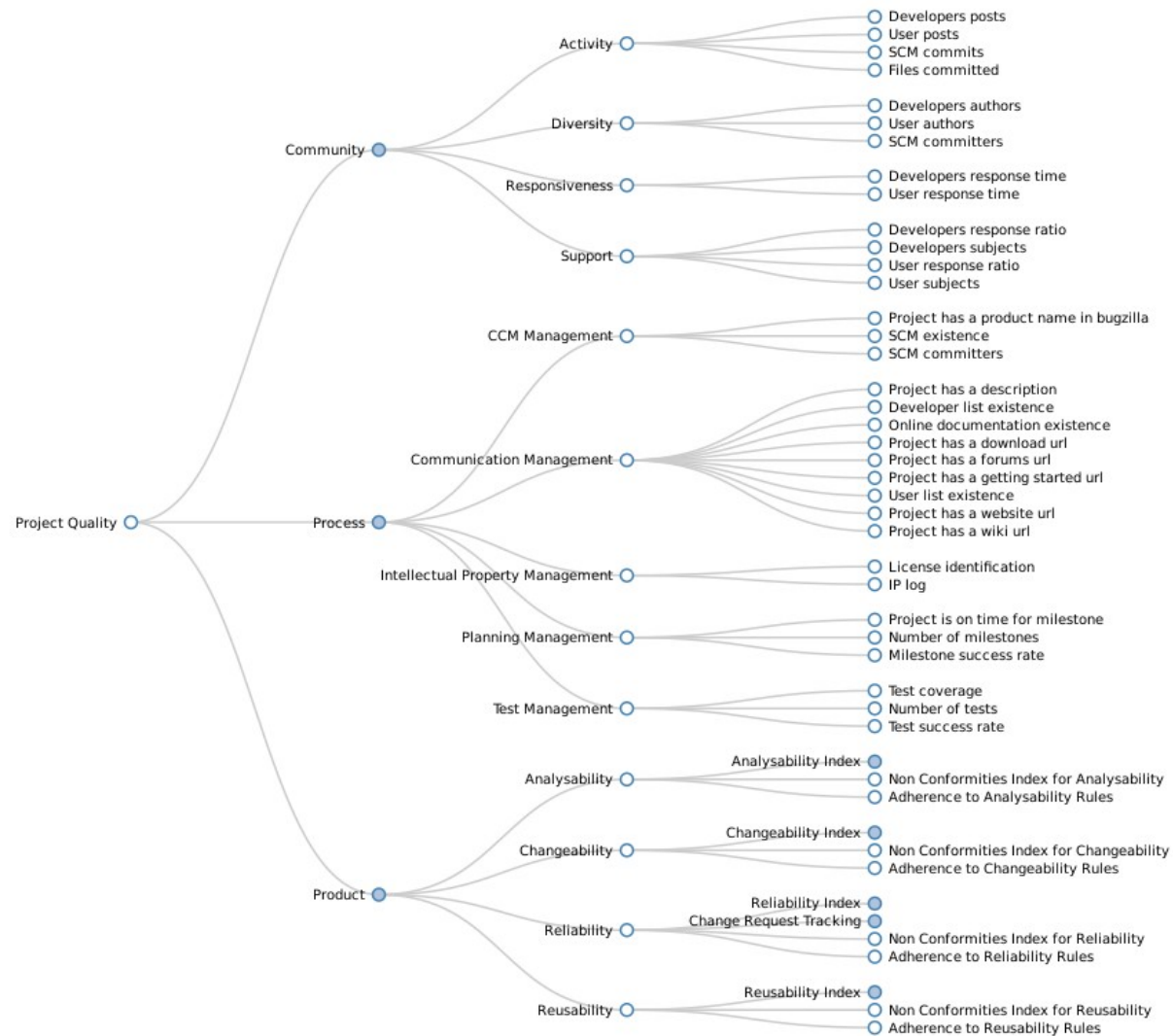
- Define a quality model with specific quality concerns
- Define means to measure quality attributes
- Define presentation of data (dashboard)



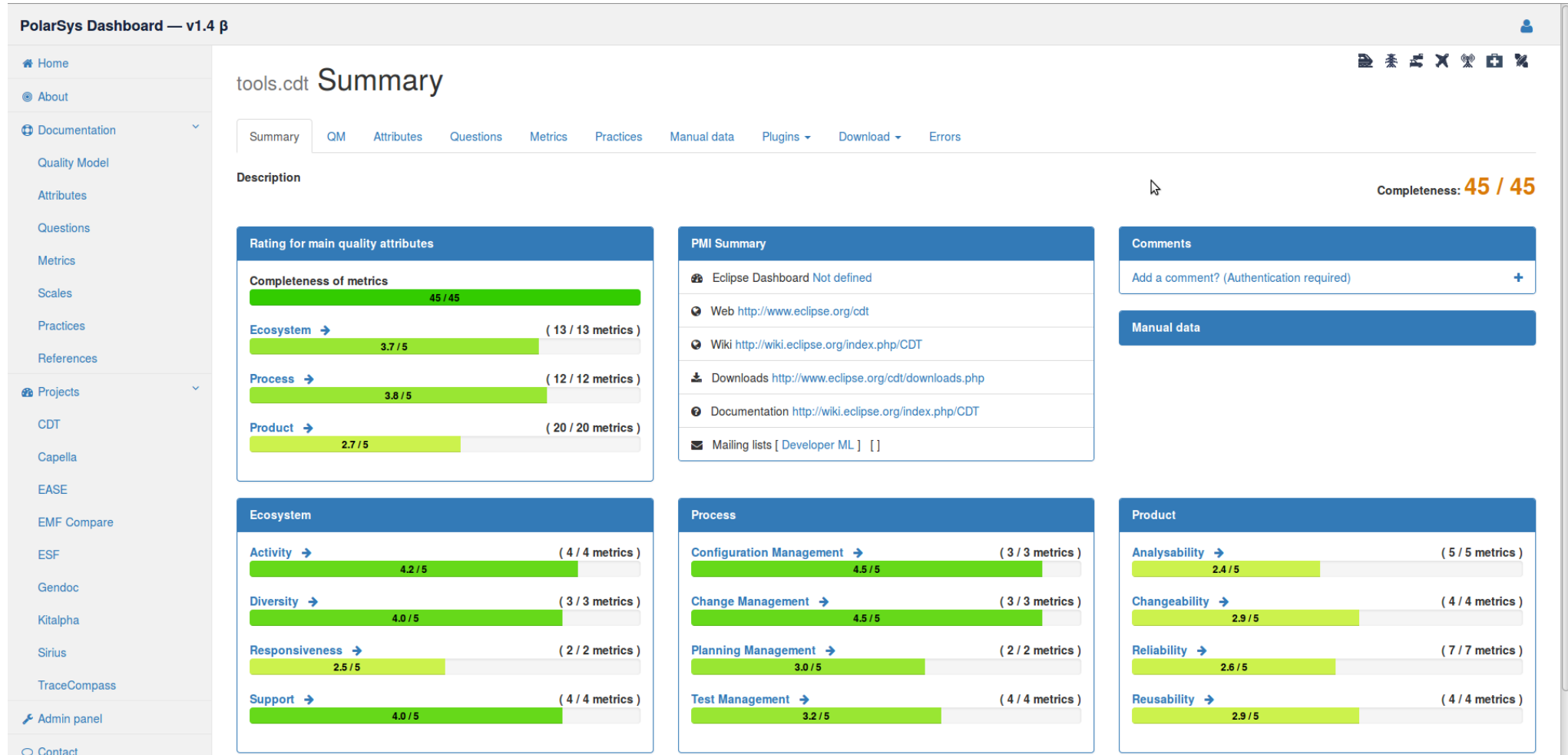
Use Cases: The PolarSys dashboard



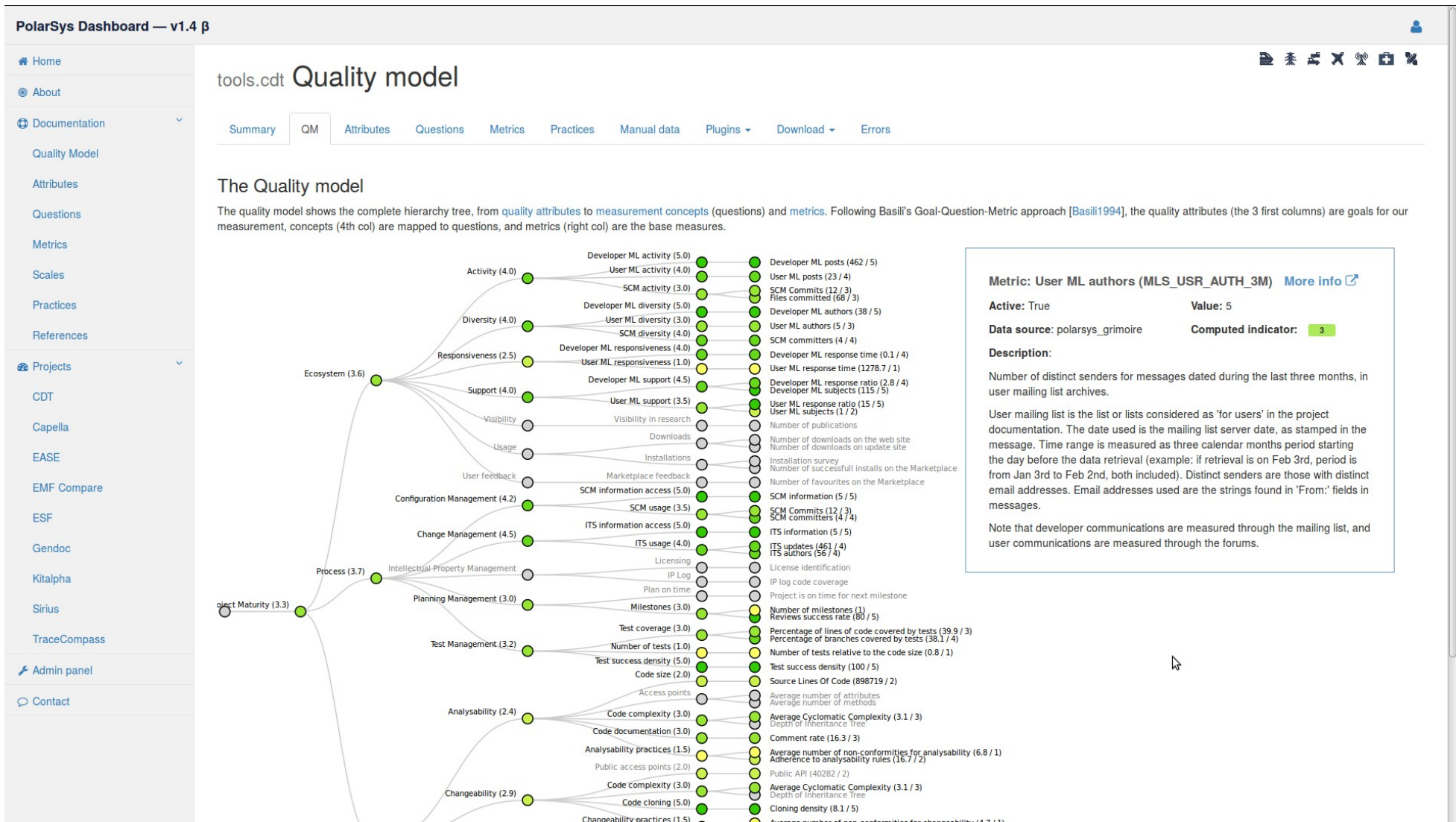
Use Cases: The PolarSys dashboard



Use Cases: The PolarSys dashboard



Use Cases: The PolarSys dashboard



Use Cases: The Eclipse forge

Use the Eclipse Foundation's infrastructure to retrieve information from the various data sources and tools of the Eclipse forge:

- The PMI for project details (description, web site, downloads, etc.)
- Issue tracking (Bugzilla)
- Configuration Management (Git)
- Communication: Mailing lists and forums
- Hudson CI, PMD..



Also use external sources:

- Stack Overflow questions about the project

Use Cases: The Eclipse forge

Alambic dashboard for Eclipse - v2.0 (beta)

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Andmore

CDT

CDT TCF

EASE

EMF

Egit

GEF

GMF

Hudson

JDT

OCL

PDT

Papyrus

Scout

Sirius

Target Management

Titan

Trace Compass

Admin panel

Contact

technology.egit **Summary**

Summary QM Attributes Questions Metrics Manual data Plugins Download Errors

Description Completeness: 13 / 13

Highlights

13 / 13

Completeness

81

Metrics

4.2 / 5

Ecosystem

4.5 / 5

Process

44

Commits

last month

40

Issues closed

last month

46

Mails sent

last month

PMI Summary

Eclipse Dashboard Not defined

Web <http://www.eclipse.org/egit/>

Wiki <http://wiki.eclipse.org/EGit>

Downloads <http://eclipse.org/egit/download>

Documentation <http://www.eclipse.org/egit/documentation>

Mailing lists [Developer ML] [User Forums]

Manual Data

Add a comment? (Authentication required)

Visualisation plugins

pmi_checks

eclipse_mls

eclipse_its

eclipse_scm

stack_overflow

hudson

Configuration management

Overall:

4668 commits made by 127 authors and 127 committers, representing 3621 files.

Last month:

44 commits by 8 authors.

Last year:

480 commits by 34 authors.

Issue Tracking System

Overall:

2492 issues opened by 688 people

1867 issues closed by 111 people.

Last month:

263 % of issues were closed by 4 people.

Last year:

11 % of issues were closed by 18 people.

Mailing lists

Overall:

6196 messages sent by 189 authors in 1807 threads.

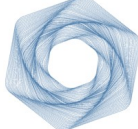
Last month:

46 messages sent by 4 authors.

Last year:

478 messages sent by 25 authors.

Stack Overflow

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Alambic dashboard for Eclipse - v2.0 (beta)

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technology.git

Plugin stack_overflow

Summary

QM

Attributes

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Metrics

Manual data

Plugins

Download

Errors

StackOverflow Questions

This section shows information about SO posts concerning the tag `egit` during the last 5 years (i.e. from `2011-05-21T22:01:38`).

Quick Summary

There is a total of `1013` questions and `2438` posts related to `egit` .

Posts analysed span from `2011-05-21` to `2016-05-19` .

Last activity registered was on `2016-05-19 15:31` .

`712` of them (`70%`) have an accepted answered.

`175` actually have answers but none of them is accepted.

`126` have no answer at all.

There is an average of `1.41` answers to questions.

The wordcloud on the right details frequent words used in the question titles. The size and colour of the words depend on their number of appearances in questions. It shows what are the concerns and issues of people when dealing with the project.

Recent questions waiting for an answer

The following recent questions (less than 1 month old) have been asked more than 2 days ago and still have no answer. Would you like to check them?

Question	Created on	Score	Views
Eclipse cdt Egit commit run configuration	2016-05-05 10:12:57	0	10
Export deployable plugi-ins and fragments for projects stored in Git repository from Eclipse Kepler	2016-05-09 20:40:53	0	25
Eclipse egit cannot not detecting changed files or add new file	2016-05-12 16:39:01	0	14
Eclipse Git - Making changes at the same time	2016-05-14 13:33:27	1	21
Commit and Push keeps making new branch (Eclipse)	2016-05-19 01:51:15	0	16

version

delet

java

workspac

conflict

cant

local

repository

exist

commit

project

remot

push

github

new

get

unabl

histori

instal

branch

show

add

import

make

fail

line

use

creat

work

clone

error

plugin

share

different

make

egit

eclipse

Alambic 3.0

Alambic 3.0 adds many features:

- Architecture / Use Cases
 - More data-centric, positionned as a central data management platform.
 - Address new use cases: DevOps, system engineering.
 - Address new forges: GitHub, Apache..
- Plugins
 - New types of plugins: post and global triggers for reports
 - Wizards to create new projects: Eclipse PMI, GitHub, Apache
 - Tools: easily use external tools (e.g. R for analysis and reporting)

Conclusion & Perspective

Alambic project:

- Home:
<http://alambic.castalia.camp>
- Source, issues, documentation:
<http://bitbucket.org/BorisBaldassari/alambic>

Check the live instances:

- Polarsys dashboard: <http://dashboard.polarsys.org>
- Eclipse forge dashbaord: <http://eclipse.castalia.camp>

Check the full article! →

