VALUING AND IMPROVING
SOFTWARE
CAPITAL

SQUORING Technologies

Key Performance Indicator

Line Counting			
Lines of Code	481219	↗	✓
Source Lines Of Code	401326	↗	✓
Effective Lines Of Code	325196	↗	✓
Cyclomatic Complexity	12265	↗	✓
Comment Rate	16 %	↘	✗

Decision Making			
Business Value	1912	→	i
Technical Debt	3626	↗	i
Maturity Index	65 %	↘	C
Stability Index	84 %	↗	B
Reusability Index	44 %	↘	D

Squore 16.1.2

Getting Started Guide

Reference : SUM_Squore
Version : 16.1.2
Date : 11/10/2016

Squoring Technologies
76, allées Jean Jaurès / 31000 Toulouse - FRANCE / Tel. +33 581 346 397
http://www.squoring.com/
APE 5829 C - SIREN 521171629 – RCS Toulouse

Getting Started Guide

Abstract

This edition of the Getting Started Guide applies to Squore 16.1.2 and to all subsequent releases and modifications until otherwise indicated in new editions.

Licence

Warranty

Table of Contents

Typographical Conventions

The following conventions are used in this manual.

Typeface or Symbol	Meaning
Bold	Book titles, important items, or items that can be selected including buttons and menu choices. For example: Click the **Next** button to continue
Italic	A name of a user defined textual element. For example: **`Username`** : *admin*
`Courier New`	Files and directories; file extensions, computer output. For example: Edit the `config.xml` file
`Courier Bold`	Commands, screen messages requiring user action. For example: **`Username`** : *admin*
>	Menu choices. For example: Select **`File > Open`**. This means select the File menu, then select the Open command from it.
<...>	Generic terms. For example: <SQUORE_HOME> refers to the Squore installation directory.

Notes

Screenshots displayed in this manual may differ slightly from the ones in the actual product.

Acronyms and Abbreviations

The following acronyms and abbreviations are used in this manual.

CI	Continuous Integration
CLI	Command Line Interface
DP	Data Provider, a Squore module capable of handling input from various other systems and import information into Squore
RC	Repository Connector, a Squore module capable of extracting source code from source code management systems.

1. Introduction

1.1. Foreword

This document was released by Squoring Technologies.

It is part of the user documentation of the Squore software product edited and distributed by Squoring Technologies.

1.2. About This Document

This document is the Getting Started Guide for Squore.

It is indented as a follow up to the Squore Installation and Administration Guide and will help you understand how to use the Squore user interface to create and update projects. It is divided into several chapters, as detailed below:

- Chapter 2, *The Tools at Your Disposal* provides details on where to find the sample Squore projects.
- Chapter 3, *Accessing Squore* will guide you through your first access to Squore as a user.
- Chapter 4, *Creating Projects and Versions* covers ways of creating new projects and versions.
- Chapter 5, *Understanding Analysis Results* describes the user interface and functionality you will use in Squore on a daily basis.
- Chapter 6, *Managing Your To-Do List With Squore* helps you integrate action items suggested by Squore into your workflow.
- Chapter 7, *Track Your Favourite Indicators* shows how you can track your favourite items and consult Squore results on mobile devices.
- Chapter 9, *Communicating With Squore* covers all reporting features of Squore.
- Chapter 10, *Keep it Tidy: Project Maintenance in Squore* helps you maintain a Squore installation.

If you are already familiar with Squore, you can navigate this manual by looking for what has changed since the previous version. New functionality is tagged with **(new in 16.1)** throughout this manual. A summary of the new features described in this manual is available in the entry *** What's New in Squore 16.1?** of this manual's Getting Started Guide.

For information on how to use and configure Squore, the full suite of manuals includes:

- Squore Installation Checklist
- Squore Installation and Administration Guide
- Squore Getting Started Guide
- Squore Command Line Interface
- Squore Eclipse Plugin Guide
- Squore Configuration Guide
- Squore Reference Manual

1.3. Contacting Squoring Technologies Product Support

If the information provided in this manual is erroneous or inaccurate, or if you encounter problems during your installation, contact Squoring Technologies Product Support: http://support.squoring.com/

You will need a valid Squore customer account to submit a support request. You can create an account on the support website if you do not have one already.

For any communication:

support@squoring.com

Squoring Technologies Product Support
76, allées Jean Jaurès / 31000 Toulouse - FRANCE

1.4. Responsabilities

Approval of this version of the document and any further updates are the responsibility of Squoring Technologies.

1.5. Getting the Latest Version of this Manual

The version of this manual included in your Squore installation may have been updated. If you would like to check for updated user guides, consult the Squoring Technologies documentation site to consult or download the latest Squore manuals at http://support.squoring.com/documentation/16.1.2. Manuals are constantly updated and published as soon as they are available.

2. The Tools at Your Disposal

2.1. Default Users and Sample Projects

Squore ships with a collection of sample projects that we will refer to throughout this guide. Each project consists of one or several versions of the source code of an application. The code can be found in Squore Server and Squore CLI in the folder **<SQUORE_HOME>/samples**. If you do not have access to the sample projects, contact your Squore administrator to obtain a copy of the code.

Squore ships with a database that contains two sample users that you can use to familiarise yourself with all the functionality available:

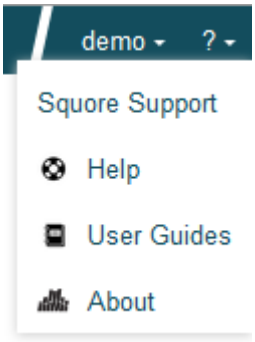
- **admin/admin** is the default user that can manage the server installation, reload the server configuration after changes and perform access management tasks for the Squore installation.
- **demo/demo** is the default Squore power user that can create, review and manage projects, as well as give team members visibility or management privileges on the projects he himself manages.

You can use these two default users, but we recommend that you change their passwords after your first connection. The privileges and permissions assigned to these default users can be modified as needed. You can familiarise yourself with Squore permissions and privileges by referring to Section 3.1, “Understanding Profiles and Roles”.

Tip

You may choose to read this manual from beginning to end, or jump straight to a specific topic. Logging in as the **demo** user, gives you access to a **Tools** menu that allows to reproduce the examples shown in this manual. Click **Tools > Create Demo** and select the **ISO9126 -- C** to get started.

2.2. Getting More Help



The Help menu

If at any moment you have doubts about how a feature works, Squore offers help in HTML and PDF formats. A Wiki and support site are also available.

2.2.1. Online Help

The Squore online help can be accessed from anywhere in Squore by clicking on the **? > Help** menu entry.

The online help is contextual and provides information in a popup window about the page that you are currently viewing in Squore.

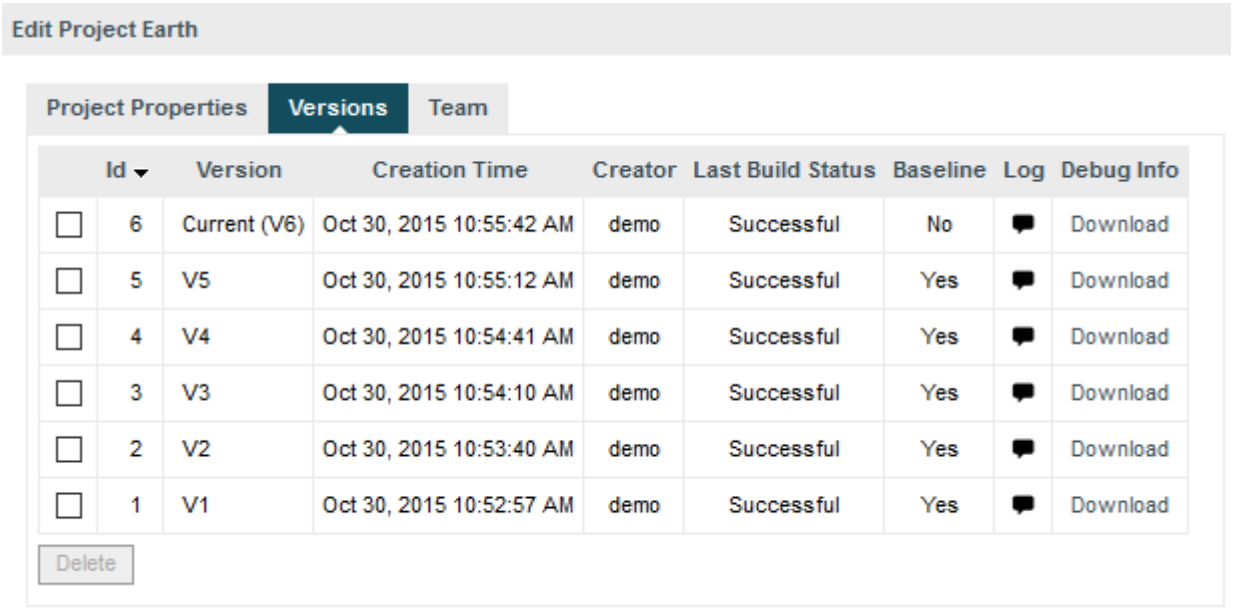
2.2.2. User Guides and Support Wiki

The Squore user guides are available in PDF and HTML format by clicking the **? > User Guides** menu entry in Squore. You can download a copy for offline use.

The Squoring Technologies Support Wiki provides release notes, known issues and hints and tips for current and past Squore versions. Visit http://openwiki.squoring.com for more information.

2.2.3. Log Files and Debug info

Every **owner** or **Project Manager** of a project can retrieve the analysis log files for their projects without the need to consult an administrator. This is done by accessing the **Manage** page for a particular project and viewing the **Versions** tab (**My Projects page > Manage icon > Versions tab**) as shown below:



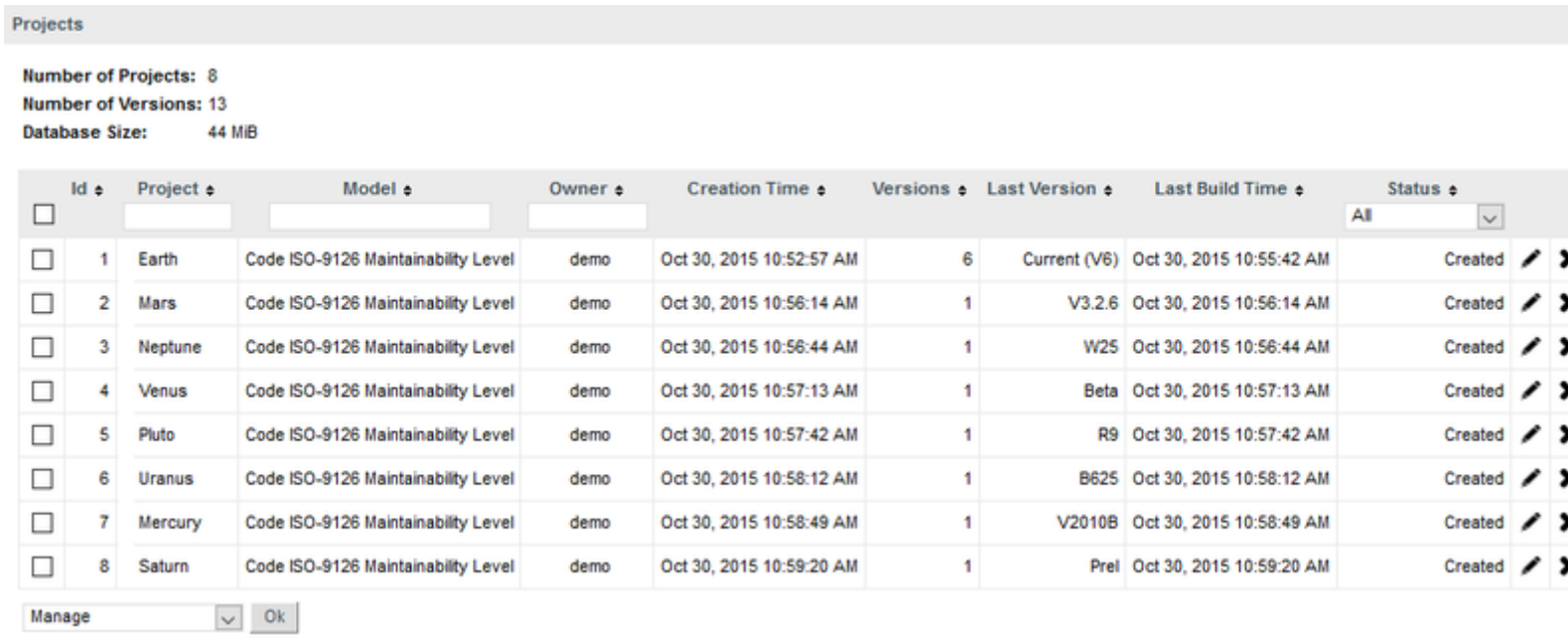
The Versions tab provides access to log files and Debug info

Clicking the **Log** icon opens a page showing the project's client and server logs, as well as configuration and output files will open in a new browser tab.

Clicking the **Download** link in the **Debug info** column downloads a zip file of the logs and project data that can be further analysed to understand problems during problem creation.

In order to investigate application failures (rather than project analysis errors), Squore administrators have the possibility to extract the latest log file created by the application. You can access the log if you have administrator privileges by clicking **Administration > Server Log** in the toolbar after logging in. The log file opens in a new browser window or tab.

Administrators can also get debug information and manage any project created on the server by clicking **Administration > Projects**, which provides a detailed view of all projects created on Squore Server, on a summary page shown below.



The project administration page for administrators

A debug info package contains the following items:

- A `DataProviders` folder containing the output files generated by each Data Provider run during the analysis.
- A `[DataProviderName].log` file for each Data Provider included in the analysis.
- A `[projectId]_conf.xml` file summarising the project parameters used for the analysis.
- A `[projectId]_output.xml` file containing the output information requested with the --filter parameter during the analysis.
- A `build.log` file containing the information relative to actions carried out on the server during the analysis.
- A `build_client.log` file containing the information relative to actions carried out on the client during the analysis.
- A `excluded.log` file containing the list of all files not included in the analysis and the reason for their exclusion. Note that this file is only generated if some files were excluded.
- A `table.md5` file containing state information about the analysed source code, if any.
- A `storage` folder containing information about the analysed source code, if any.

Tip

If you do not want to download the entire debug package, note that the main log files can also be downloaded individually from the Projects page by clicking on the project status label.

3. Accessing Squore

This chapter walks you through your first access to Squore and covers the web interface and some ways to customise it to your liking.

3.1. Understanding Profiles and Roles

Before you start working with Squore, it is essential to understand how access management works. The various permissions and privileges that can be assigned to Squore users are grouped in profiles and roles respectively. A set of default roles and profiles is available when you first start the server. You can edit them, or create more as needed.

Use this simple trick to remember the different between a profile and a role:

- A **Profile** is a set of permissions granting access to certain Squore features to a user
- A **Role** is a set of privileges for a user within a Squore project.

A Squore user with the Administrator profile can manage users, their roles and profiles. A Squore user with the Project Manager role for a project can create a new version of this project or give access to another user to this project's analysis results.

3.1.1. User Profiles

You can use profiles to grant or deny access to the following Squore features:

- **Manage Server:** Configure the server, access server logs, manage all projects.
- **Manage Users, Groups and Roles:** Complete access to user management on the server.
- **Use Capitalisation Base:** Provides access to the Capitalisation Base feature to learn from past data in order to improve your model.
- **Create Projects:** Allows users to run analyses.
- **View Models:** Allows users to use the Viewer and the Validator.
- **Modify Models:** Allows users to use the Dashboard Editor and the Analysis Model Editor.
- **Use External Tools:** View and use external tools configured by your Squore Administrator. To learn more about this feature, consult the Configuration Guide.
- **Manage Configuration:** Allows users to reload the server configuration from disk.
- **View Online Help:** Allows users to consult the online help from the web interface.
- **View User Manuals:** Allows users to consult the product documentation from the web interface.

Three profiles are available by default, with permissions set as shown below:

ge r	Manage Users, Groups and Roles	View Models	Use Capitalisation Base	Create Projects	Modify Models	Use External Tools	Manage Configuration	View Online Help
	☑	☐	☐	☐	☐	☐	☑	☑
	☐	☑	☑	☑	☑	☑	☐	☑
	☐	☐	☐	☐	☐	☐	☐	☑

Default profiles for administrators, advanced user and standard user

Note that a profile can be assigned to a user or a group of users. It is therefore possible for a user be a member of more than one profile. In this case, the user's profile is the combination of all permissions from all the profiles they are a member of.

3.1.2. User Roles

A role is the set of privileges that a user enjoys in the context of a project. You can use roles to allow users to undertake these actions within the scope of a project:

- **View Projects:** Allows a user to see a project in their project list and to browse this project's analysis results.
- **Manage Projects:** Allows a user to manage a project: rename it, create or delete versions, access project creation log files and add other user to the project team.
- **Baseline Projects:** Allows a user to create a baseline version of a project that will not be overwritten by a subsequent analysis. For more information about baselining, see Section 4.3, “Working with Draft and Baseline Versions”.
- **View Drafts of Projects:** Allows a user to view the current draft version of a project. Without this privilege, only baseline versions of a project are visible in the project portfolio. For more information about baselining, see Section 4.3, “Working with Draft and Baseline Versions”.
- **Modify Action Items:** Allows updating the status of Action Items from `TODO` to `Relaxed` for example. Without this privilege, the status is displayed as a read-only field.
- **Modify Artefacts Attributes:** Allows user to modify the value of attributes displayed in the Forms tab of the Explorer. Without this privilege, attributes are read-only.
- **View Source Code:** Allows user to click to view the source code of an artefact from any tab in the Explorer.
- **Modify Artefacts:** Allows user to add, delete, relax, exclude artefacts from the artefact tree. Users without this privilege, can still view artefacts created by others.

Five roles are available by default, with privileges assigned as shown below:

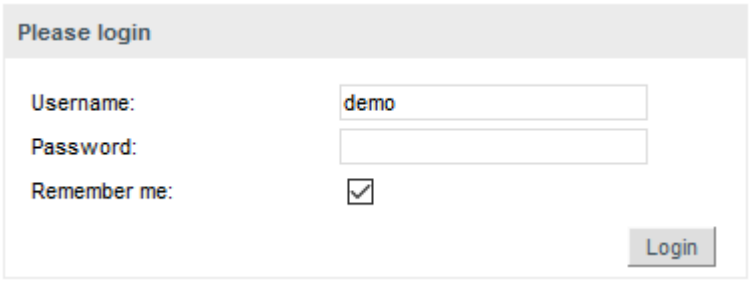
Role ▲	View Projects	Manage Projects	Baseline Projects	View Drafts of Projects	Modify Action Items	Modify Artefacts Attributes	View Source Code	Modify Artefacts
DEVELOPER	☑	☐	☐	☑	☑	☐	☑	☑
GUEST	☑	☐	☐	☐	☐	☐	☐	☐
PROJECT_MANAGER	☑	☑	☑	☑	☑	☑	☑	☑
QUALITY_ENGINEER	☑	☐	☑	☑	☐	☐	☐	☑
TESTER	☑	☐	☐	☑	☐	☑	☐	☐

Default roles available for users in Squore

Note that a user can have multiple roles in a project. This allows a user to view the dashboard in the Explorer as a user from another role would. A **View As** option in the option menu of the Explorer allows to you to switch between the various dashboards available to you. When you have multiple roles in a project, you combine privileges from all the roles that you are a member of.

3.2. How Do I log into Squore?

Your Squore installation runs on `http://localhost:8180/SQuORE_Server` by default. By accessing this page in your browser, you will be redirected to the Squore login page, as shown below:

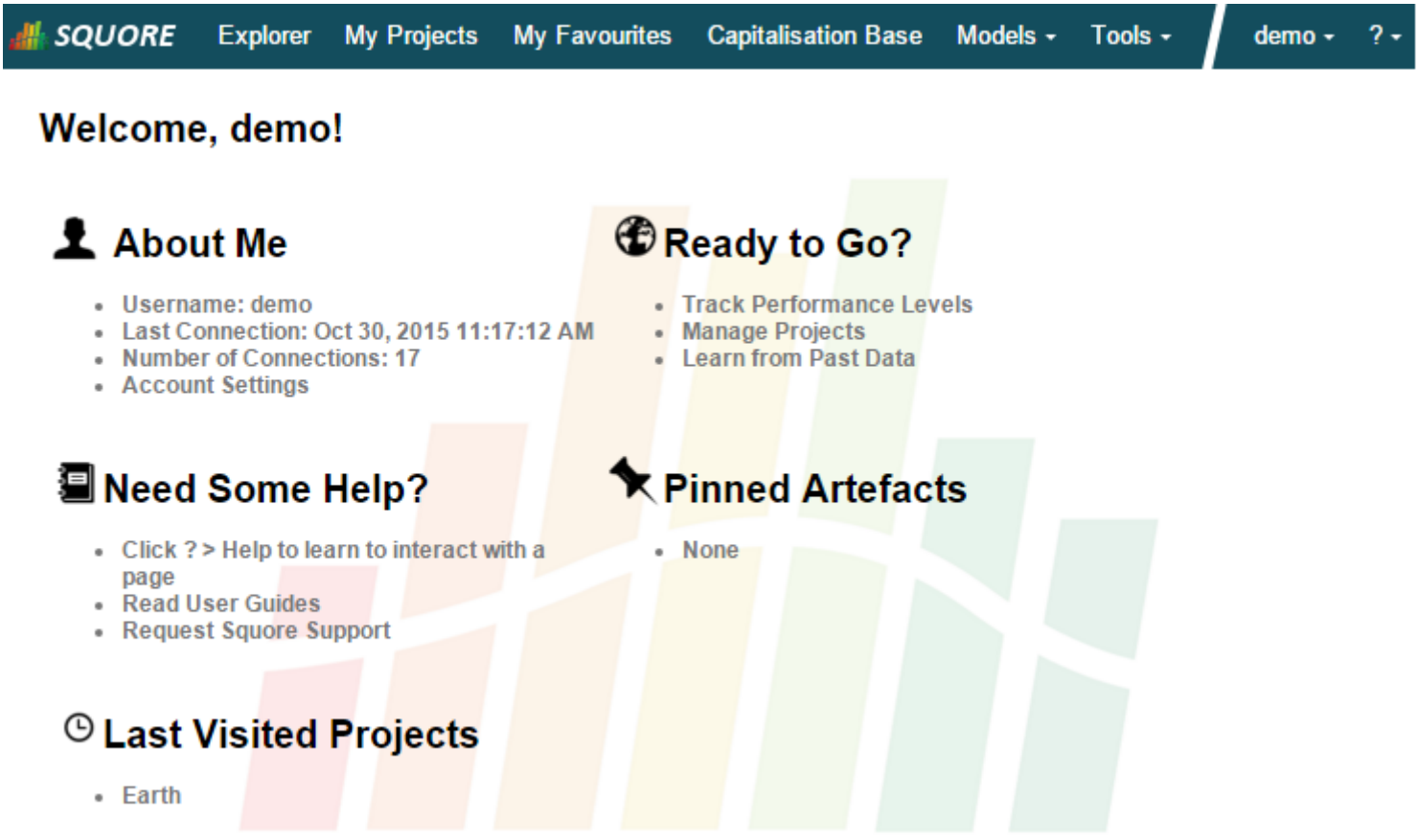


The Squore login page

Type in a username and a password and check the **Remember Me** box if you want your username to be filled-in automatically the next time you view the login page.

3.3. Where Do I Go From Here?

To begin using Squore, log in as the demo user with `demo` as username and password on the login page. Click the **Login** button and wait for the Welcome page to open.



The Squore Welcome page

From the Welcome page, you can automatically return to the last projects or favourite artefacts that you had opened in the Explorer before logging out. You can also get links to the help and other features available for your account.

As the demo user, you are an advanced user of Squore and have access to the following functionality from the toolbar:

- **Explorer**, where you can review and drill-down data for your projects.
- **My Projects**, where projects are created and managed.
- **My Favourites**, where you can view and manage your favourite charts across projects.
- **Capitalisation Base**, where aggregated statistical data can be found.
- **Models**, under which you can examine all characteristics of your model and edit your dashboards.
- **Tools**, which contains shortcuts to scripts that recreate demo projects. Note that only the `demo` user has access to this menu by default.
- **<username>**, where you can set your preferences and log out from Squore.
- **?**, where online help, user manuals and application information can be found.

Note: If you log in as an administrator of Squore using `admin` as the username and password, your will gain access to the **Administration** menu where you can configure access management and administer the server.

3.4. How Do I log out of Squore?

You can log out of Squore by clicking your user name in the menu bar and selecting the **Log Out** option. Note that if you close your browser without logging out, your session will automatically time out after two hours.

3.5. Can I Tweak the Squore Look and Feel?

3.5.1. Using a Different Theme

The Squore look and feel can be adapted to your liking, with three provided themes, accessible from the **<username>** menu option. Select one of the available colour schemes to change the color of the interface. Your changes are saved using a browser cookie.

3.5.2. User Interface Language

You can use Squore in various languages. English and French are provided by default, and your Squore administrator can add more as needed. If you want to change the language of the Squore user interface, click the **<username>** menu option and click one of the flags available. The changes are applied immediately and your preferences are saved even after you log out.

4. Creating Projects and Versions

In this chapter, you will learn about the various ways to create a project in Squore: using the UI, using a command line tool or triggering analyses in a continuous integration environment.

4.1. How Do I Create a Project in Squore?

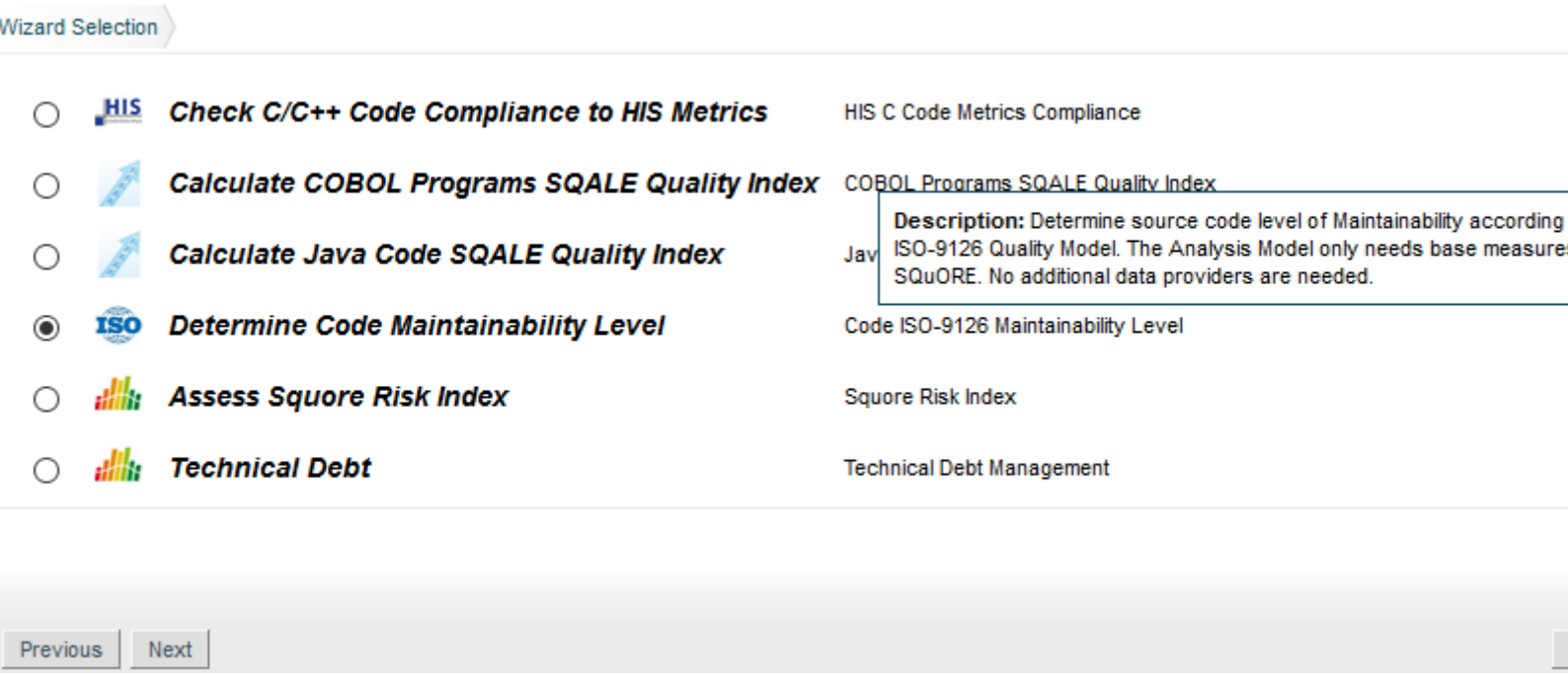
,

Creating a project in Squore is as easy as following a wizard that will prompt you for information about the source material to analyse, and the external Data Providers to add to the analysis results.

The example below assumes that the source code for the sample project used is available on a network share. The path to the source files to analyse is relative to the server.

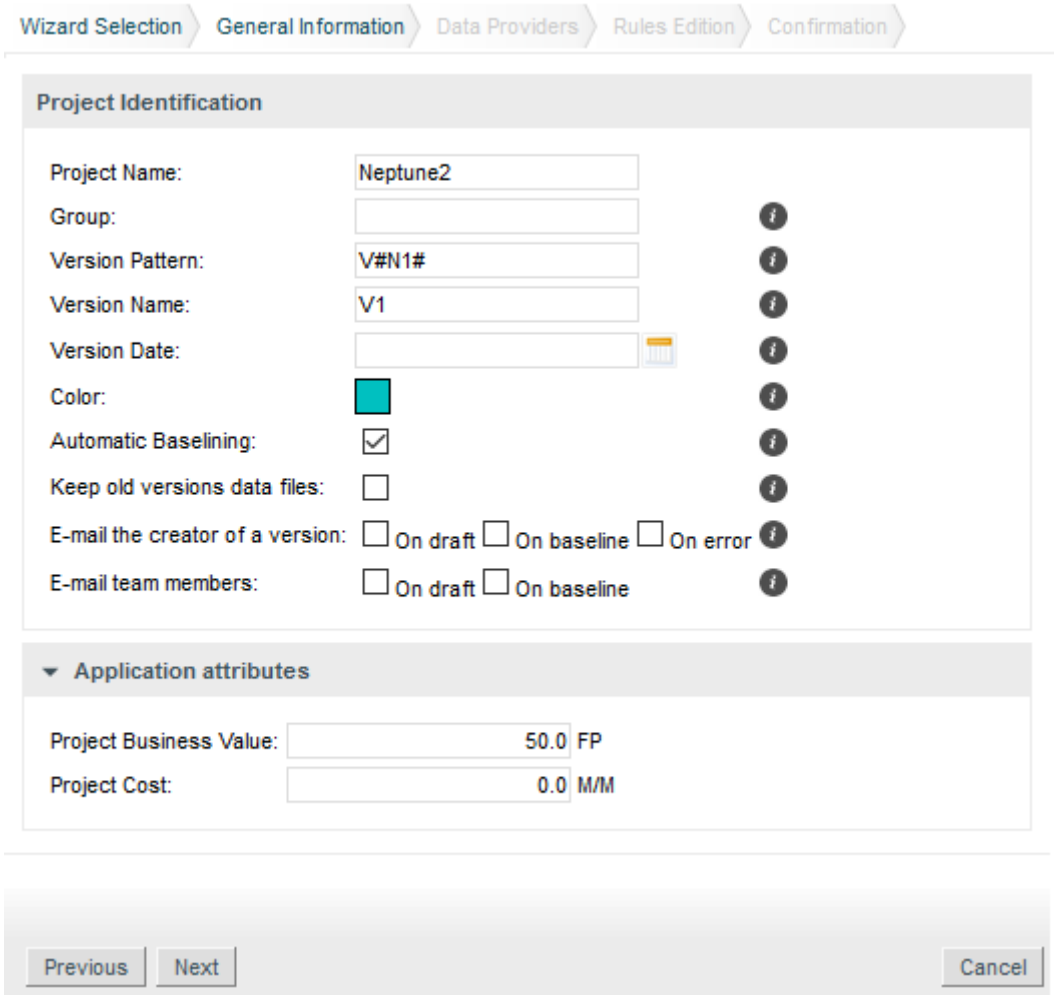
In order to create a project for the sample application Neptune2, follow these steps:

1. Access `http://localhost:8180/SQuORE_Server` in your browser. The log-in page appears.
2. Log in as the demo user with the login/password combination `demo/demo`.
3. Click the **Login** button. You are presented with the Squore home page.
4. Click **My Projects** to switch to the projects view and click **New Project...** to create the Neptune2 project. The list of available project creation wizards appears:



The Squore wizard selection screen

5. Click the **Code ISO-9126 Maintainability Level** wizard to start creating the project.
6. On the Project Identification screen, enter the information relative to your project as shown below:

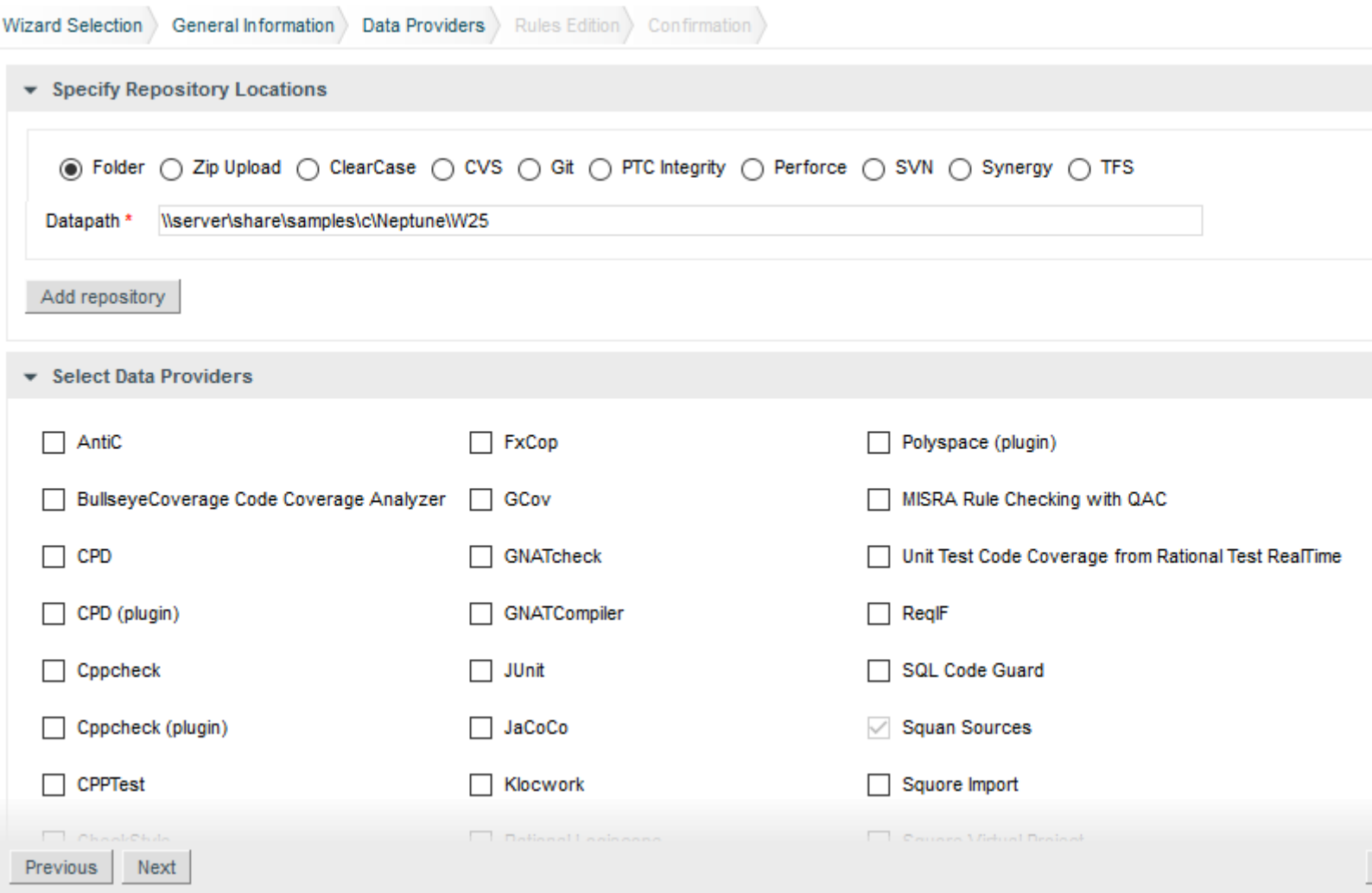


The Project Identification screen

Tip

The **Version Date** field allows specifying a custom date for the analysis, so that different analyses can be placed correctly on a timeline later for certain charts in the dashboard. If you leave it empty, then the actual time at which you are running the analysis is used.

7. Click the **Next** button. The Data Providers options screen is shown:

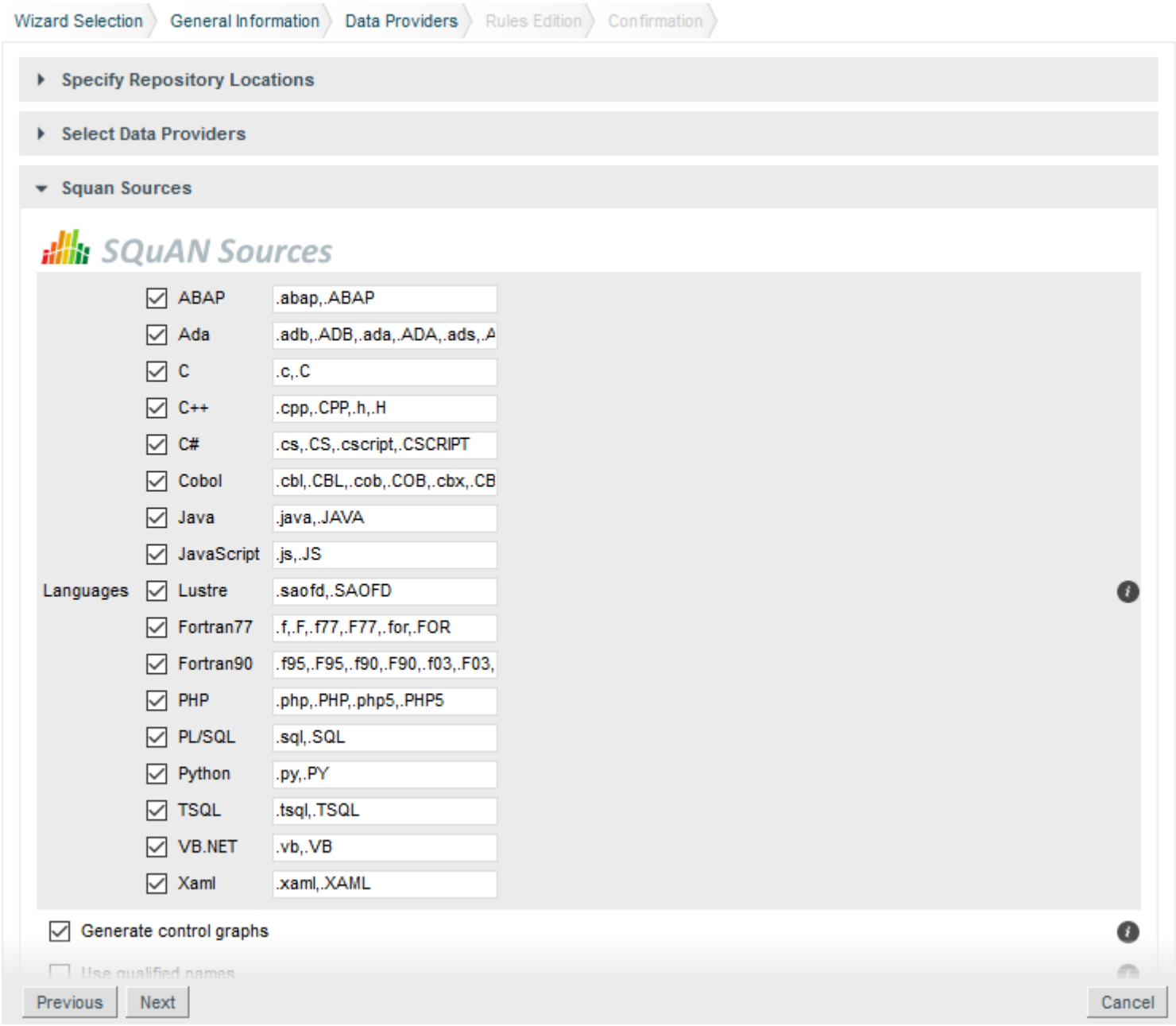


The Data Providers options screen

8. This screen allows configuring the repository locations and tools that will be used in your analysis. Set the source code files option to **Folder**. In the **Datapath** text box, type the path to the Neptune2 source code: `\\server\share\samples\c\Neptune\W25`.
The only Data Provider used in our analysis is Squan Sources, the source code analyser, so you can leave all the other tools unchecked.

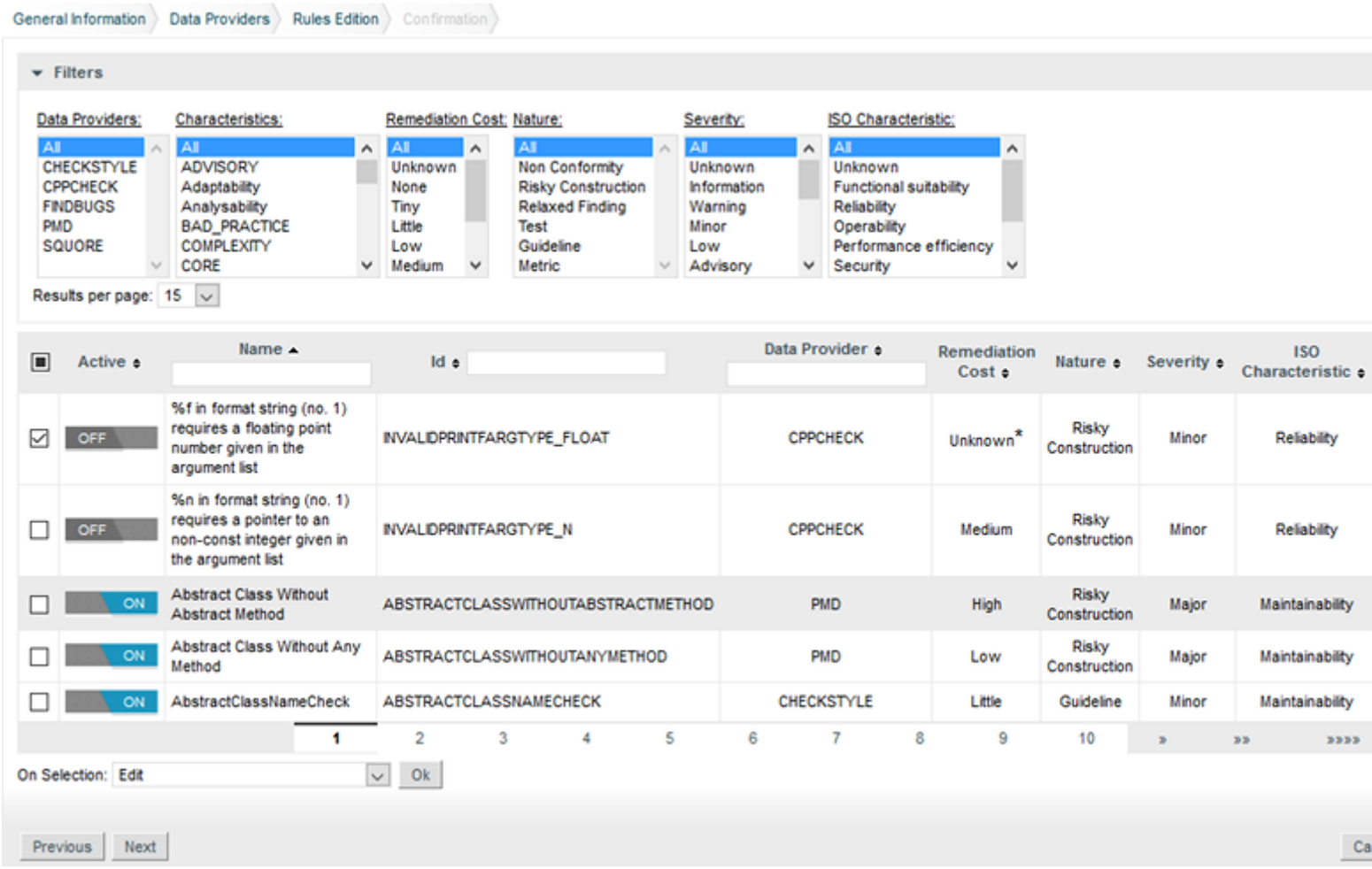
   Tip
   If you want to learn more about the available Data Providers and Repository Connectors, consult Chapter 12, *Data Providers* and Chapter 11, *Repository Connectors*.

   In the Squan Sources parameters, ensure that **C** is one of the programming languages selected, as shown below:



The Squan Sources Data Provider parameters

9. Click the **Next** button to read the Rules Edition screen. This screen allows you to tweak the ruleset available in the analysis model.



The Rules Edition screen

The table displays the entire model's ruleset, which you can filter and sort by data provider or category. Each rule can be turned on or off, and you can click the Edit button to adjust the categories for each rule. Note that any modifications from the original configuration are displayed with an asterisk.

Click the **Next** button when you are satisfied with your modifications. Note that your modifications are applied for any subsequent analysis of this project and do not affect other projects using the same model.

Note

This screen may not be enabled in your wizard, as your administrator may have disabled it in your configuration. Your administrator can also decide to make modifications to the ruleset that apply to any project created with this model using the Analysis Model Editor. Consult Section 5.3.4, “Analysis Model Editor” to learn more.

10. Before launching the analysis, a summary of your selections is displayed. Review the information and click **Run** to confirm the project creation.

Tip

The summary page lists all lists all the options you specified for the project creation and also allows outputting them in various formats so that you can repeat the project creation in command line.

For more information about reusing the project parameters in a different context, consult the online help or Section 4.5, “Can I Create a Project Via the Command Line?”.

When the project analysis completes, Squore shows you the list of projects. Neptune2 appears in the list, together with information about the current version and its computed rating:

me	Version	Rating	Analysis Model	Color	Owner	Build Time	Manage	Build	Baseline	Delete
h	*Current (V6)*	D	Code ISO-9126 Maintainability Level		demo	Oct 30, 2015 10:55:42 AM				
s	V3.2.6	D	Code ISO-9126 Maintainability Level		demo	Oct 30, 2015 10:56:14 AM				
cury	V2010B	D	Code ISO-9126 Maintainability Level		demo	Oct 30, 2015 10:58:49 AM				
tune	W25	C	Code ISO-9126 Maintainability Level		demo	Oct 30, 2015 10:56:44 AM				
tune2	V1	C	Code ISO-9126 Maintainability Level		demo	Oct 30, 2015 12:26:45 PM				
p	R9	C	Code ISO-9126 Maintainability Level		demo	Oct 30, 2015 10:57:42 AM				
rn	Prel	D	Code ISO-9126 Maintainability Level		demo	Oct 30, 2015 10:59:20 AM				
nus	B625	D	Code ISO-9126 Maintainability Level		demo	Oct 30, 2015 10:58:12 AM				
us	Beta	A	Code ISO-9126 Maintainability Level		demo	Oct 30, 2015 10:57:13 AM				

The projects list

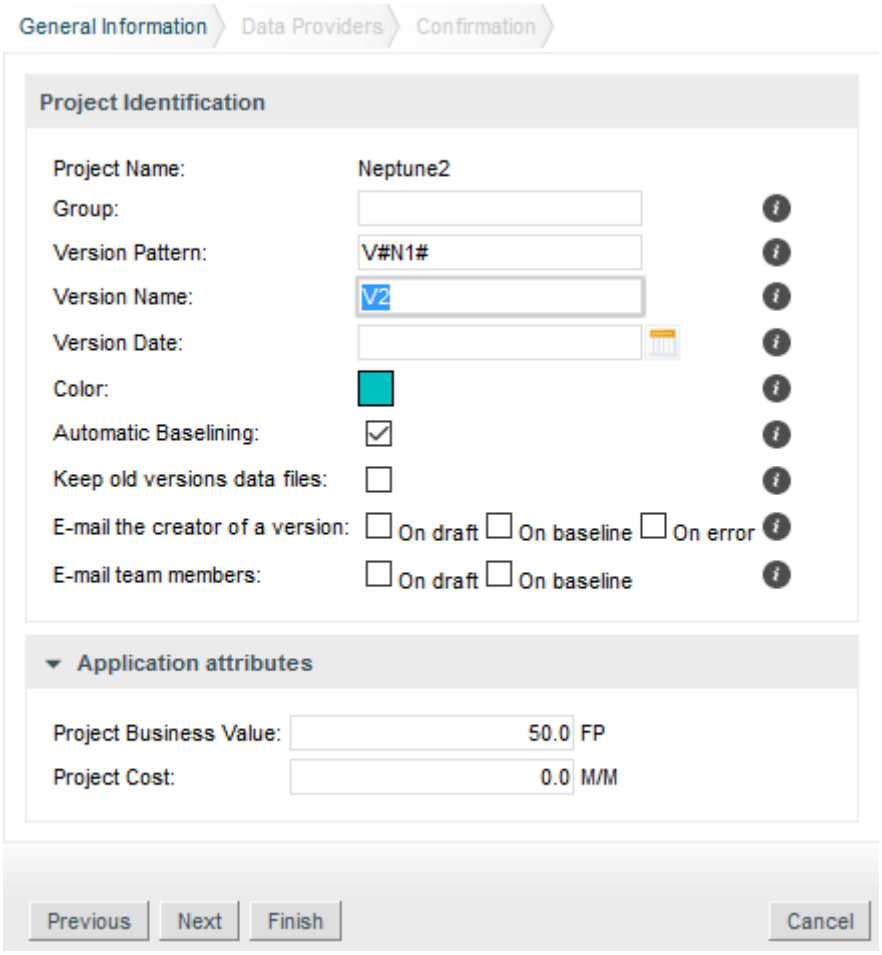
To consult the results of the analysis, click on the project name to view the Squore Dashboard. More information on how to read the Dashboard is available in Section 4.9, “Where Are My Analysis Results?”.

4.2. Creating Version 2 of My Project

Adding a version to an already-existing project is a simple procedure that is carried out from the **My Projects** page.

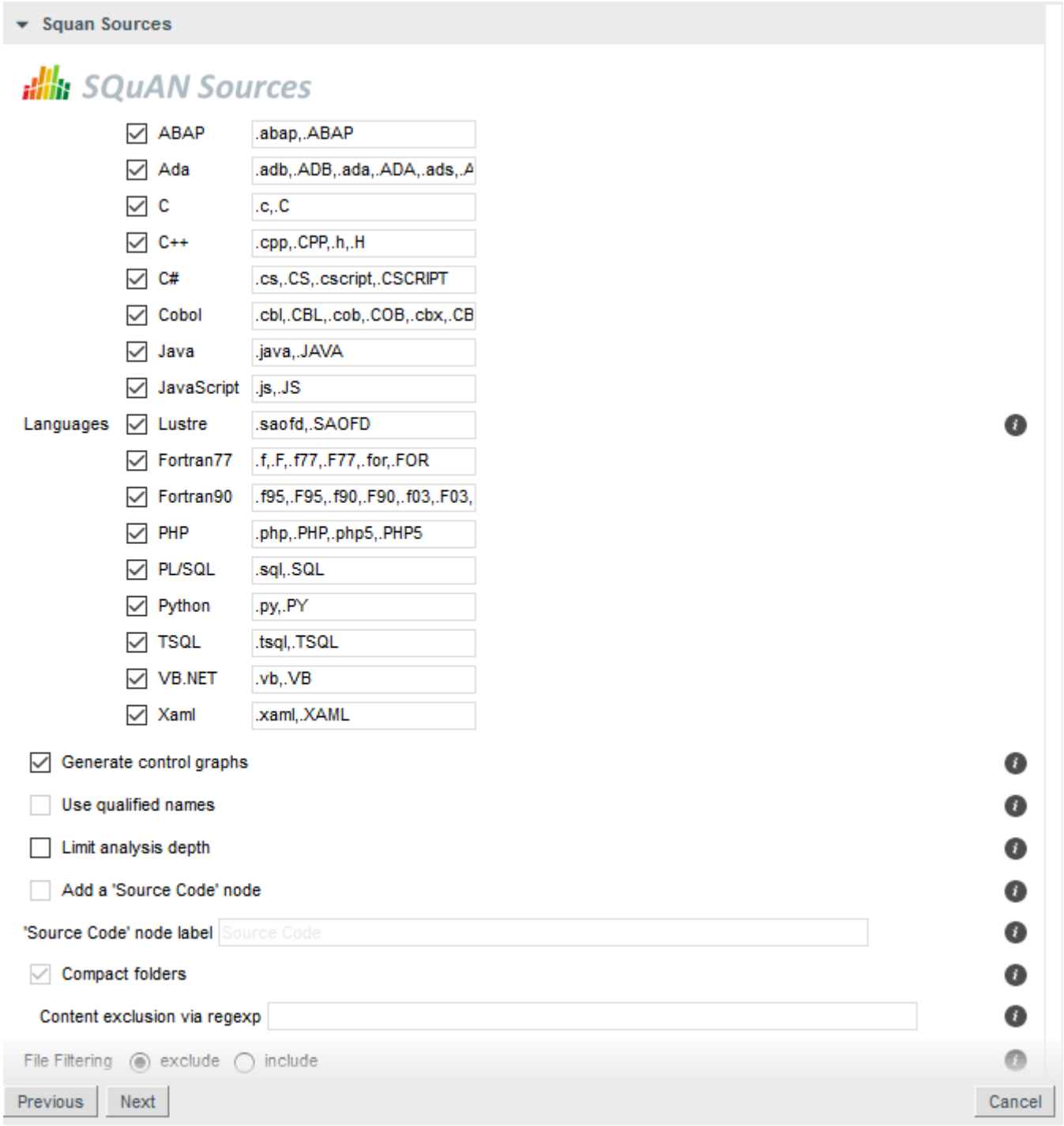
Follow these steps to create version 2 of your project:

1. After logging into Squore, click on **My Projects**.
2. Click the **Build** icon ( ) for the Neptune2 project in order to access the source code file options.
3. The first screen of the wizard enables you to specify the version name and to modify some of the project attributes if necessary.



Parameters For the New Version of Neptune2

4. Click the **Next** button to reach the project language and source settings screen. On this screen, you can modify the path to the source code and point to the newer version. Note that by default, Squore displays the path used when analysing the last version. Leave the path as it was for version 1. We are going to create a version that analyses the same code in this example. If you scroll down to the code analysis option, you will notice that some of them are now disabled. This is because the project configuration was set in version 1 and is not allowed to be modified in subsequent analyses. This ensures that your project is scored using the same criteria every time you analyse new code.



Unavailable options when creating version 2 of a project

Note: You can add new sources to the project at this stage if needed. Read more about projects using sources spread over multiple locations in Section 4.8, “Can I Create Projects with Sources From Multiple Locations?”.

5. Click the **Next** button and **Run** to launch the analysis of Neptune2 V2. When the analysis finishes, Neptune2 V2 will be listed in the list of projects on the Projects page.

4.3. Working with Draft and Baseline Versions

This section covers an essential workflow feature of Squore: baselining. While it is possible to keep every version of a project created in Squore, you may want to permanently keep analysis results only for particular milestones and work with an always updating draft version.

You can decide whether a version is a draft or a baseline when you create it, or after the analysis is finished.

4.3.1. Drafts vs. Baseline: The Basic Concepts

The most important thing to remember about a draft version is that it is a snapshot of your data at a given time. You can use it to compare the evolution of your project against the last baseline created. There is therefore only one draft version available per project (the latest version), which Squore creates automatically if your previous version was a baseline. A baseline version, on the other hand, is permanently saved and will not be overwritten the next time an analysis is launched.

When you create a draft version, it is always called Current and can be modified in several ways:

- Forms can be updated
- Attribute values can be modified so that a new value is taken into account in the next analysis
- Artefacts can be manually added, modified or deleted
- Components can be relaxed or removed from the project
- Action Items can have their status changed

Being able to view draft versions of a project is a user privilege that can be granted to users of a particular role, and so is the ability to baseline a project. For more information about roles, refer to Section 3.1, “Understanding Profiles and Roles”. This means that as a project manager, you can give access to every version to users within your team, but can restrict the project visibility to the rest of the company to show them only milestone versions (the ones you baselined). You can also decide which members of your team are allowed to change the status of a version from draft to baseline.

4.3.2. Baselining at Version Creation

Use the Automatic Baselining option on the General Information screen of the project creation wizard to create a draft or baseline as follows:

- When the Automatic Baselining box is unchecked, a draft version is created and all subsequent versions will be draft versions.
- When the Automatic Baselining box is checked, a baseline version is created and all subsequent versions will be baseline versions.

4.3.3. Baselining After Review

You can use the Baseline option on the My Projects page to create a baseline version of the current draft as follows:

1. Log into Squore and click on **My Projects**.
2. Click the Baseline icon ( ) next to the project you want to baseline.
3. Click the **Baseline** button to confirm.

After confirming the baseline creation, you are redirected to the My Projects page and the last draft version becomes the new latest baseline. Note that baselining is only available for users whose role allows the

Baseline Projects privilege. For more information about roles, consult Section 3.1, “Understanding Profiles and Roles”

> **Tip**
> No new analysis is run when you baseline manually. Baselining manually allows to save the modifications made to a draft, but only a full analysis with the Automatic Baselining checkbox selected ensures that all the modifications made to the draft are fully taken into account in the final project rating.

4.4. Can I Make Changes to My Project?

There are three types of changes you can make to Squore projects:

- Changes to attribute values
- Changes to source code locations
- Changes to some of the Data Provider options

Project attributes are always editable when creating a new version of a project, except for the name of the project.

The location of the source code can always be modified. When editing a project, you can also add more source locations as needed, following the steps described in Section 4.8, “Can I Create Projects with Sources From Multiple Locations?”.

Whether you can edit the settings used in the Data Providers for the project depends on their ability to support edits. This ability is defined by a Squore administrator via the configuration of the Squore wizards. For more information, refer to the Squore Configuration Guide.

4.5. Can I Create a Project Via the Command Line?

Instead of creating a project from the Squore web interface, you can create a project directly from the command line using Squore CLI. Squore CLI is a client for Squore that enables you to create and analyse projects locally and send the results to Squore Server. Alternatively, you can use Squore CLI to instruct Squore Server to carry out the analysis.

If you have installed Squore CLI on your computer, you can call it using Java, passing the parameters you would have passed in the web interface to create projects. The following is an example of the command line you can use to create a project using Squore CLI on Windows:

```
@echo off
java -Dsquore.home.dir="%SQUORE_HOME%" ^
-jar %SQUORE_HOME%\lib\squore-engine.jar ^
--url=http://localhost:8180/SQuORE_Server ^
--commands=DELEGATE_CREATION ^
--name=Mars2 ^
--repository "type=FROMPATH,path=\\server\share\samples\c\Mars2\V3.2.6" ^
--color=rgb(103,25,237) ^
--tag BV=30 ^
--tag COST=50 ^
--version=1.0 ^
--login=demo ^
--password=demo ^
--filter=APPLICATION,MEASURE,LEVEL ^
--wizardId="ISO9126" ^
--dp "type=SQuORE,genAs=true,clAlg=true,languages=c:.c,.h;"
```

```
echo done
pause
```

The example above shows how to specify commands, parameters and project options to Squore CLI. This would create a project named **Mars2** in version **1.0**, analysing source code located in **\\server\share\samples \c\Mars2\V3.2.6** with the Data Provider **SQuORE** (the internal name for Squan Sources).

You can find more information about using Squore CLI in the Command Line Interface manual, which explains how to install the client and create projects.

4.6. How Do I Connect Squore to My Continuous Integration System?

If you use a Continuous Integration tool like Jenkins or CruiseControl, you can add Squore to your build process and analyse projects every time your code is compiled. This requires the installation of Squore CLI on the continuous integration server, and is therefore described in greater details in the Command Line Interface Manual.

4.7. Can Squore Pull Source From My Version Control System?

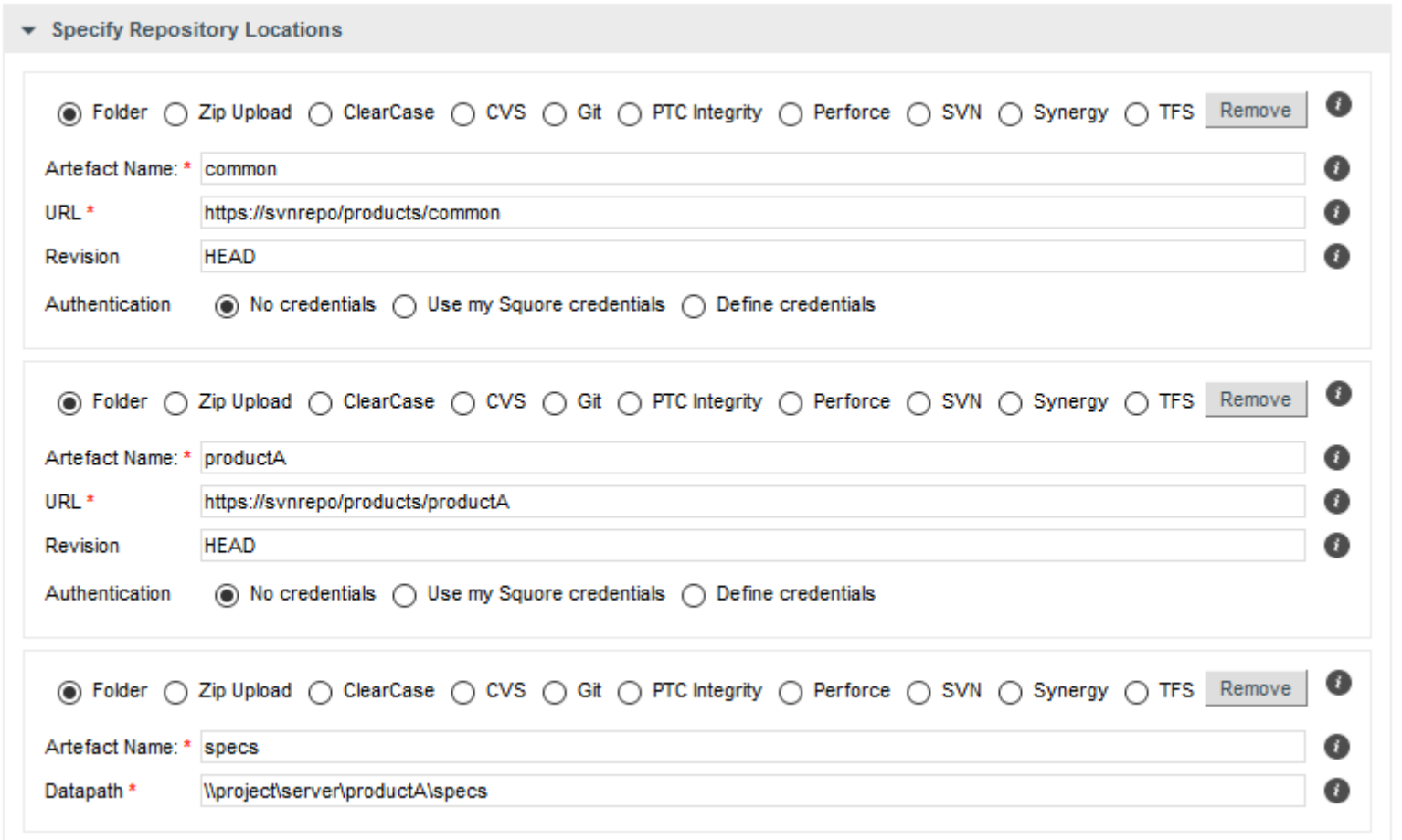
The source code analysed by Squore does not have to be located on the same machine as Squore Server or Squore CLI. When you create a project, you get the option to choose from a range of Repository Connectors to pull source code from:

- Direct file system access (local drive, network share, mass storage media...)
- Zip upload
- A ClearCase view
- A CVS checkout
- Git cloning
- An Integrity repository
- A Perforce depot
- A Subversion revision
- A Synergy database
- A TFS server

Each option requires different parameters, which can be specified from the project wizard, or via the command line. For more information, refer to Chapter 11, *Repository Connectors*.

4.8. Can I Create Projects with Sources From Multiple Locations?

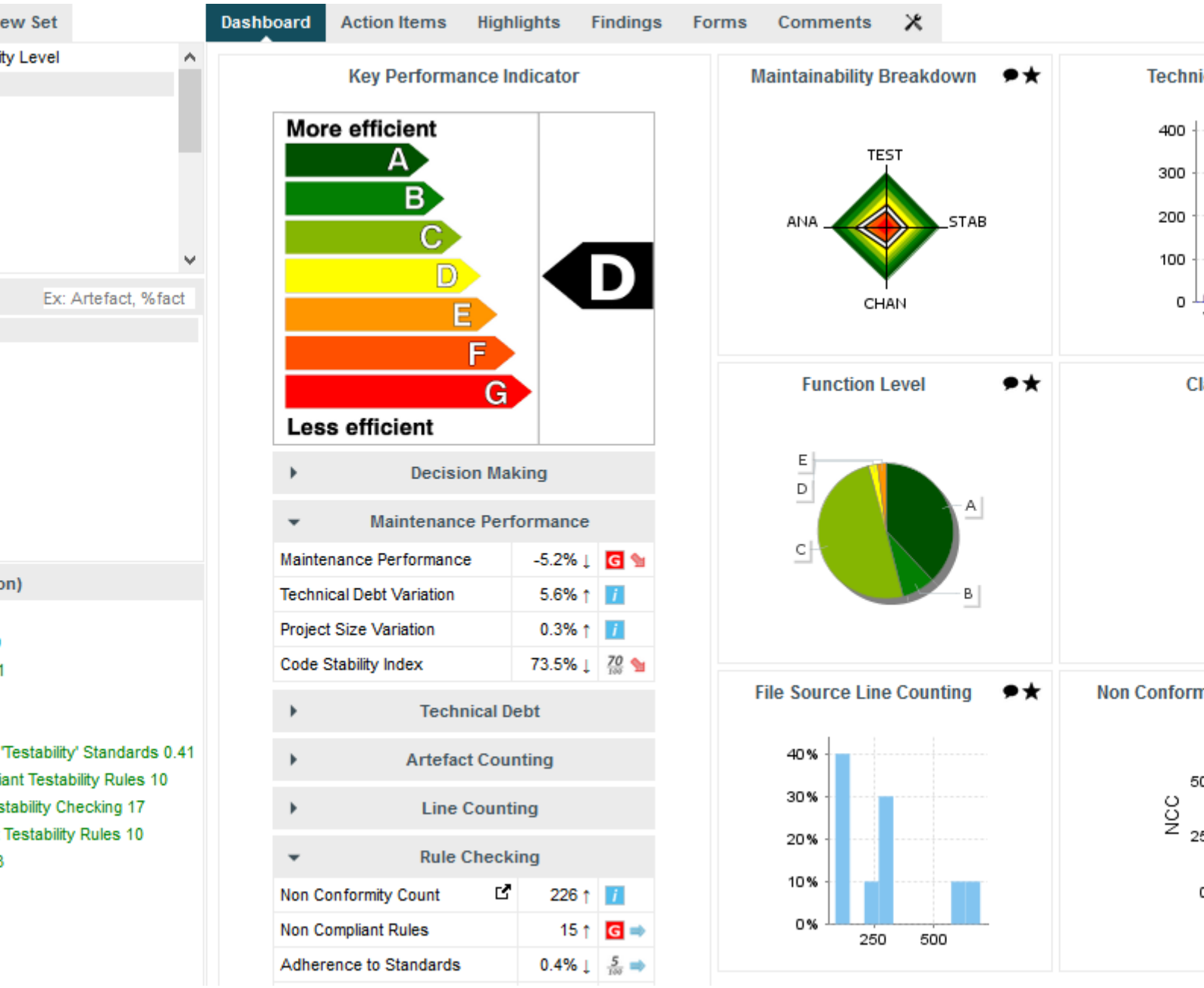
Squore provides support for analysing projects whose sources are spread over several locations or version control systems. If your source code resides in `/products/common` and `/projects/myproject`, you can specify these two locations in the Squore project wizard by clicking the **Add Repository** button. Similarly, if some of your code is managed by a SVN repository and the rest is handled by a Git server, you can configure both locations as part of the same project, as shown below:



A project using sources from two SVN repositories and a network drive

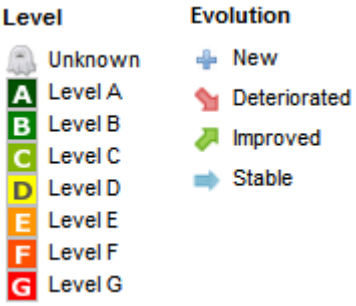
4.9. Where Are My Analysis Results?

Now that you have created a project, you are ready to start reviewing the analysis results in the main section of Squore, the Explorer, which consists of a set of trees for browsing through project artefacts and various dashboards to display the information associated with these artefacts.



The Squore Explorer

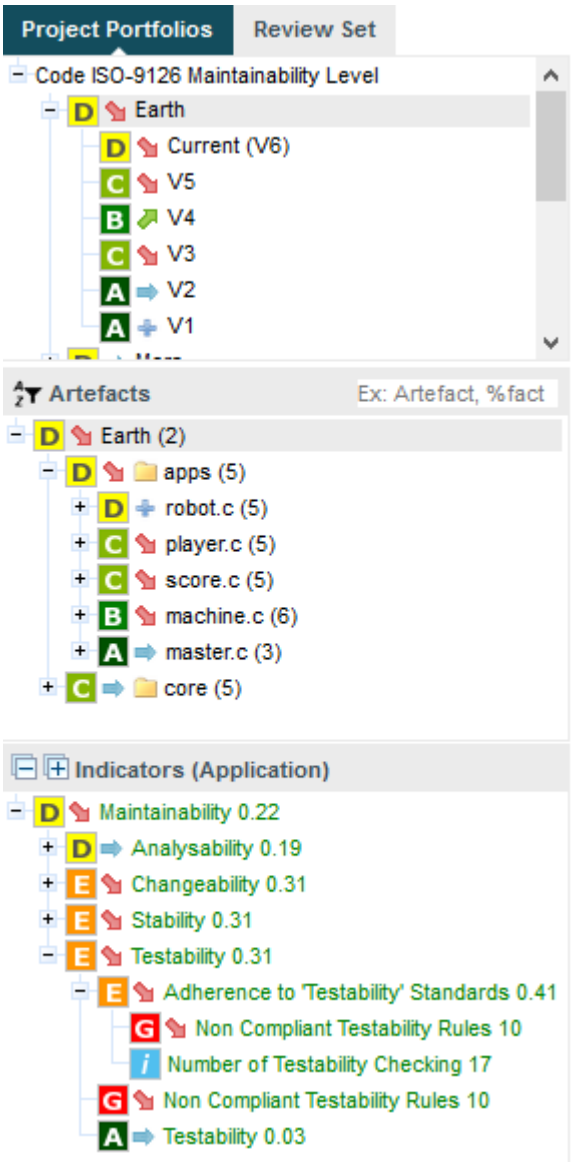
Common icons are used throughout the explorer to indicate the rating of a component and its evolution compared to the previous version. The image below shows the meaning of the different icons used:



The Squore Explorer icons

4.9.1. The Tree Pane

The left-hand part of the Explorer is a three-panel section containing expandable trees.

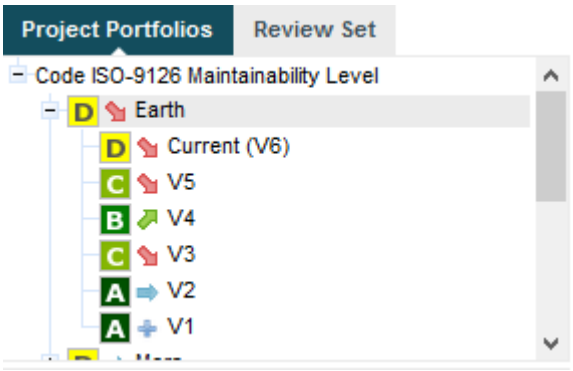


The Tree Pane

The top panel contains the **Project Portfolios** and the **Review Set**.

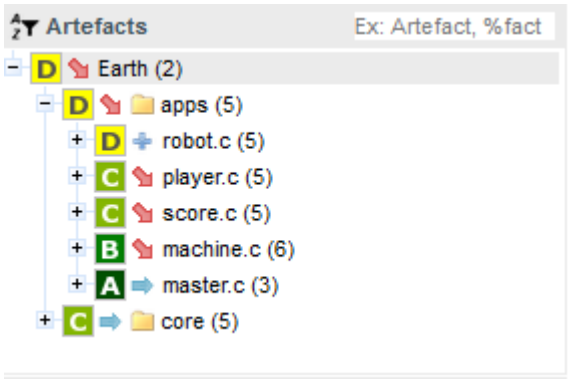
The Project Portfolios is a list of all the projects you have access to, grouped by analysis model. Each project is listed with its latest rating and evolution and can be expanded to show all versions of the project that were analysed with Squore.

The Review Set is a flat list of artefacts you collect from various projects in order to review them. This list is saved when you log out and log into Squore again.



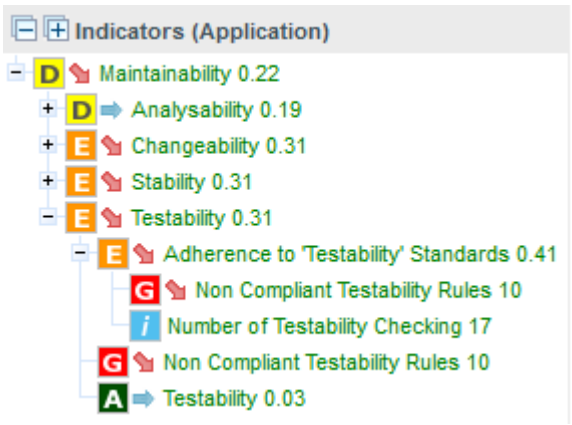
The expanded Earth project, rated D, and its 6 versions in the Project Portfolios

The tree in the middle panel is the **Artefact Tree** . When Squore analyses a project, it breaks it down into artefacts of various configurable types, for example APPLICATION, PROGRAM, FOLDER, FILE, CLASS or FUNCTION, according to the analysis model used. The artefacts in the tree are displayed for the version selected in the Project Portfolios. clicking a different version of a project refreshes the artefact tree with the ratings for the version just selected. Above the artefact tree are tools for filtering, pinning, sorting and searching artefacts. Each artefact is displayed with its current rating and can be expanded to reveal child artefacts if available. The number in brackets indicates the amount of child artefacts for the current artefact. You will learn about these tools later in Section 5.1, “Has the Quality of My Project Decreased Since the Previous Analysis?” and Section 5.2, “How Do I Find and Keep Track of Artefacts?”.



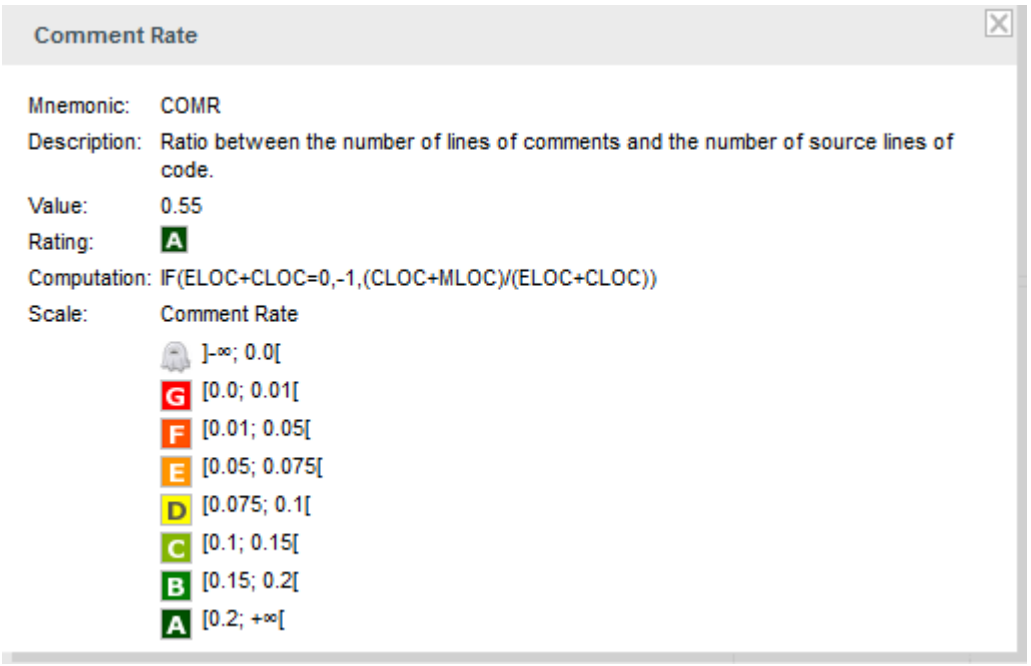
The Artefact Tree for version 6 of the Earth project

The bottom panel is the **Indicator Tree** , in which ratings for the indicators defined in the analysis model at the current level are displayed. Each indicator can be expanded to display the rating of each of its sub-indicators. The Indicator Tree displays statistics for the artefact currently selected in the Artefact Tree and refreshes when the selection is changed. The type of artefact selected in indicated in brackets. Two shortcut buttons can be found above the top node to quickly expand and collapse the entire tree.



The partly expanded Indicator Tree for version 6 of the Earth project at Application level

Clicking one of the tree nodes reveals more information about the indicator, including the formula used by Squore to compute its value and rating.

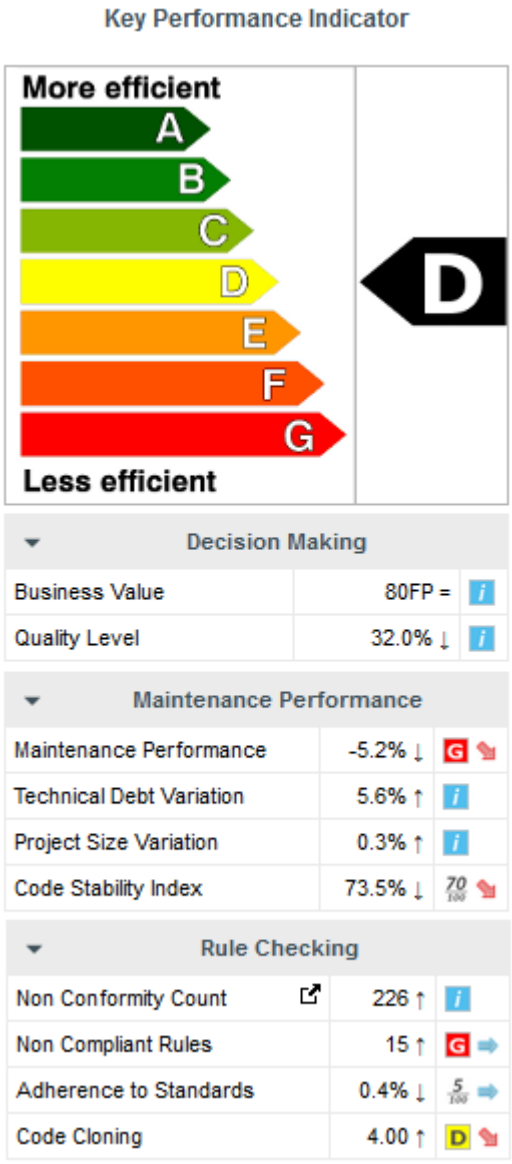


The popup displayed when clicking the Comment Rate indicator for a function

4.9.2. The Dashboards

The right-hand side of the Squore Explorer contains a series of tabs, the first of which is the Dashboard. The Dashboard is dynamic and always displays information about the artefact currently selected in the artefact tree. There is not one Dashboard, but a Dashboard per node in the tree. Additionally, the Dashboard can be customised by a Squore administrator so that users see a different Dashboard according to their role in a project, thus highlighting different information for project managers, quality engineers and developers for example. Ask your Squore administrator about Dashboard customisation, or refer to the Squore Configuration Guide for more information.

The left-hand area of the Dashboard contains the score card , which consists of a graphical representation of the key performance indicator for the current artefact, and some tables highlighting key metrics about the project.



The score card area

Each table lines display a series of details about the key performance indicator:

- The name of the metric (e.g. **Maintenance Performance**). When clicked, a popup shows the way the metric is computed. Optionally, some metrics may allow an extra link to be displayed. This link shows the list of findings taken into account when calculating this metric (See **Non Conformity Count**).
- The raw value of the metric and its evolution according to the previous version (e.g. **-5.2% ↓**). Clicking a value ion this column displays a chart of the history of the last 10 values recorded for this metric.

- If the metric displayed is an indicator, the rating of the indicator is displayed, along with its evolution (e.g. **Level G, deteriorated**). If the metric is a measure, then an information icon is shown. In both cases, you can click the information in this column to display more details about how the metric is computed.

The right-hand area of the Dashboard contains a series of charts representing key information about the current artefact. Clicking a graph opens a larger version of the image so you can analyse the data. Note that the available charts will differ depending on the type of artefact selected in the tree. Files and functions for example include a **Source Code** chart (for users who have the privilege to browse source code), which does not appear in the Dashboard for folders and applications.

The charts area

The Dashboard is only the first of a series of tabs in the Explorer. In the following chapter, you will find out more about the role of the **Action Items**, **Highlights**, **Findings**, **Forms**, **Reports**, **Indicators**, **Measures** and **Comments** tabs. Note however that like the Dashboard, the information displayed in each tab is always relative to the node currently selected in the Artefact Tree.

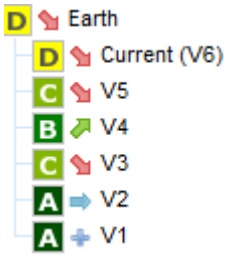
5. Understanding Analysis Results

This chapter covers a list of Squore use cases for various features of the Explorer. By the end of the chapter, you should be able to make the most of the information and decisions presented by Squore and start applying them to improve your development practices.

5.1. Has the Quality of My Project Decreased Since the Previous Analysis?

After completing the analysis of a new version of your project, you will probably want to investigate how it has evolved, more specifically for which artefacts the quality has decreased. Let's look at the current version of the Earth Project (which should be available if your Squore administrator has created the sample projects shipped with the Squore installation) to find out how to spot the worst-scored components in your project.

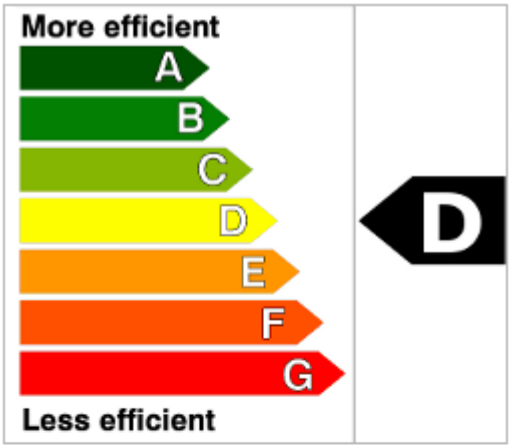
Log into Squore as the demo user using `demo/demo` and observe the evolution of the Earth project in the Project Portfolios:



The versions of the Earth Project

The downward arrow before the project name in the the Project Portfolios indicate that the quality of the last version decreased. By expanding the Earth project to show the version history, you learn that the quality of the current version decreased compared to V5, which itself was worse than V4. (More information about the quality indicator icons is available in Section 4.9, “Where Are My Analysis Results?”.)

You can start evaluating the version by looking at the score card, which rates Earth at D. Some values under **Artefact Counting**, **Line Counting** and **Rule Checking** explain the lower score: the application contains more files and functions, more lines of code, less comments and more rules violations.

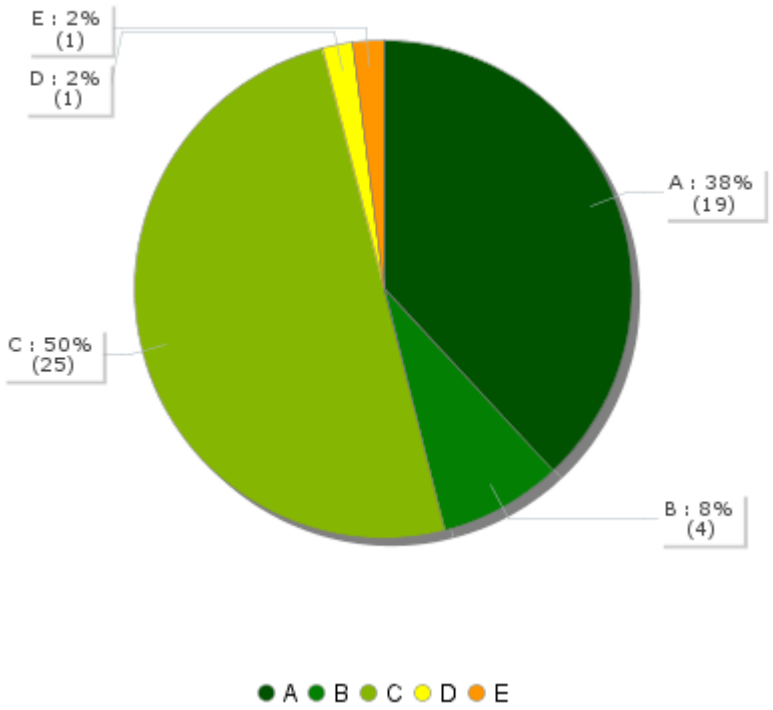


▸ Decision Making		
▸ Maintenance Performance		
▸ Technical Debt		
▾ Artefact Counting		
Source Files	10 ↑	i
▾ Line Counting		
Line Count	2,807 ↑	i
Source Lines Of Code	2,028 ↑	i
Effective Lines Of Code	1,531 ↑	i
Executable Statements	1,476 ↑	i
Cyclomatic Complexity	453 ↑	i
▾ Rule Checking		
Non Conformity Count	226 ↑	i
Non Compliant Rules	15 ↑	G
Adherence to Standards	0.4% ↓	
Code Cloning	4.00 ↑	D

The score card for the current version of Earth

By now you probably want to find out which components in your project are responsible for lowering the score of the application in this version. If you want the Artefact Tree to reflect this information, you can change the sort order to show the worst scores first by clicking on the **sort** icon () and selecting **LEVEL > Worst first** to display artefacts from worst-scored to best-scored.

The Function Maintainability Level chart is a good place to begin to understand how bad some of the components in your project are affecting the overall score.



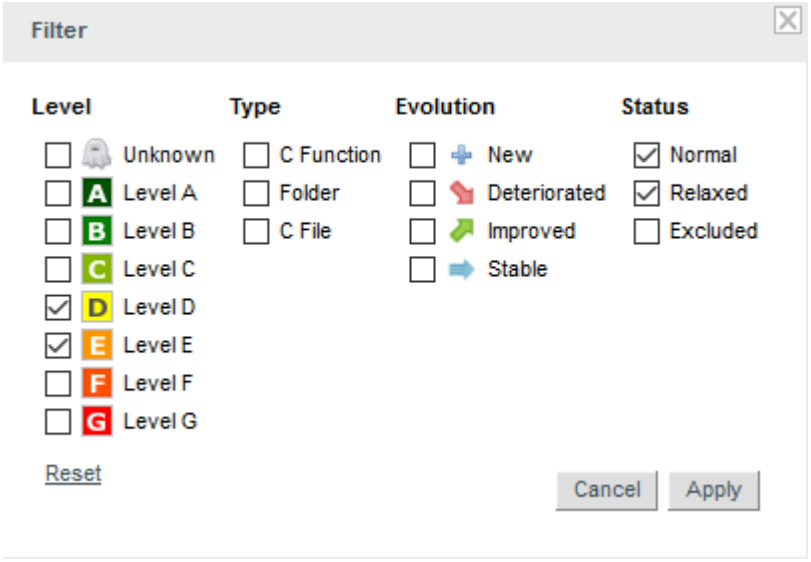
The Function Maintainability Level chart

From the chart above, you can read that 4% of all functions are rated E or F. It is a good idea to go look for these functions in the Artefact Tree and see what is wrong with them. There are several ways to do this: via filtering and Searching, or using the Highlights feature.

5.1.1. Finding Artefacts Using Filters and Search

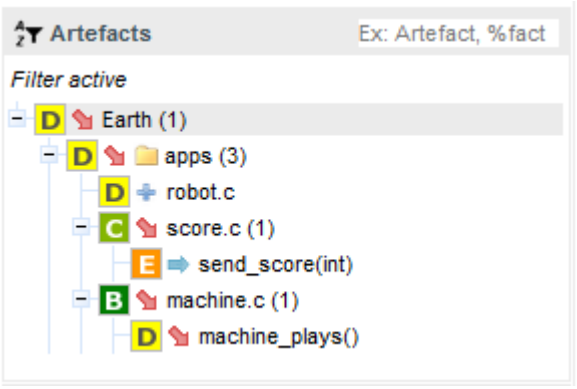
In this section, you will learn to look for artefacts the hard way by using filters and search. For a more automated way to find artefact that fit a specific category, take a look at Section 5.1.2, “Finding Artefacts Using Highlights”.

Click the Filter icon ( ) above the Artefact Tree to show the filter options and select only the levels E and F:



The filter popup with the boxes checked to filter artefacts rated E or F

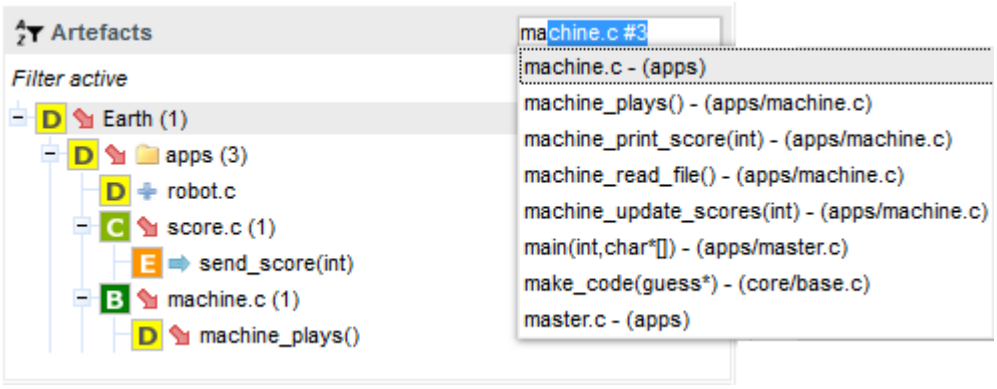
Click **Apply** to apply the changes, and the Artefact Tree should refresh to show only artefacts in the levels selected, as shown below:



The filtered Artefact Tree showing artefacts rated E or F

The notice **Filter active** is always displayed above the Artefact Tree when you are using a filter. The tree now only shows artefacts rated E or F, along with their ancestors (i.e. their parents and their parents' parents), even though the ancestors may not be rated E or F.

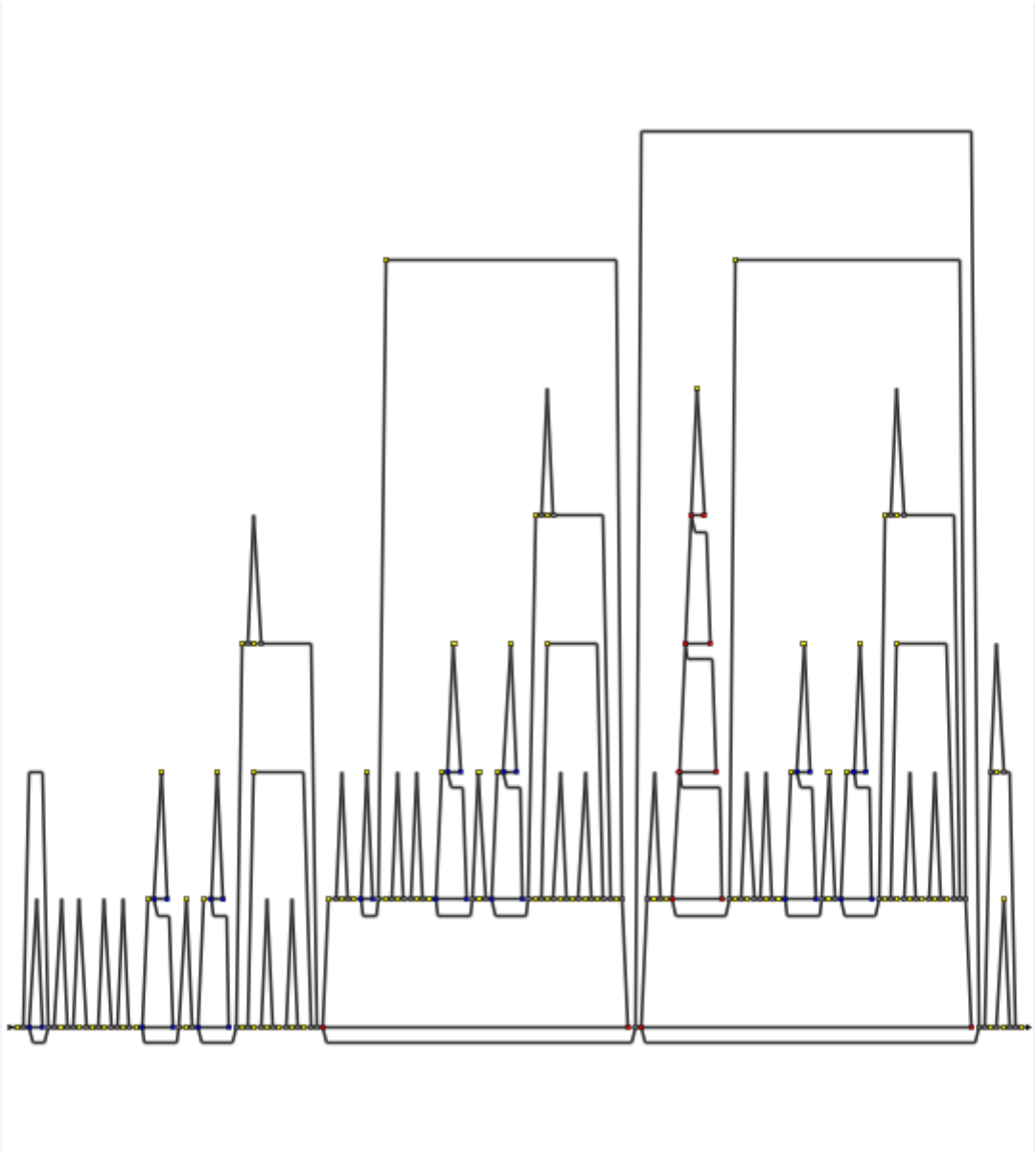
While a filter is active, you can still search for other artefacts by typing a search term in the search box. Try typing **ma** in the search box above the Artefact Tree, and watch the search results list get populated as you type:



The search results for the term entered in the search box

If you select the first search result in the list above, you will open the dashboard for `machine.c`.

Let's go back to our filtered tree. The filter singled out two artefacts with the required score range: `machine_plays()` and `send_score(int)`. The function machine_plays() deteriorated in version 6. Click on the function `machine_plays()` to view its dashboard. Note how the score card indicates that the cyclomatic complexity, non-conformity count and non-compliance to rules have all gone up. Now click on the Control Flow Chart, to see the function's complexity.

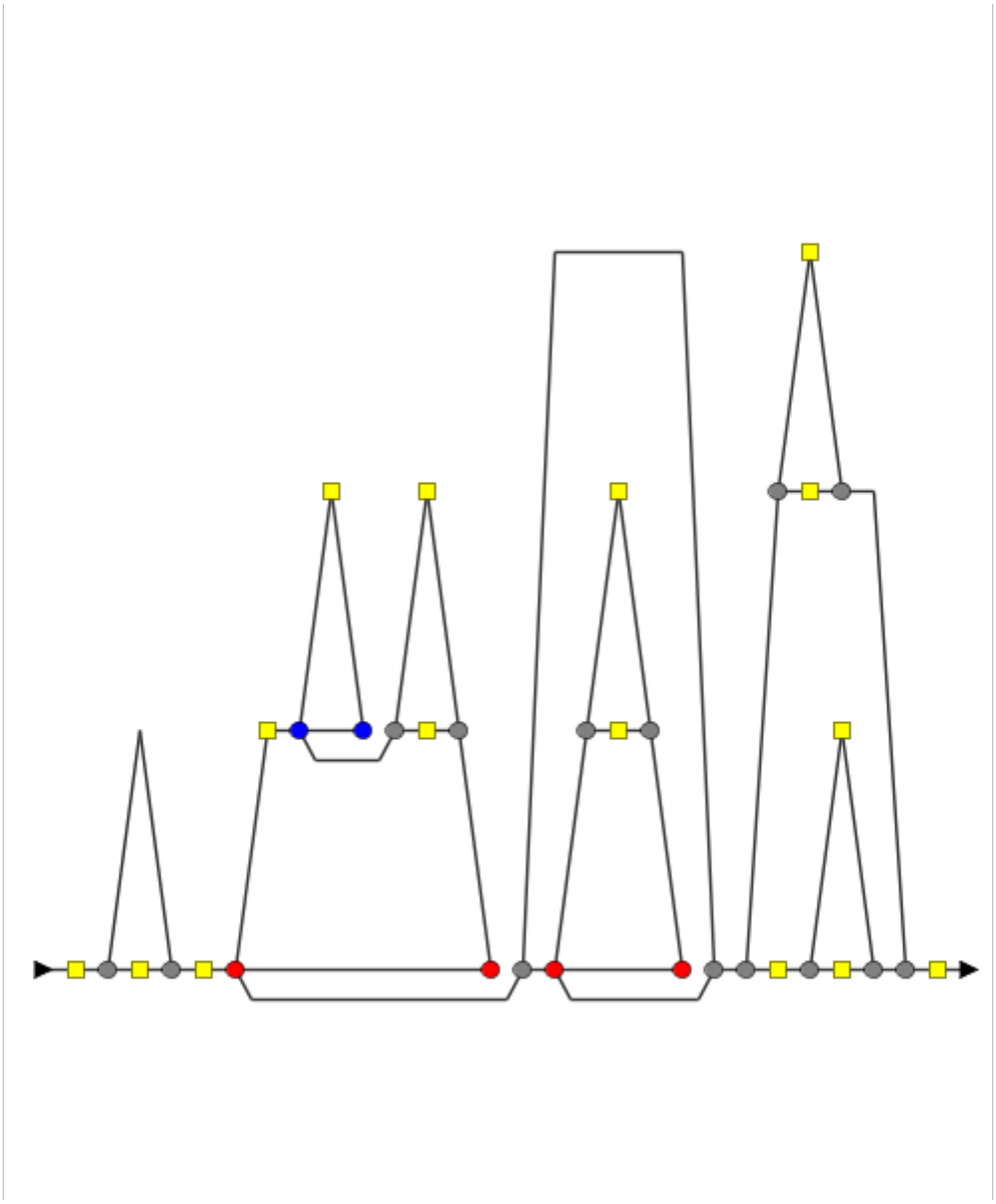


The Control Flow Chart for machine_plays()

The Control Flow Chart is a graphical representation of the way the code of a function can be executed. The line representing the entry into the function starts on the left and branches every time it reaches a logical operator, represented on the chart as described below:

- Gray circle: If, End If
- Blue circle: While, End While, Do, End Do and GOTO
- Red circle: For, Foreach, End For, End Foreach and Return
- Pink circle: Switch, End switch, Try, End Try, Catch, End Catch, Finally, End Finally
- Green circle: Break, Continue
- Yellow rectangle: Statement

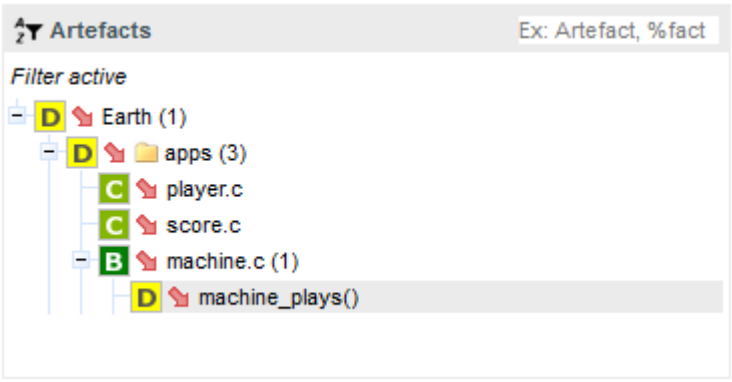
More importantly, you can compare this version's Control Flow chart with the one generated for the previous analysis of the Earth project. Click on V5 in the the Project Portfolios and watch the dashboard refresh to show the analysis results for version 5. Observe how much simpler the control graph is for this version:



The Control Flow graph for version 5 of machine_plays()

Another convenient way to try and find why a project's quality is deteriorating is to filter on the evolution of an artefact.

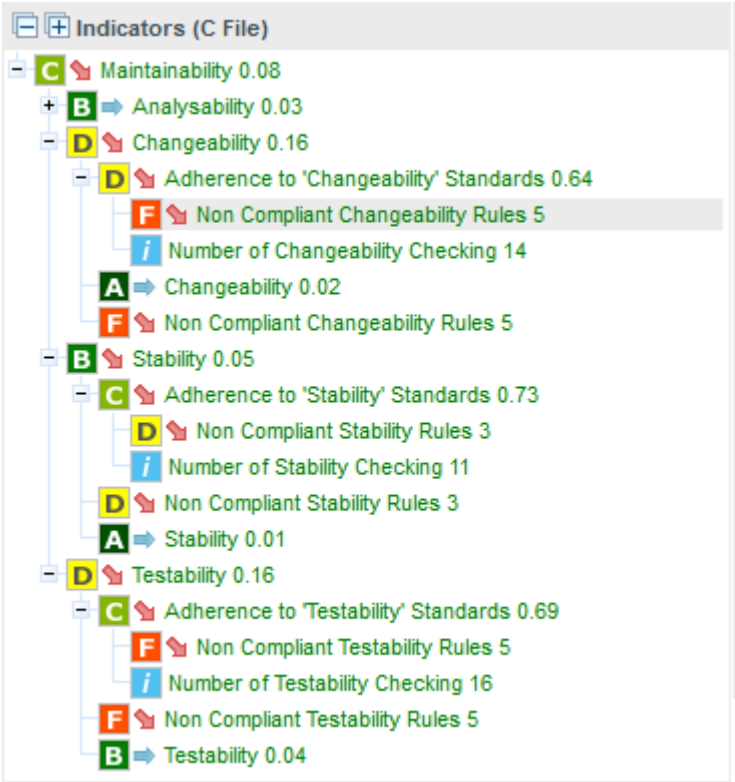
Select the current version of Earth again and edit the active filter: Uncheck the boxes for levels E and F, and select the **Deteriorated** category in the Evolution column. When applying the filter, you should see the artefacts in the tree that have the icon next to their name.



The artefacts that deteriorated in the current version of Earth

The functions you looked at earlier are still here, but there are more deteriorated artefacts that you can start reviewing. If you click on `player.c` for example, which is rated C.

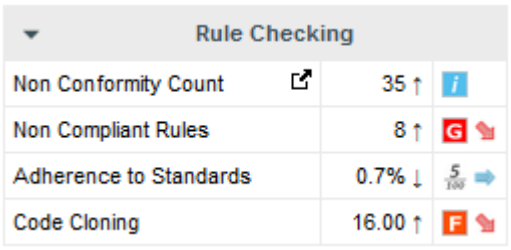
In order to find out where the degradation took place, you can look at the indicators tree to understand where the decline in quality comes from. Expand all the nodes in the indicators tree to reveal the issues with the artefact:



The Indicator Tree for player.c

Squore makes it easy to spot the irregularities quickly, like the fact that the **Non Compliant Changeability Rules** causes many of the indicators to get a worse score in the latest version than before. This is probably the first item to review in this function.

Take a look at the Rule Checking section of the artefact's scorecard to confirm the results:



The scorecard for player.c

By clicking the link icon, you can directly view the violations for this artefact in the Findings tab.

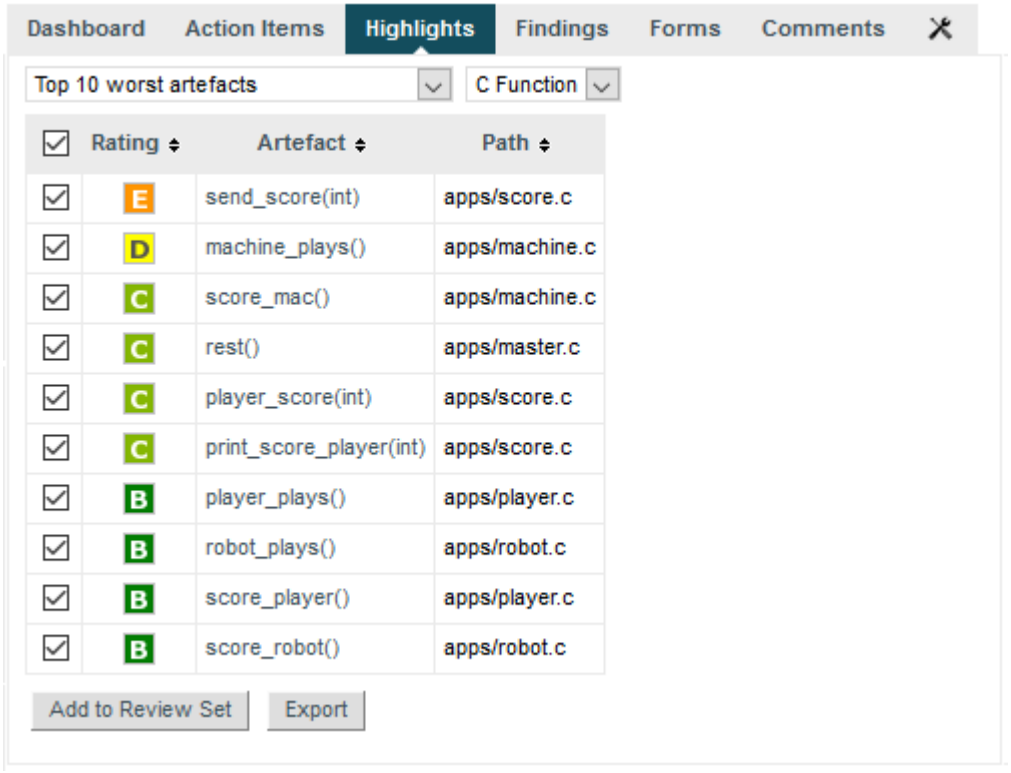
You can dive further into the analysis results by looking at the information contained in other tabs and assign action items to your team by referring to Chapter 6, *Managing Your To-Do List With Squore* or report your progress as explained in Chapter 9, *Communicating With Squore*.

5.1.2. Finding Artefacts Using Highlights

In the previous section (Section 5.1.1, “Finding Artefacts Using Filters and Search”), you got familiar with searching and filtering to find the artefact that have a negative impact on the overall rating of a project. in this section, you will learn to master the Highlights functionality, which aims to make the process of finding certain categories of artefacts easier.

Highlights are flat lists of artefacts ordered in predefined categories for a model.

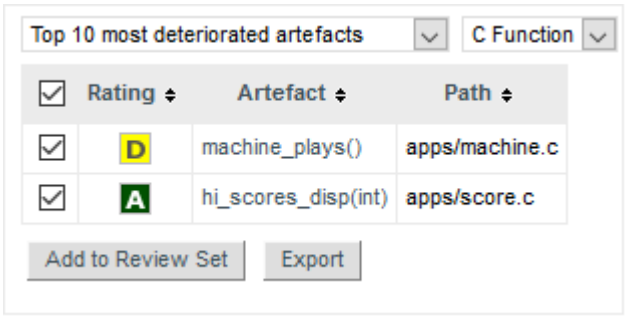
Let's try to confirm our findings about the worst and most deteriorated artefacts in Earth. Click on the current version of Earth and clear the filter. Click the **Highlights** tab of the Explorer and select the **Top 10 worst artefacts** category. The list appears as shown below:



The Top 10 worst artefacts in the current version of Earth

The list confirms that the artefacts with the worst rating are machine_plays() and send_score(int). The Highlights table shows you the artefact rating, name and path, and allows you to go to the artefact's dashboard directly by clicking the artefact name.

Now you can also find the deteriorated artefact player.c that you identified with a filter earlier in Section 5.1.1, “Finding Artefacts Using Filters and Search”: select the Top 10 most deteriorated artefacts highlight category to see the artefact appear in the list of deteriorated artefacts in this version.



The Top 10 most deteriorated artefacts in the current version of Earth

Artefacts are sorted by degradation, i.e. the difference between the value of the main indicator in the previous baseline version compared to the current value. By clicking the Export, you can export the selected items to a CSV file .

Tip

By default, the list of most deteriorated artefacts is compiled based on the previous version. By using the Reference list in the Explorer Settings menu ( )and choosing another reference version, you can update the statistics based on the new reference version you just selected.

Note: The notions of baseline and draft versions is explained in Section 4.3, “Working with Draft and Baseline Versions”.

The following categories are available for all default models:

- Top 10 worst artefacts
- Top 10 most deteriorated artefacts
- Top 10 most improved artefacts
- Top 10 'borderline' artefacts
- All new artefacts
- All impacted artefacts
- Top 10 most changed artefacts
- Top 10 worst folders
- Top 10 worst functions
- Top 10 non-compliant functions
- Top 10 functions with non-conformities
- Top 10 most complex functions

Squore administrators can customise and expand this list by referring to the Squore Configuration Guide.

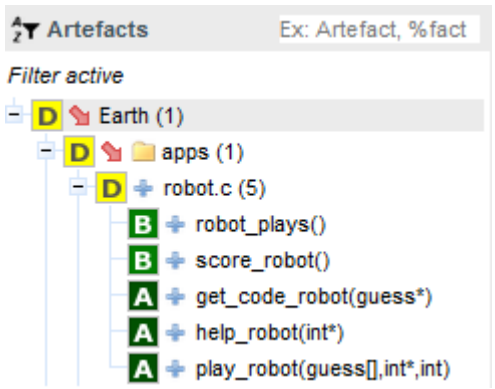
5.2. How Do I Find and Keep Track of Artefacts?

For some projects, you may want to collect artefacts so you can review them later. Squore enables you to build a Review Set, a flat list containing artefacts that you want to keep track of. Let's log in as the demo user to review all the new artefacts added to a project, in order to evaluate their level of quality.

Isolating the new artefacts can be done in three steps:

1. Log in using the demo user (`demo/demo`).
2. Click on **Earth** in the Project Portfolios to display the dashboard for the last version of the project.
3. Click the Filter icon to display only items in the Evolution column with the status **New** and apply your changes

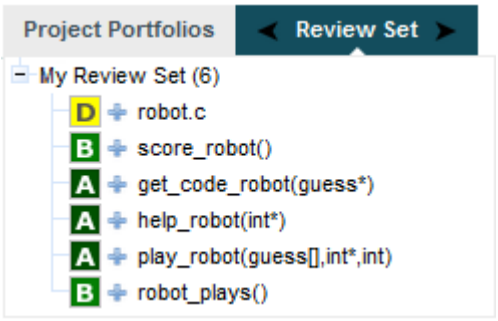
You should see the following artefacts in the Artefact Tree:



The new artefacts in the current version of Earth

Squore makes it easy for you to keep track of these artefacts. Click on the icon above the Artefact Tree and select **Add Filtered Results to Review Set**.

You can now clear your filter, the artefacts you want to review are stored in your Review Set. Click the **Review Set** tab in the left pane of the explorer to find the items you just saved.



The Review Set filled with new artefacts for the new version of Earth

At any moment, the artefact currently selected in the Artefact Tree can be sent to the Review Set as well. Simply display the context menu for an artefact and click **Add to Review Set** to add it to the Review Set. Clicking an item in the Review Set pane has the same effect as clicking it in the Artefact Tree: the dashboard refreshes to show the information for that artefact. You can use the left and right arrows in the Review Set pane to go to the previous and next artefact in the list.

If you want to know more about what actions you can take after reviewing artefacts, refer to Chapter 6, *Managing Your To-Do List With Squore* and Chapter 9, *Communicating With Squore*.

5.3. How can I Understand and Enhance My Model?

Squore provides tools to understand, verify and enhance your model under the Models menu.

- The **Viewer**, a graphical representation of all the analysis models on Squore Server
- The **Validator**, a debug tool for model writers
- The **Dashboard Editor**, which allows customising the dashboards that all users will see
- The **Analysis Model Editor**, which allows modifying the model's ruleset

Users whose profile grants the "View Models" permission have access to the first two tools.

Users whose profile grants the "Modify Models" permission have access to the last two tools.

5.3.1. Viewer

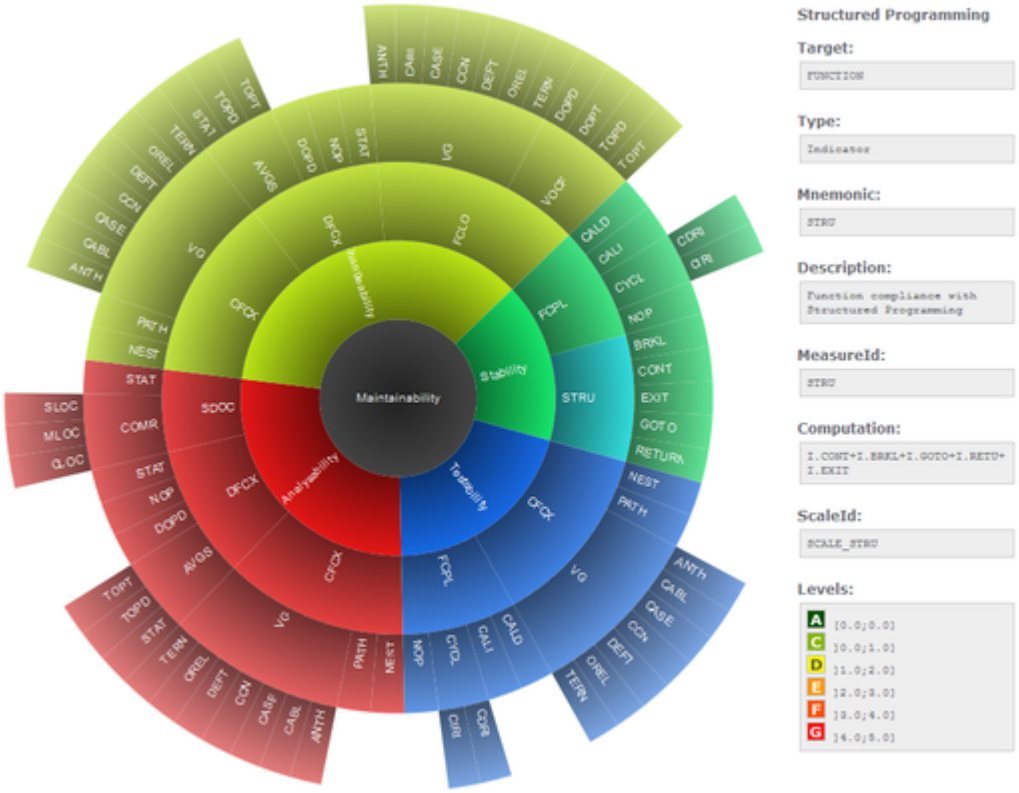
To use the Viewer:

1. Click **Models > Viewer** in the toolbar.
2. Select the analysis model you want to browse.
3. Select the artefact level you want to browse.
4. Choose your preferred graphical representation between Space-Tree and Multi-level pie.
5. Select whether measures are displayed using their full name or their mnemonic.

Upon selecting the parameters above, the page is refreshed with the top-level indicators in the model, and you can click each indicator to unveil sub-indicators and their characteristics. You can drag the tree left and right to reveal all sub-levels if necessary. For each indicator selected, Squore displays the following information:

- **Target** is the target artefact type for the selected item
- **Type** is the type of the selected item
- **Mnemonic** is the short code for the selected item
- **description** is the description of the selected item
- **Data Provider** is the Data Provider responsible for computing the selected item
- **MeasureId** is the measure ID of the selected item
- **Computation** is the formula used to compute the value of the selected item
- **ScaleId** is ID of the scale associated with the selected item
- **Levels** is the list of levels available for the selected item and their ranges

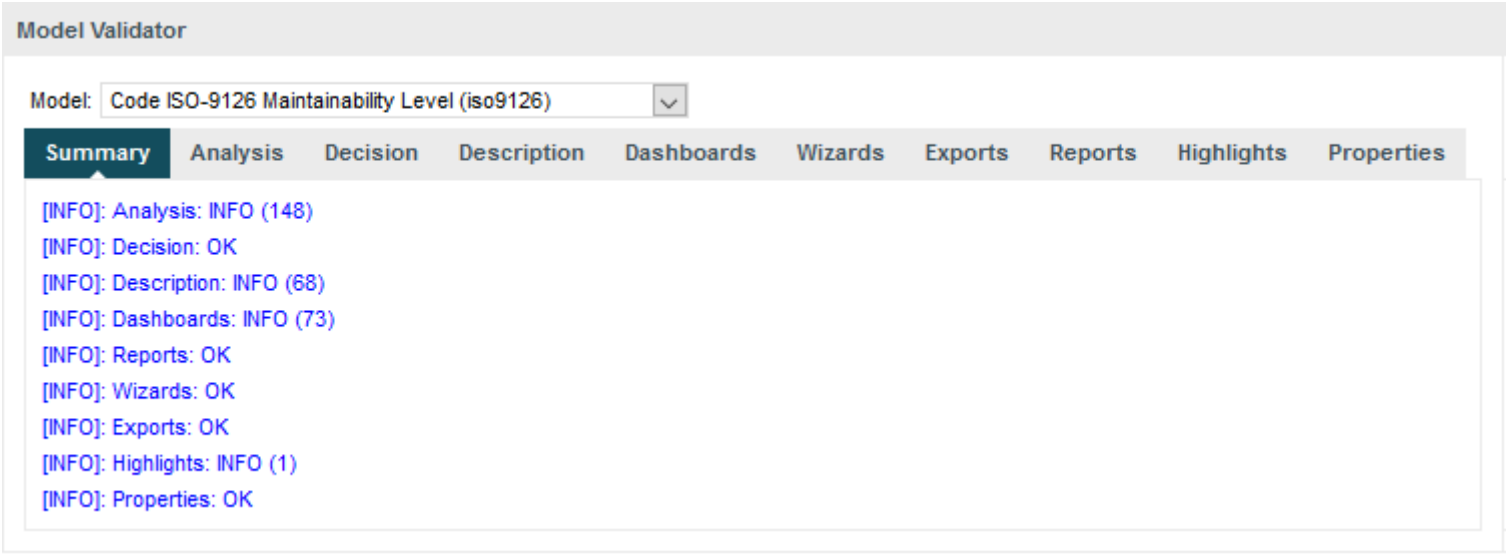
Note: The information available depends on the type of item selected.



The iso9126 model presented as a multi-level pie in the Viewer

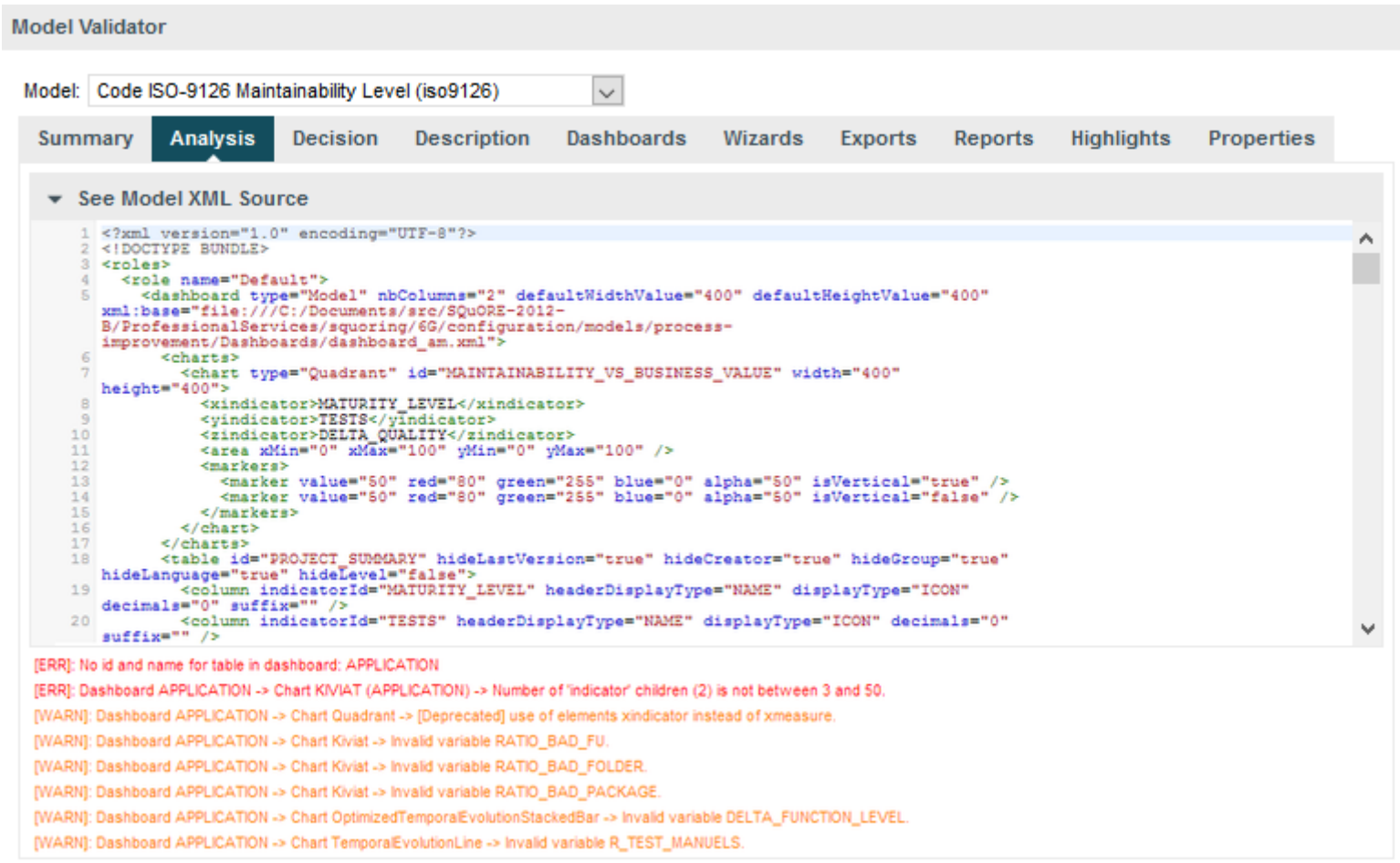
5.3.2. Validator

If your work involves adjusting the model's metrics or dashboard, you can use the Validator to verify its integrity during as you make changes. Click **Models > Validator** to display the diagnostics organised by category, as shown below:



The iso9126 model in the Validator

The Summary tab displays a summary of all the diagnostics run for each category. By clicking any of the other tabs, more details are shown about potential problems found in your model. You can also show the complete XML of the model to understand the errors reported. The XML can be searched by using the Ctrl +F key combination to bring up the search dialogue, and then Ctrl+G to search for the next occurrence of the search term:



The Validator reporting errors

Your Squore administrator can help you get more information model development. You can also refer to the Squore Configuration Guide for a complete reference.

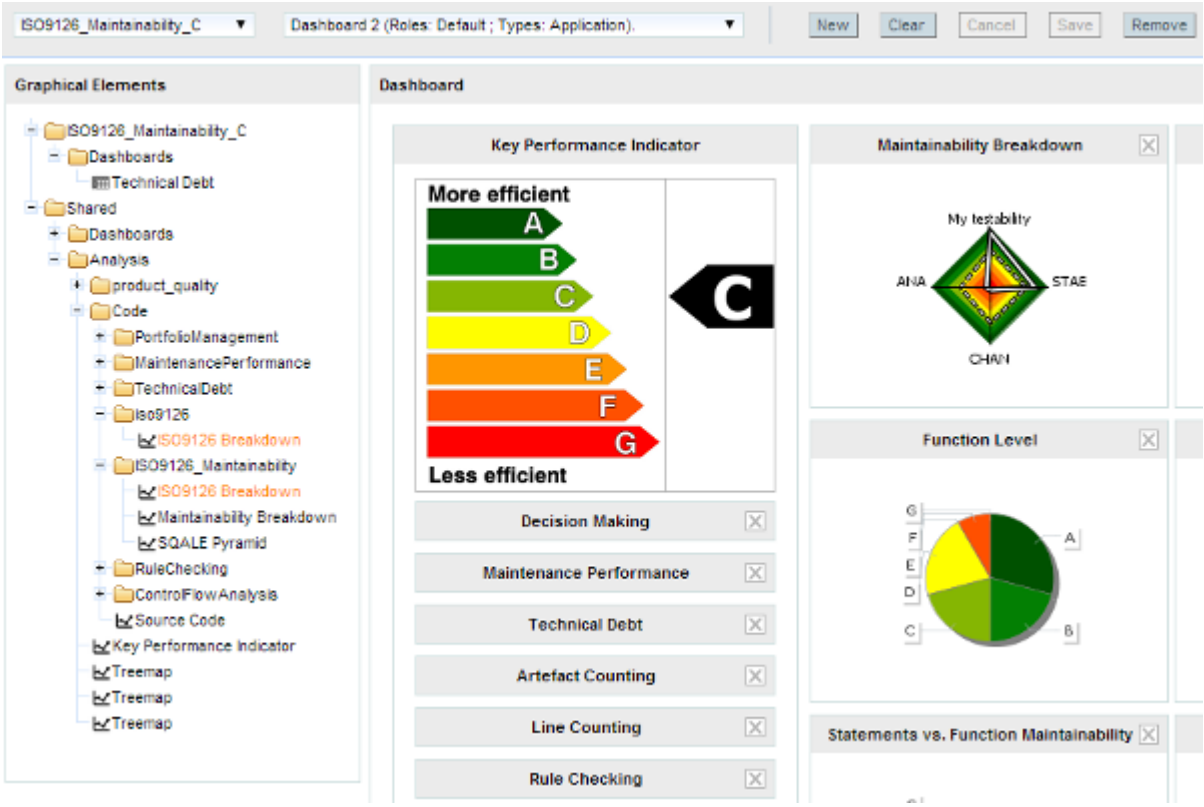
5.3.3. Dashboard Editor

The Dashboard Editor is a graphical editor for the dashboards of a particular model. Dashboards consist of a key performance indicator, a list of tables and one or more columns of predefined charts. With the Dashboard Editor, you can rearrange the information shown on the dashboard for all users, or create a completely new dashboard for a new role in your project.

In order to use the Dashboard Editor:

1. Click **Models > Dashboard Editor**
2. Select a model and load an existing dashboard

The current dashboard skeleton is loaded in the editor, as shown below:



The iso9126 model in the Dashboard Editor

The tree contains the list of pre-configured graphical elements that you can add to your current dashboard. When you hover over a dashboard element, a tooltip explains what metrics it displays. You can drag and drop an element over an existing chart on the current dashboard, drag charts and tables to rearrange them. When you are satisfied with your changes, you can save your modifications. You can also create a new dashboard, using an existing one as a basis for the new one, or start from a blank canvas.

> **Tip**
> In the tree, graphical elements are colour-coded so that you know before you add them to your dashboard if they are compatible with your model. Blue elements have minor incompatibilities with your current model and orange elements are likely not compatible. Use the tooltip for an element to understand why the element is flagged as incompatible.

More detailed explanations about the Dashboard Editor can be found in the Squore online help.

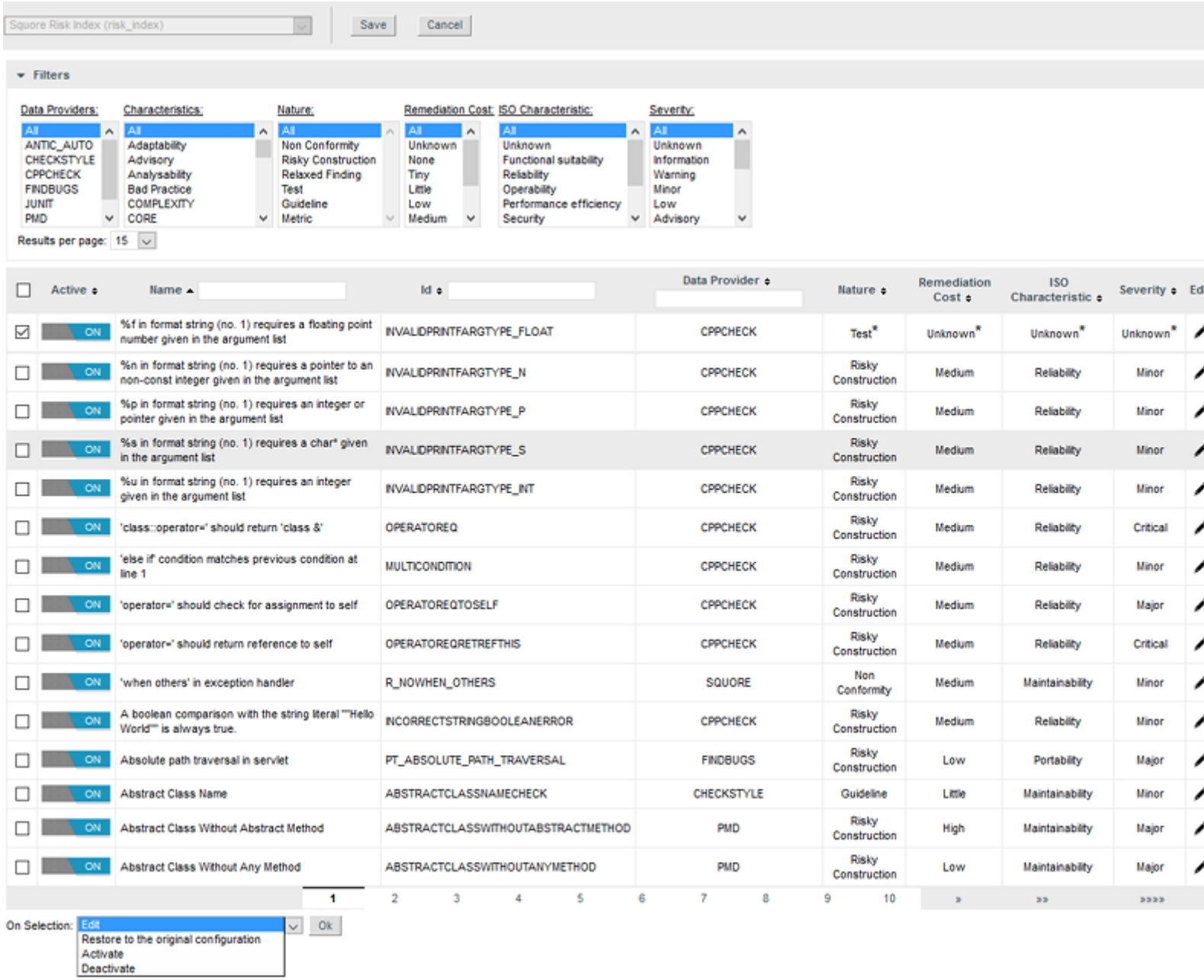
5.3.4. Analysis Model Editor

The Analysis Model Editor is a graphical ruleset editor where you can turn rules on and off, or adjust the categories associated to each rule in your model.

In order to use the Analysis Model Editor:

1. Click **Models > Analysis Model Editor**
2. Select a model to load its ruleset

The entire ruleset for the current model is displayed in table form, as shown below:



The Analysis Model Editor displaying the ruleset of the Squore Risk Index model

Use the filter pane and the table headers to find the rule you want to modify. You can activate or deactivate a rule by clicking the on/off switch in the table. If you want to make more modifications, cick the **Edit** icon for this rule.

You can edit multiple rules at once by checking several rules and using the actions list at the bottom of the page. When you save your changes, the configuration is reloaded and every new analysis for this model will use the new settings.

Tip
Changes made in the web interface are saved in the configuration folder on the server in a file called editor.xml.

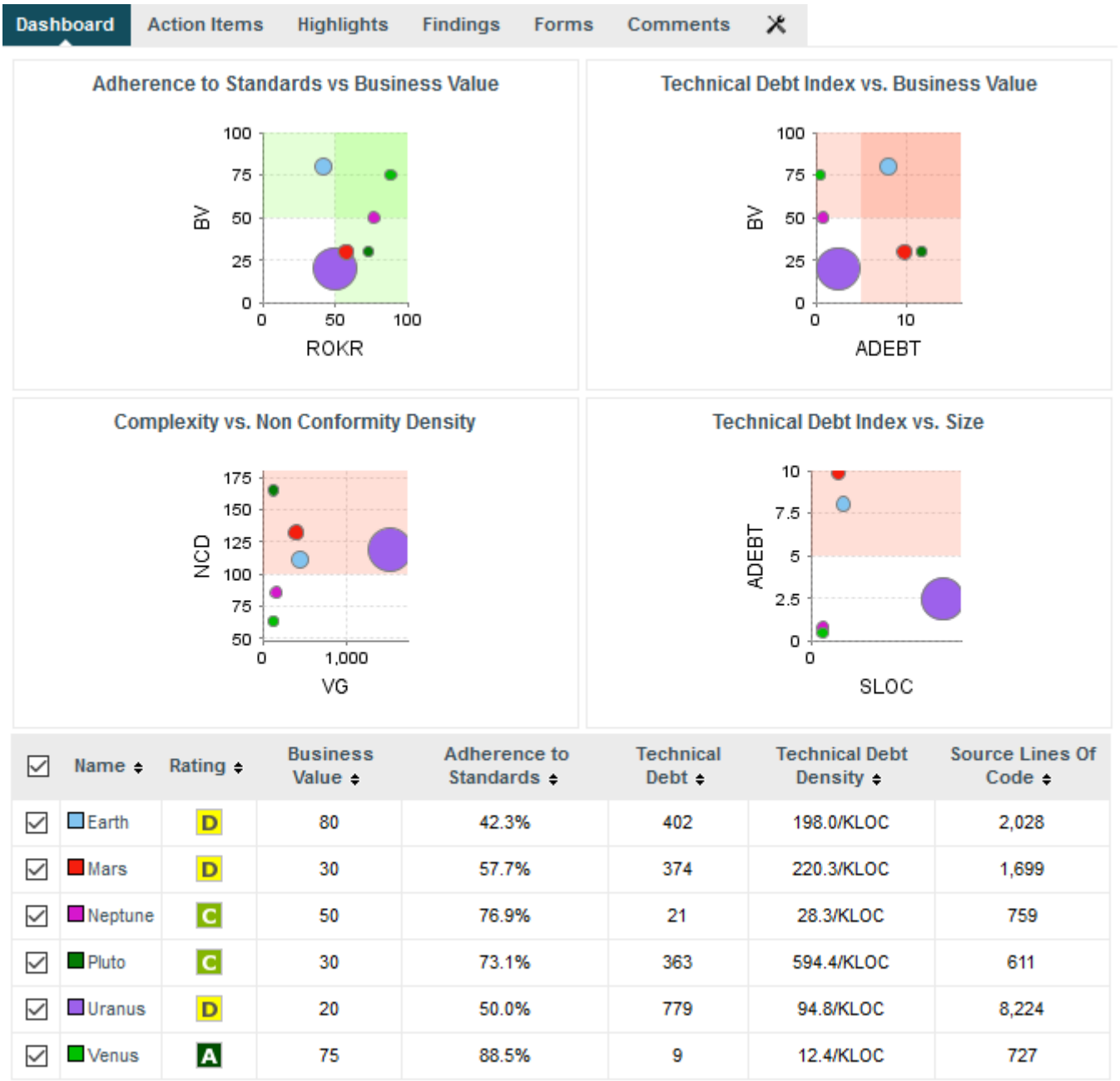
5.4. Reviewing Multiple Projects

Project Managers may be interested in monitoring several projects as a whole. Squore provides a special dashboard view which compounds information about several projects into an analysis model dashboard, which can help you prioritise projects according to their current status.

In order to view the analysis model dashboard:

1. Log into Squore with the demo user.
2. Click the model name "Code ISO-9126 Maintainability Level" in the Project Portfolios.

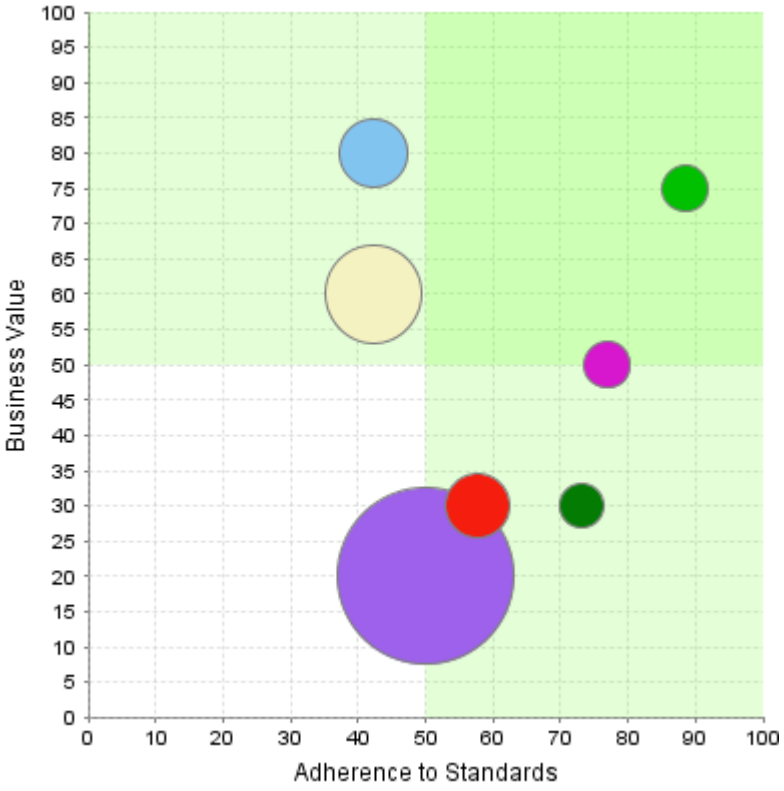
The dashboard refreshes to show the compounded information for all projects analysed with this model using Quadrant charts and tables:



Name	Rating	Business Value	Adherence to Standards	Technical Debt	Technical Debt Density	Source Lines Of Code
Earth	D	80	42.3%	402	198.0/KLOC	2,028
Mars	D	30	57.7%	374	220.3/KLOC	1,699
Neptune	C	50	76.9%	21	28.3/KLOC	759
Pluto	C	30	73.1%	363	594.4/KLOC	611
Uranus	D	20	50.0%	779	94.8/KLOC	8,224
Venus	A	75	88.5%	9	12.4/KLOC	727

The analysis model dashboard for iso9126 projects

In the quadrants, each project is represented as a bubble. Two indicators define the horizontal and vertical position of the bubble along the axes, while a third indicator defines the bubble size. Let's see how you should prioritise maintanance work on the your project portfolio for the sample projects. Click on the **Adherence to Standards vs Business Value** quadrant to view the full version:



Adherence to Standards vs Business Value for current iso9126 projects

In this chart, projects with a high business value appear higher, while more standards-compliant projects appear more to the right. The size of each bubble indicates the size of the project in terms of source lines of code. Therefore, a project with a high business value like Earth (blue) is in a difficult situation because it is important for your company, but more work is required to bring it to an acceptable standard like the smaller projects in the top-right section of the chart (Venus, in light green) As a project manager, you knew that as a general rule you need to focus on moving projects in the top half of the chart (the valuable ones) to the right half of the chart (the standards-compliant ones).

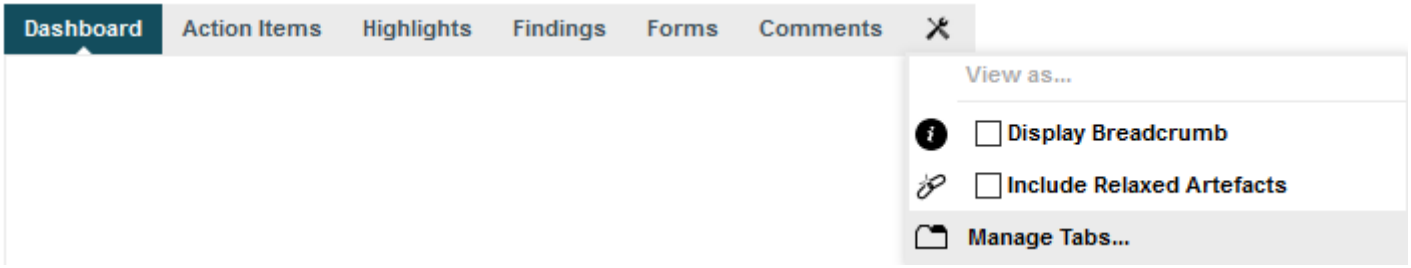
Below the quadrants, Squore displays tables with the values used in the charts so you can refine the information read in the charts. All the information shown in the analysis model dashboard can be configured by a Squore administrator. Refer to the Squore Configuration Guide for more information.

6. Managing Your To-Do List With Squore

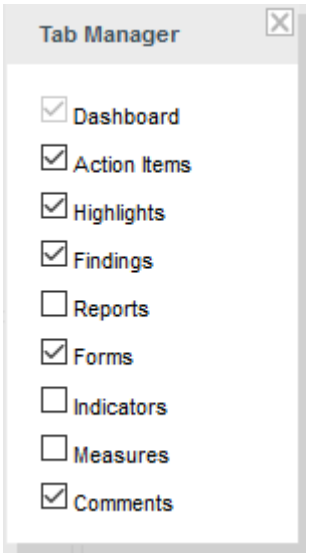
The analysis results you obtained by creating your first projects in Chapter 4, *Creating Projects and Versions* and observed in Chapter 5, *Understanding Analysis Results* can be drilled down further by looking at the other tabs available in the Explorer. In this chapter, you will learn how to use the information contained in Indicators, Measures, Findings and Action Items to better understand and reuse the information provided by Squore in your development workflow.

6.1. How do I understand and Improve My Ratings?

If you need more background information about the measures and indicators used in the charts and tables in the dashboard, the **Indicators**, **Measures** and **Findings** tabs can provide more details about the statistics recorded for the current artefact. Note that these tabs are not displayed by default. If you want to show them in Squore, click the Explorer Settings menu and then Manage Tabs to display the Tab Manager to enable these tabs, as shown below:



The Manage Tabs option in the Explorer Settings allows to display the Tab Manager



The Tab Manager allows to display tabs hidden by default by checking them.
Note that not according to your configuration, some tabs may not be removeable

If you want to understand the scale used for a particular indicator, to see for example how close you are to moving up the rating scale, you can check the scale used for this indicator in the **Indicators** tab of the dashboard.

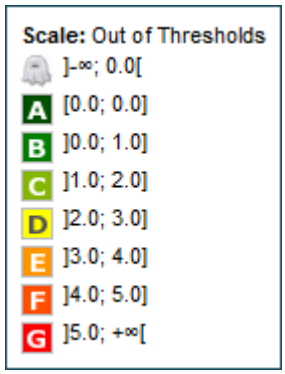
Log in and search for the artefact **DB5_backup.c** in the Neptune project, where the indicator **Adherence to 'Analysability' Standards** is rated D. While this tells you about the current rating for this artefact, this does not tell you how to improve it. In order to learn how to improve this score, let's first take a look at the scale used for this indicator. Click the **Indicators** tab of the Explorer. The table of indicators opens, as shown below:

Name	Mnemonic	Value	Rank	Rating
Non Compliant Rules	RKO	4	0.25	E
Analysability	ANA	0.12	0.125	D
Analysability	FUANA_IDX	0.19	0.125	D
Testability NCC	NCC_TEST	6	0.125	D
Analysability NCC	NCC_ANA	7	0.125	D
Changeability NCC	NCC_CHAN	7	0.125	D
Adherence to 'Analysability' Standards	ROKR_ANA	0.57	0.125	D
Technical Debt Density	DDEBT	145.61	0.125	D
Non Compliant Analysability Rules	RKO_ANA	3	0.125	D
Non Compliant Changeability Rules	RKO_CHAN	3	0.125	D
Non Compliant Testability Rules	RKO_TEST	3	0.125	D
Maintenance Performance	MPI	0	0	D
Adherence to 'Changeability' Standards	ROKR_CHAN	0.79	0.062	C
Technical Debt Average	ADEBT	2.15	0.062	C
Maintainability	MAIN	0.05	0.031	B
Testability	TEST	0.04	0.031	B
Changeability	CHAN	0.05	0.031	B
Maintainability	FUMAI	0.05	0.031	B
Stability NCC	NCC_STAB	1	0.031	B
Adherence to 'Stability' Standards	ROKR_STAB	0.91	0.031	B

1 2 » »»»

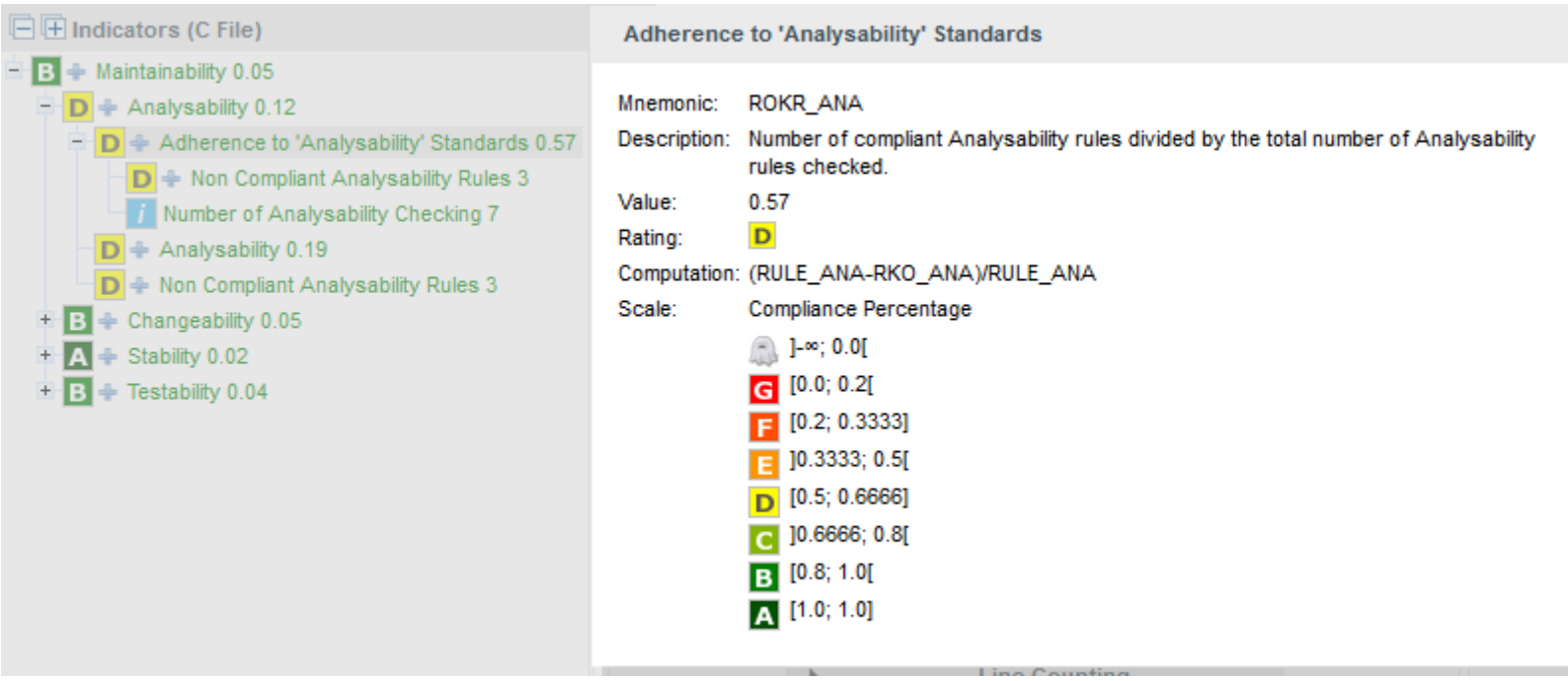
The indicators table for DB5_backup.c

The table lists all the indicators available for the artefact over several pages. The scale and levels available for an indicator can be viewed in a tooltip by placing your mouse over a rating. Using the filter above the "name" column, look for the entry named **Adherence to 'Analysability' Standards**, then click its value in the rating column. The scale for the indicator indicates that the artefact is rated D because the value of the indicator is 3. In order to improve the score, the value would need to decrease to under 2 to be rated C, as shown below:



The scale used for rating Adherence to 'Analysability' Standards

To understand how to improve the rating, you need to know how the indicator's value is computed. Clicking the indicator name in the Indicator Tree shows the following explanation in the indicator popup:



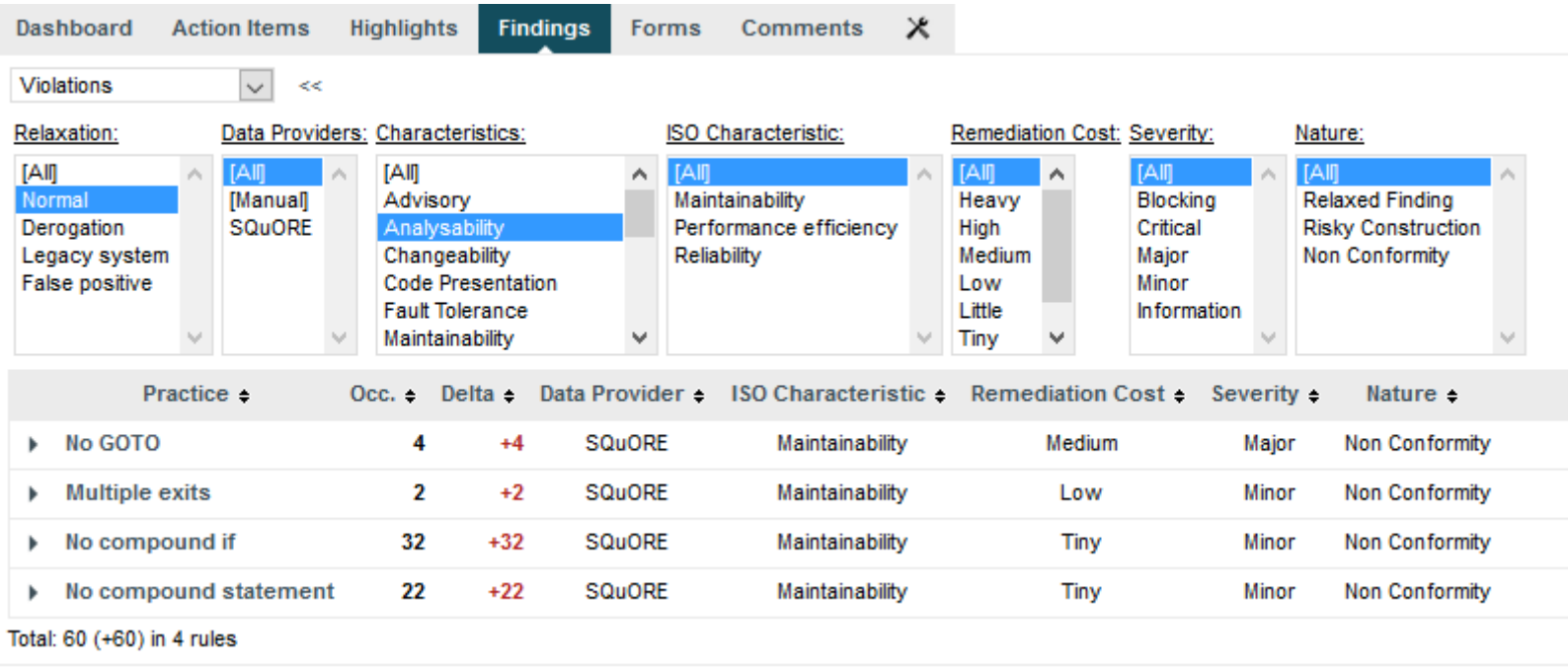
The indicator popup for the Adherence to 'Analysability' Standards indicator

The computation, i.e. the formula used to calculate the rating is `(RULE_ANA-RKO_ANA)/RULE_ANA`, meaning that the indicator is a ratio of the number of broken analysability rules. To find out what these rules are, click the **Findings** tab.

Squore displays all the findings for a particular artefact in a table in the Findings tab. Next to the finding's label is a number of occurrences followed by a colour-coded delta value (red for more occurrences, green for less) compared to a previous analysis.

If you want to find out which rules are taken into account by the Adherence to 'Analysability' Standards indicator, click the **>>** button next to the default filter to show the advanced filtering options. Highlight

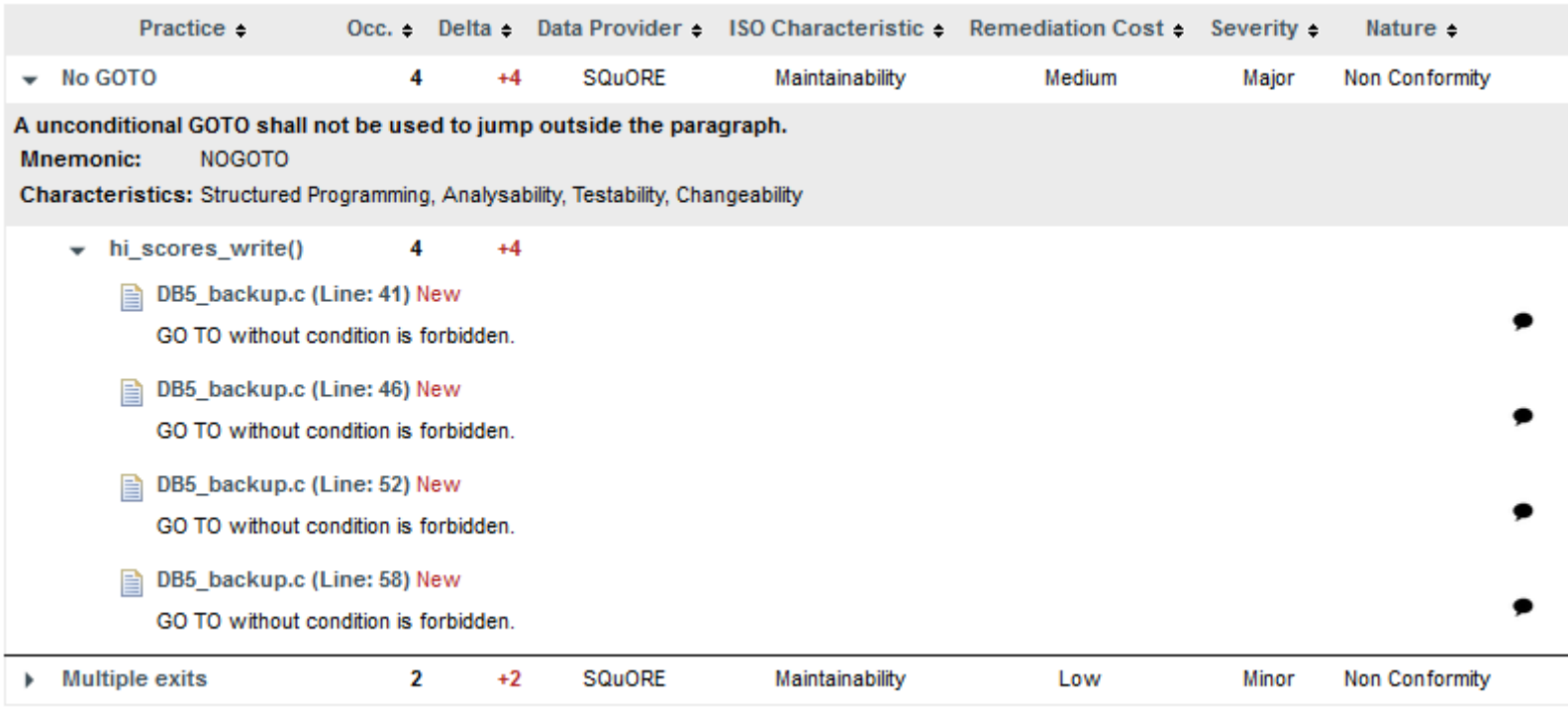
ANALYSABILITY in the `Characteristics` filter to see the corresponding rules, as shown in the picture below:



The findings table for DB5_backup.c

The rules **No GOTO**, **Multiple exits** and **No compund if** are the rules that should be fixed in order to improve the analysability rating of DB5_backup.c.

You can expand the **No GOTO** rule to show each occurrence of the rule being broken, and also review the location in the source code that breaks the rule, as shown below:

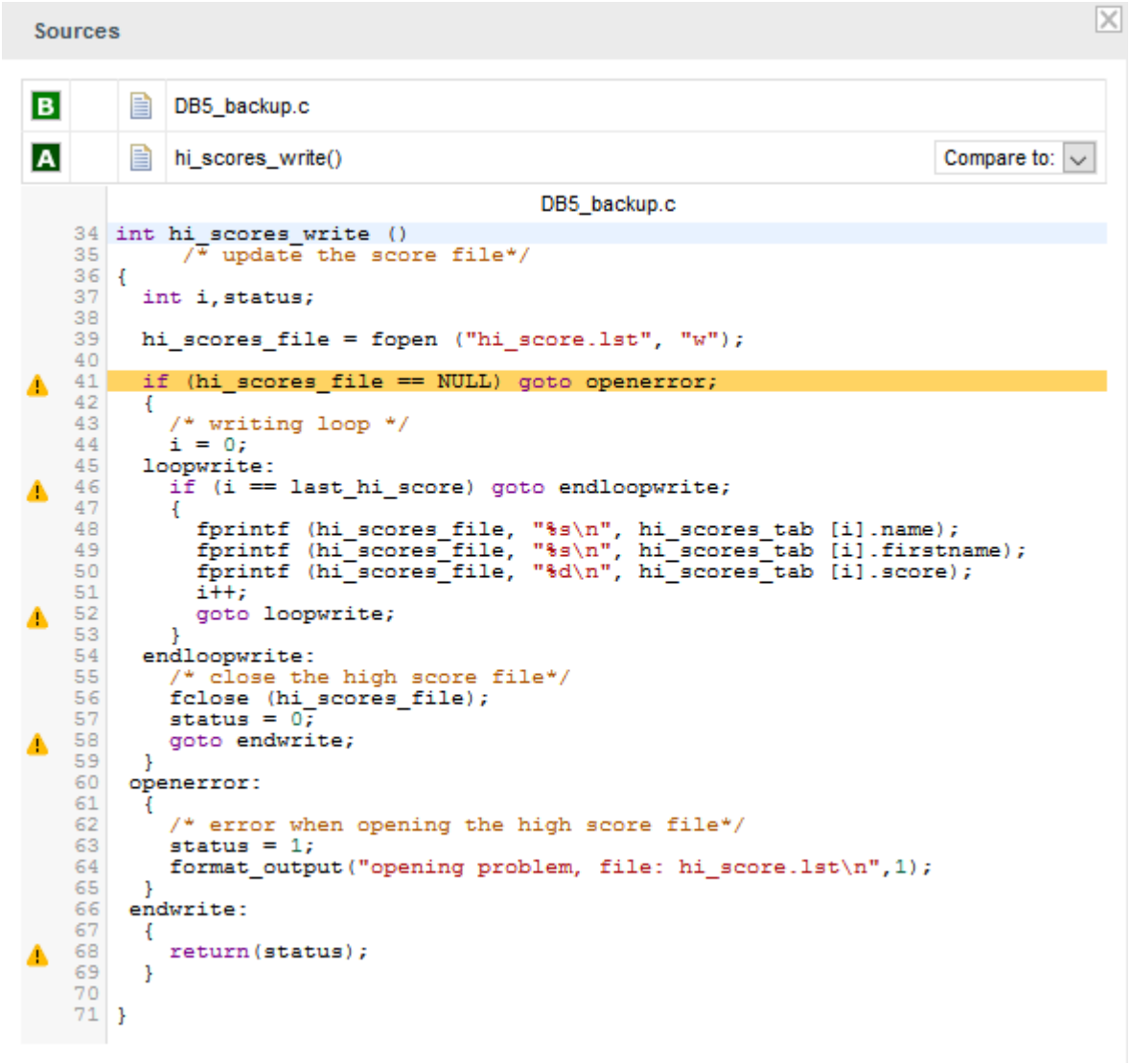


The location of the broken occurrences of the **No GOTO** rule

Tip

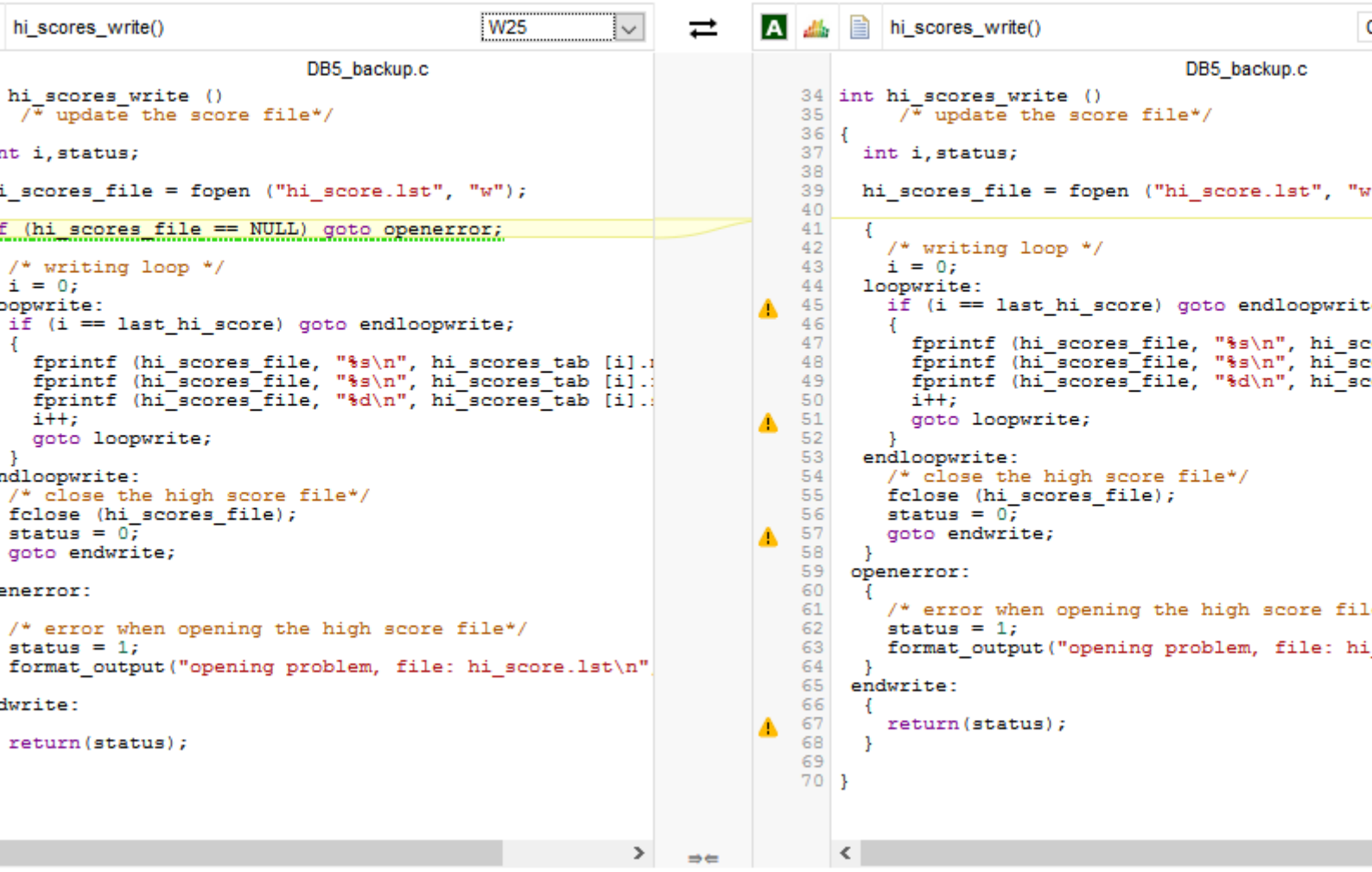
The list of findings indicates if a finding is **New**, **Closed** or **Modified** since the reference version. Findings are traceable through time, so even if your code is modified, you can to go back to the version in which it was first detected.

Finally, clicking on the line number for each rule breaking occurrence opens the source code viewer in full screen so you can carry out your code review:



The source code viewer highlighting the first occurrence of **No GOTO**

The source code viewer allows comparing the code against another version of the code. Select a version name in the **Compare to:** list to switch to diff mode, as shown below:



The source code viewer in diff mode

Tip

In diff mode, use the top arrows to switch the left and right panes, and the bottom arrows to turn synchronised scrolling on or off. Characters that were removed are underlined in green, while characters that were added are underlined in red.

Analysing findings helps improving the quality of the code in your project. There is much more you can do with the Findings tab by using the built-in filters to detect regressions and improvements:

- **Violations:** displays all the rules violated in this version
- **Lost Practices:** displays violations that are new in this version since a specified version
- **Acquired Practices:** displays all violations not occurring anymore in this version since a previous version
- **Deteriorated Practices:** displays all violations with more occurrences in this version than in a previous version
- **Improved Practices:** displays all violations with less occurrences in this version than in a previous version

- **New violations:** displays all the new violations since a previous version
- **FIxed violations:** displays all the violations fixed since a previous version
- **All changed violations:** displays all the rules where a change in the number of violations was detected, essentially providing the combination of New violations and FIxed violations in one list
- **All rules:** displays all the rules checked by the model, i.e. the violated ones as well as the ones that are not

Tip

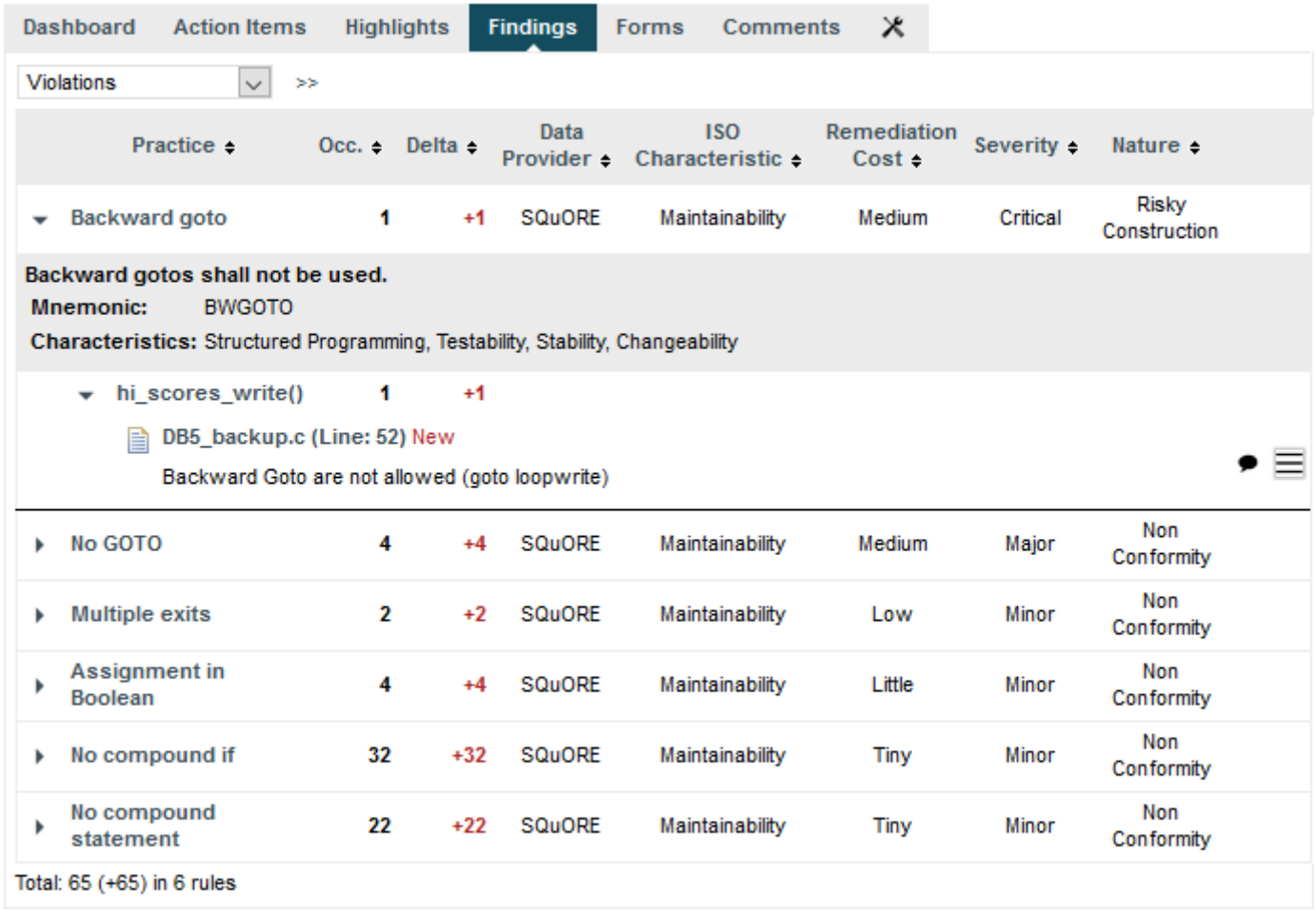
By default, the Findings tab displays violations compared to the previous analysis, but you can refine the search by adjusting the **Reference** drop-down list (under the Explorer Settings menu) that contains all the versions analysed in your project.

You can learn about more automated ways to review and fix code in Section 6.8, “How Do I Review And Manage Action Items Flagged by Squore?”.

6.2. Relaxing Findings

If you realise that a violation found during an analysis is not justified, you can relax it from the Findings tab of the Explorer.

In the example below, a we consider that a **Backward goto** violation should not be reported, because it is a false positive. Let's start by locating the violation in the Findings tab:

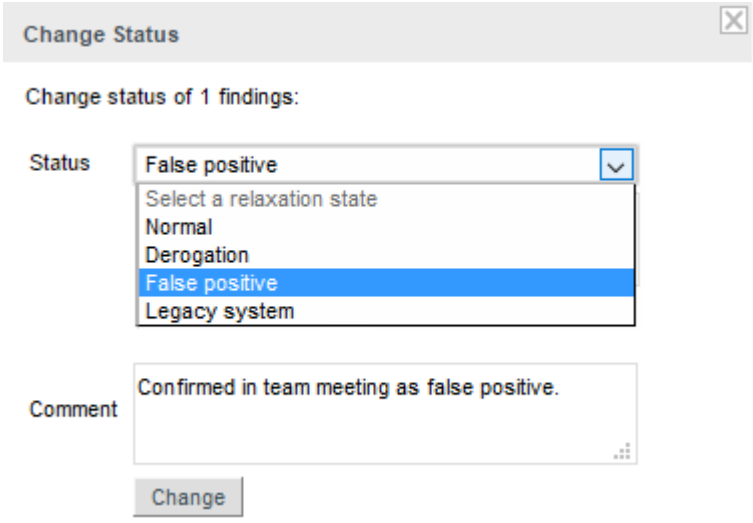


The backward goto violation we want to relax

When you hover over the menu icon for the violation, you can display a context menu that allows you to change the status of the finding:

The finding context menu

Click **Change Status...** to view the available statuses for the violation.



The Change Status Popup

Type a justification or comment for the relaxation and choose from one of the reasons for relaxing the violation:

- **Normal** is the default status for new finding, which means no relaxation
- **Derogation** means that you are relaxing a true violation for an exceptional reason
- **False positive** can be used to work around a violation that was falsely detected by a data provider
- **Legacy system** is used when a violation is detected in a piece of code that was analysed but cannot or will not be fixed.

In our example, select **False Positive**, enter a comment and click **Change**. The Findings page will reload and the violation will be gone from the list.

Dashboard | Action Items | Highlights | Findings | Forms | Comments

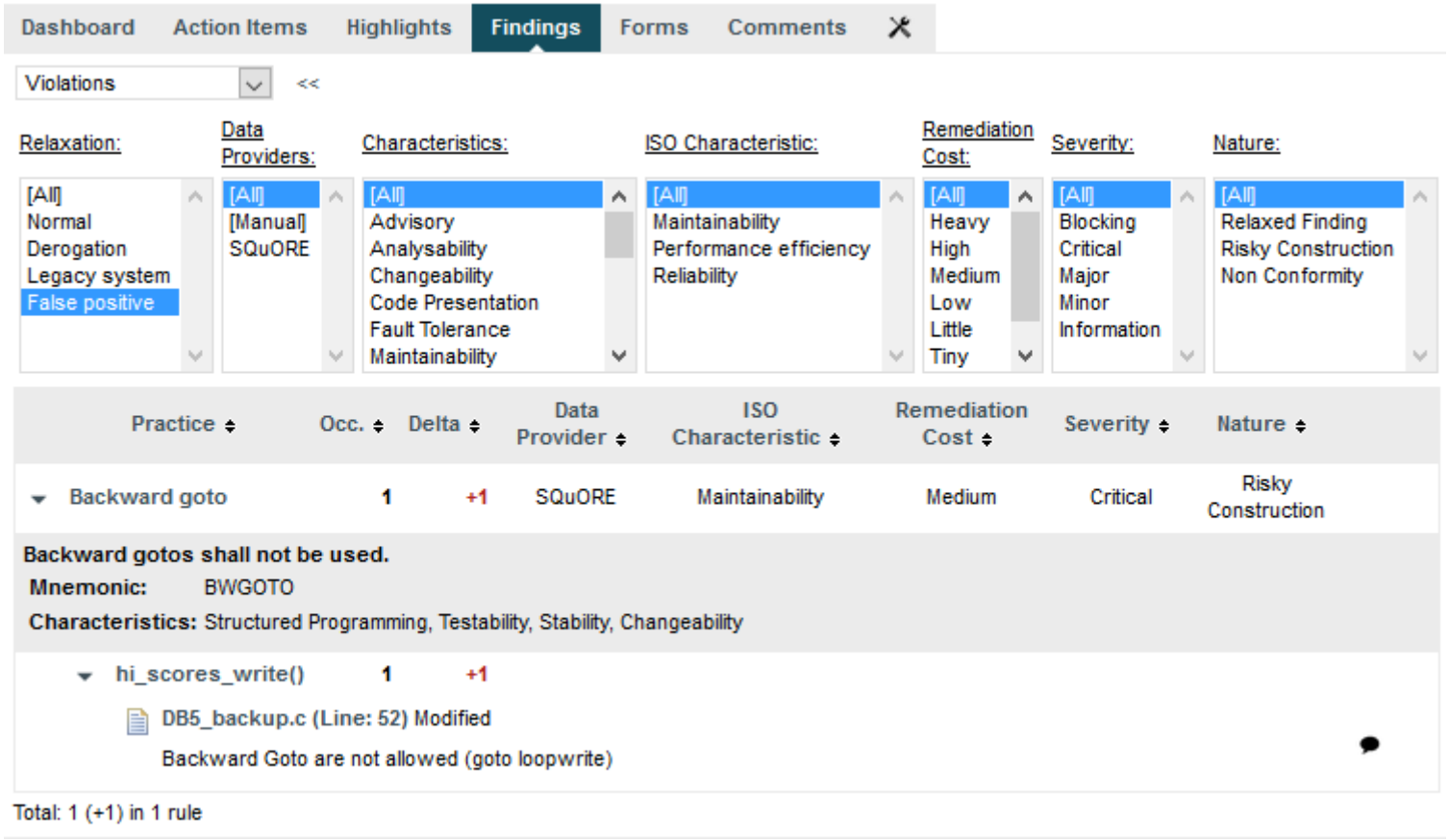
Violations >>

Practice	Occ.	Delta	Data Provider	ISO Characteristic	Remediation Cost	Severity	Nature
No GOTO	4	0	SQuORE	Maintainability	Medium	Major	Non Conformity
Multiple exits	2	0	SQuORE	Maintainability	Low	Minor	Non Conformity
Assignment in Boolean	4	0	SQuORE	Maintainability	Little	Minor	Non Conformity
No compound if	32	0	SQuORE	Maintainability	Tiny	Minor	Non Conformity
No compound statement	22	0	SQuORE	Maintainability	Tiny	Minor	Non Conformity

Total: 64 (+0) in 5 rules

The updated findings list after relaxing the backwards goto

Relaxed findings are never deleted. If you want to review the list of findings that were relaxed in your project, adjust the filter on the Findings tab to display relaxed findings, as shown below;



The filtered list of findings for the project, including the backwards goto false positive

Tip

You can relax an individual finding, all findings for an artefact, or an entire rule at once. Note that instead of relaxing a rule.

Note that you can also relax artefacts from the Artefact Tree (see Section 6.4, “Relaxing Artefacts”) deactivate rules by using the Analysis Model Editor (see Section 5.3.4, “Analysis Model Editor”).

6.3. Relaxing Violations in Code

Squore provides a violation relaxation mechanism that is triggered via comments found in the source code itself. There are two pre-requisites for relaxation to work:

- The model used to analyse your source code must implement a special rule called **R_RELAX** for relaxation to take place.
- You need to know the mnemonic of the violated rule you want to relax, in order to use it as a key in your comment.

Squore interprets comments formatted in one of these three ways:

1. **Inline Relaxation**
   This syntax is used to relax violations on the current line.

```
some code; /* %RELAX<keys> : Text to justify the relaxation */
```

2. **Relax Next Line**
   This syntax is used to relax a violation on the first following line that is not a comment. In the example the text of the justification will be: "Text to justify the relaxation the text of the justification continues while lines are made of comments only"

```
/* >RELAX<keys> : Text to justify the relaxation */
/* the text of the justification continues while */
/* lines are made of comments only */
some code;
```

3. **Block Relaxation**
   This syntax is used to relax violations in an entire block of code.

```
/* {{ RELAX<keys> : Text to justify the relaxation */
/* like for format 2 text can be on more than one line */
int my_func() {
   /* contains many violations */
   ...
}
/* }} RELAX<keys> */
```

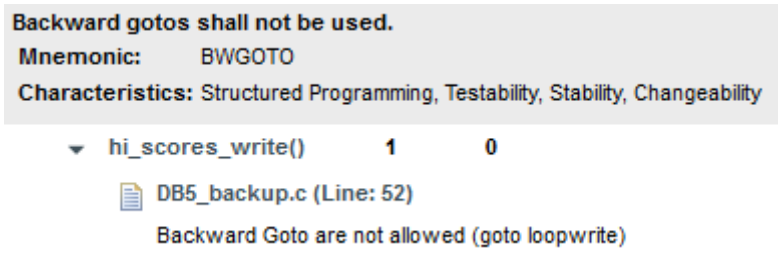
<keys> can be one of the following:

- **<*>:** relax all violations
- **<MNEMO>:** relax violations of the rule MNEMO
- **<MNEMO1,MNEMO2,...,MNEMOn>:** relax violations of rules MNEMO1 and MNEMO2 ... and MNEMOn

The relaxed violations are still shown in the Findings page after the next analysis, but they appear under the rule R_RELAX, showing the mnemonic of the relaxed violation and the justification text.

As an example, this is how you would relax the violations of the rule Backward goto for Adherence to 'Analysability' Standards in Neptune:

1. click the violation of **Backward goto** on the Findings page to find the rule's mnemonic (BWGOTO) and the location of the finding (DB5_backup.c line 52).



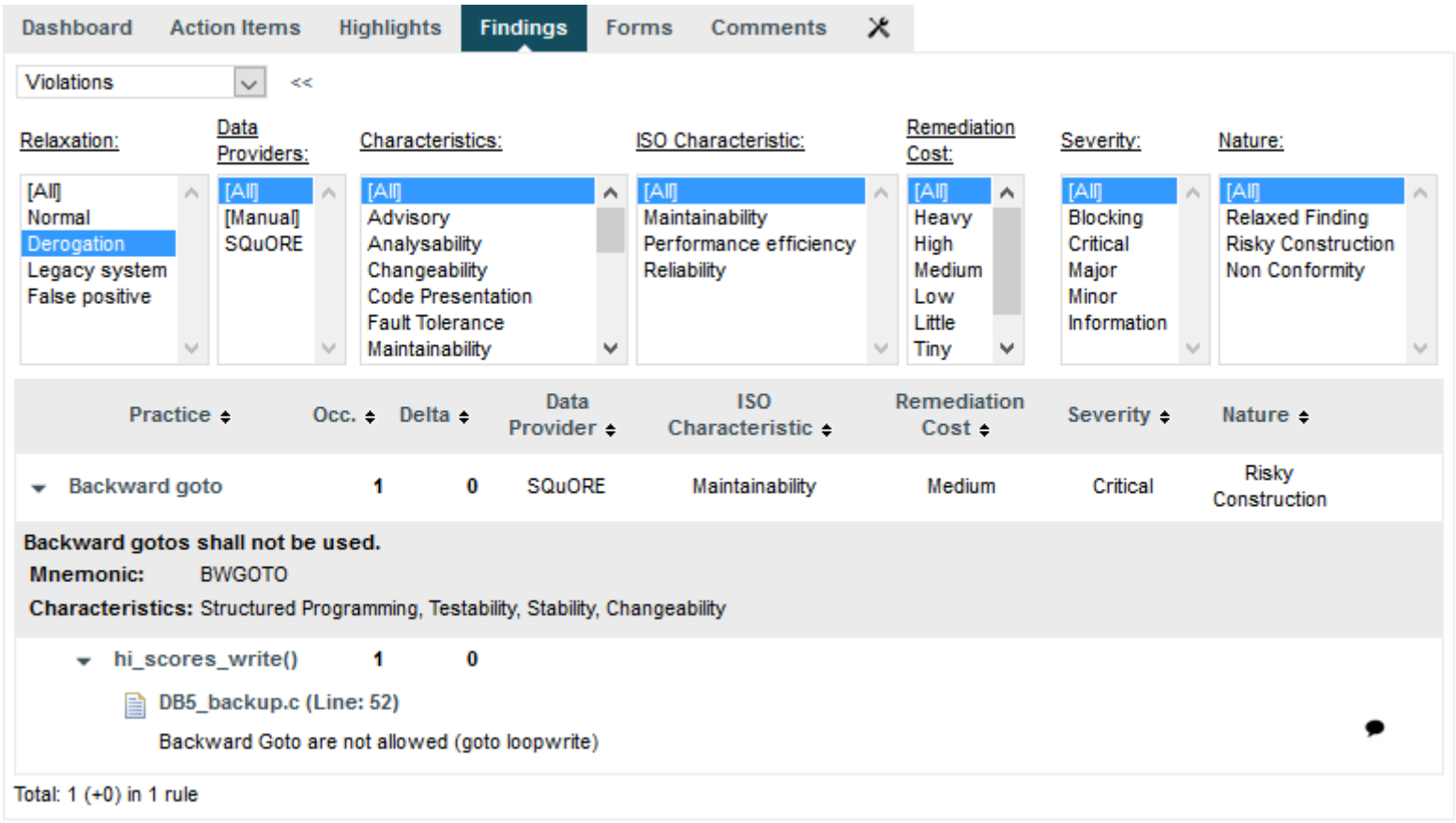
The details of the Backward goto violation

2. Edit the code of the sample project to relax the violation as shown below.

```
goto loopwrite; /* %RELAX<BWGOTO> : This backward goto is acceptable in our
 code. */
```

3. Create a new version of the project.

On the Findings page, the violation now visible if you select to display derogations in the filter:



The relaxed violation is visible when displaying derogations

6.4. Relaxing Artefacts

In this section, you will learn how to relax artefacts directly from the Artefact Tree instead of relaxing violations by editing the source code of the application. Relaxing artefacts ensures that their metrics do not impact the rating of the project, however, data providers will still generate findings for the relaxed artefacts.

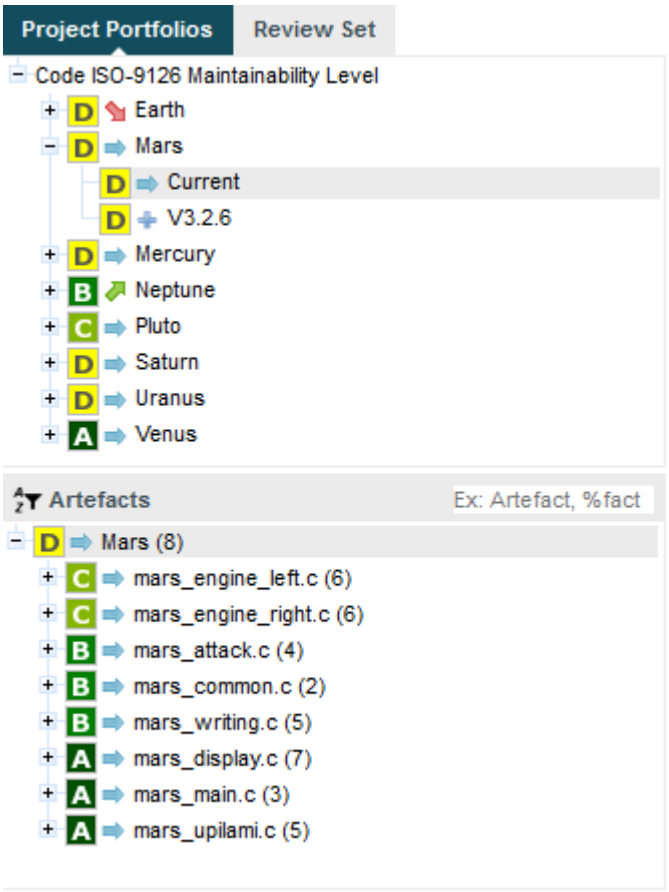
This example uses the Mars project from the samples folder. Ensure that you are a Project Manager in this project, or are part of a role with the **View Drafts of Projects** and **Modify Artefacts** privileges before you begin.

Expand the Project Portfolios to show all the versions of **Mars**. There are two versions in the tree (from bottom to top):

1. **V3.2.6** is the baseline version, whose results were computed during the analysis and cannot be changed.
2. **Current** is a version that was automatically inserted so that you can edit form values, relax, exclude ot add artefacts in preparation for the next analysis.

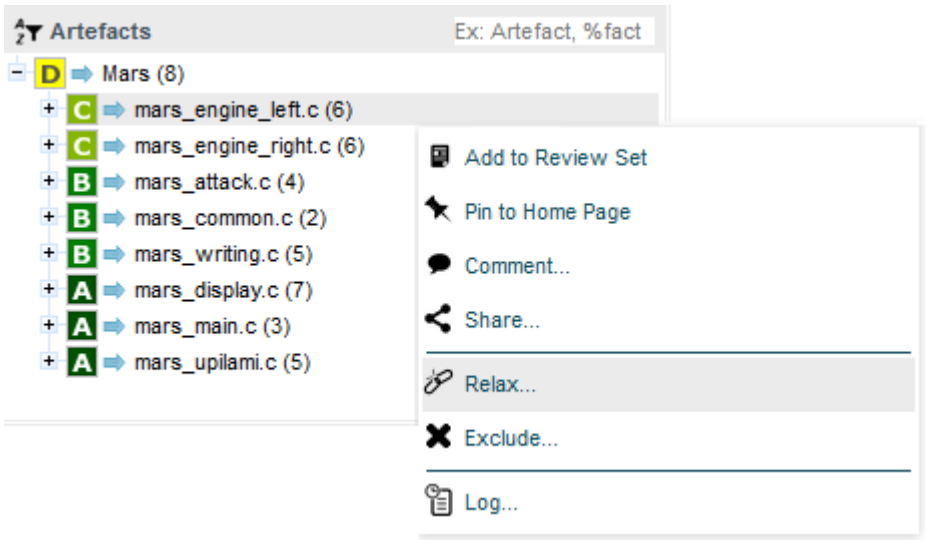
Tip
For more information about the concepts behind baseline and draft versions, refer to Section 4.3, “Working with Draft and Baseline Versions”.

Click on **Mars > Current** to see the artefacts in the Mars project as created by the demo script:



The artefacts in the Current version of the Mars project and their rating

To relax an artefact and therefore tell Squore that its rating should not impact the rest of the project, display the context menu for this artefact. The relaxation options appear at the bottom of the menu if they are available for your model, as shown below:



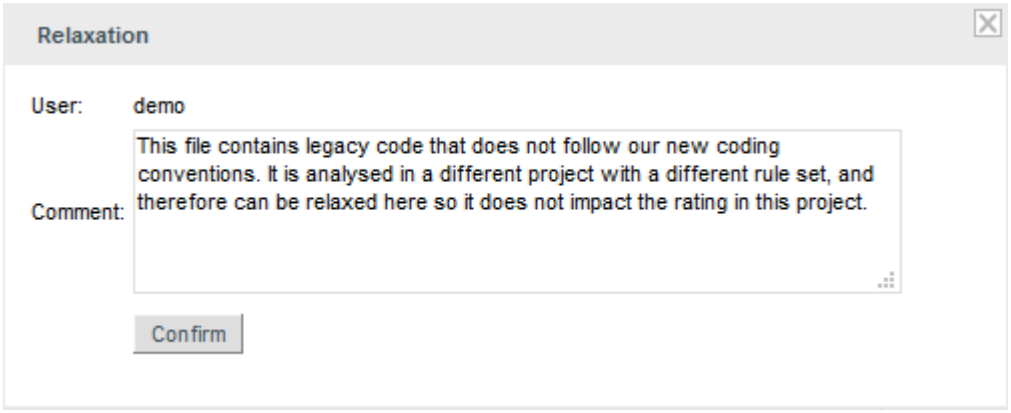
The artefact context menu

There are two actions that can be taken to relax an artefact:

- **Relax...** allows simply marking an artefact as relaxed, leaves it in the tree in a way that will not impact the overall rating of the project.
- **Exclude...** also relaxes the artefact but then removes it from the Artefact Tree so it will not be visible anymore in future analyses.

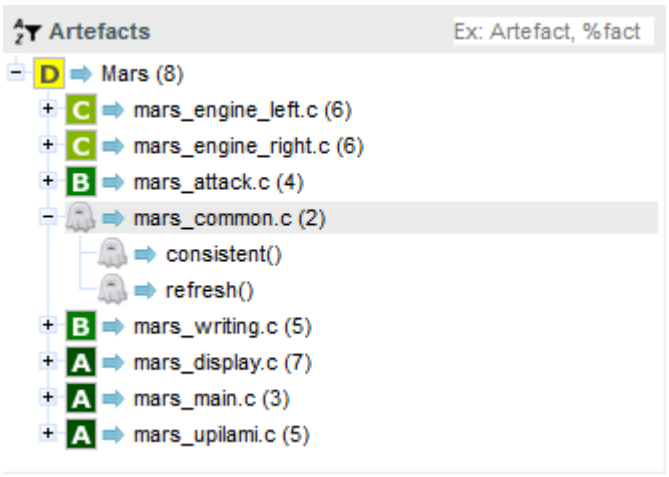
> **Tip**
> In both cases, the relaxation action is only made on a draft version and can be reversed by selecting the **Un-relax...** entry in the menu or the **Clear unapplied changes** option in the project portfolio.

Clicking **Relax...** or **Exclude...** brings up a pop-up menu where you can type a comment to explain the reason for the relaxation. Let's relax `mars_common.c` so it stops impacting the overall project rating. Click the **Relax...** option in the menu to display the relaxation popup and enter a relaxation comment:



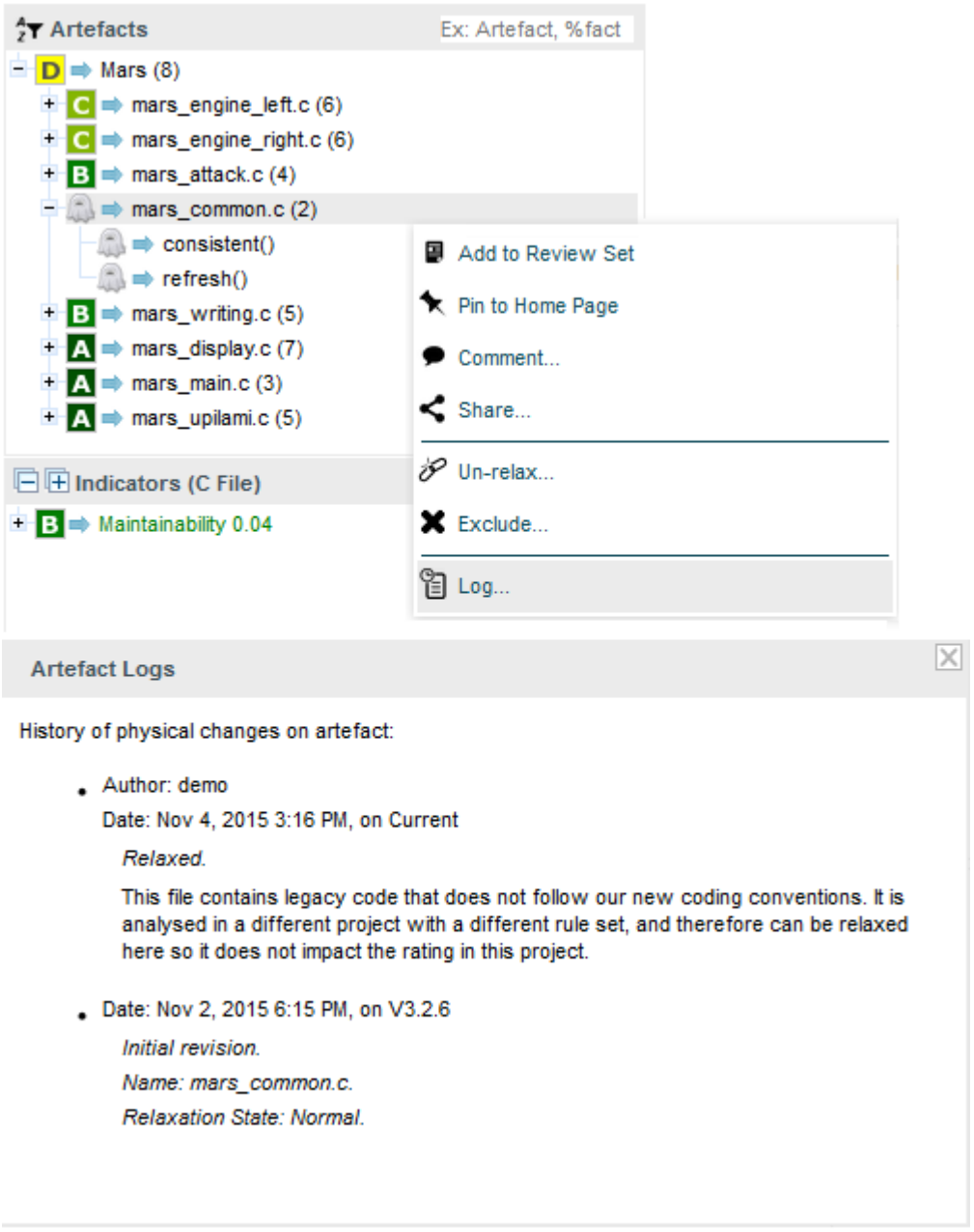
The relaxation justification

Click **Confirm** to save your comment, and notice how the Artefact Tree is updated to reflect the finding's status:



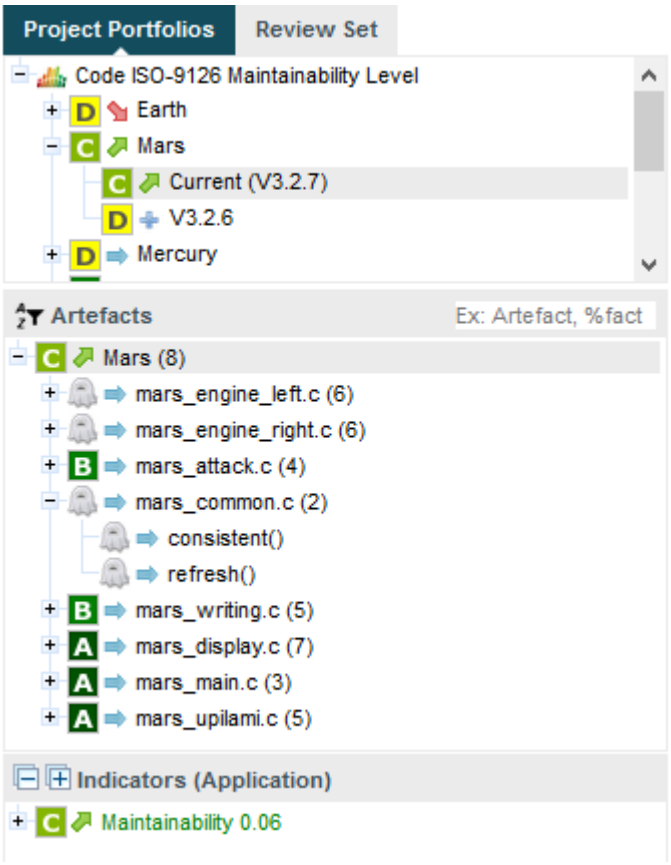
The relaxed mars_common.c in the Artefact Tree

Other users can review the justification for the relaxation by clicking on the Log... item in the artefact context menu:



The log of changes for the artefact mars_common.c

If you keep relaxing artefacts rated C in this project and create a new draft build of the project, then you will end up seeing changes in the overall rating, as shown below:

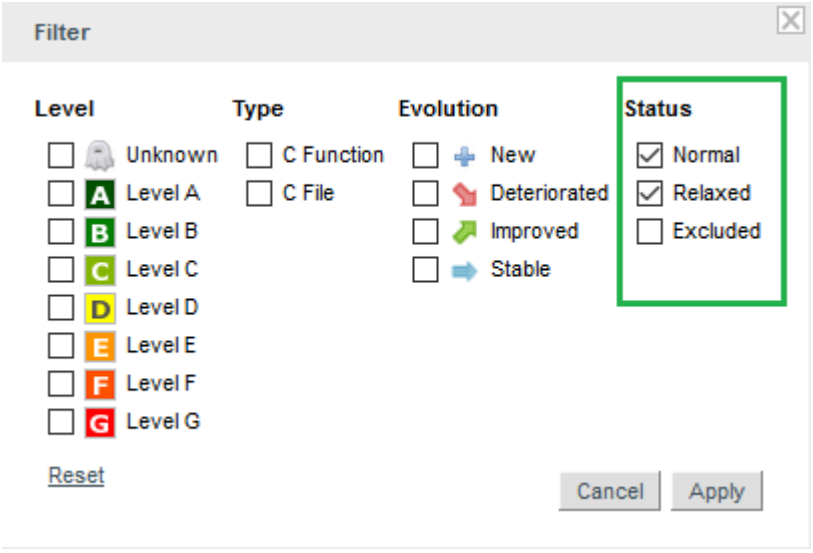


The improved rating of the Mars project after a new analysis

Tip

When you relax an artefact, the action items and findings relevant to this artefact are hidden, except when you specifically click on the relaxed artefact. If you want to show them, you can do so by clicking the Include Relaxed Artefacts option from the Explorer Settings menu.

You can show or hide relaxed and excluded artefacts by checking the boxes with the appropriate status in the filter popup:



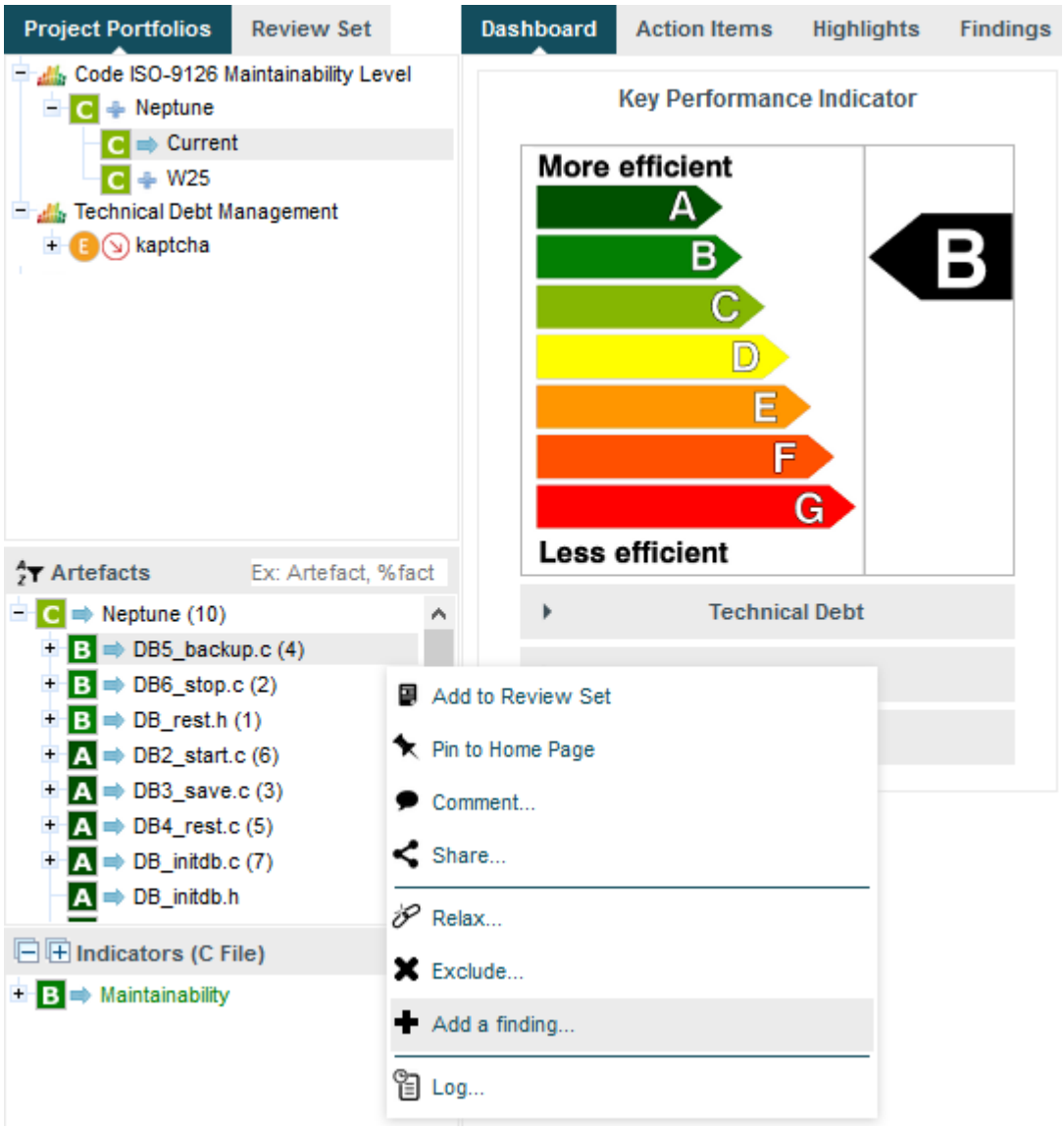
The artefact statuses shown by default in the Artefact Tree

6.5. Adding Findings Manually

If you notice that a violation in the code or an issue in the project was not detected during an analysis, you can decide to create a finding manually from the Artefact Tree.

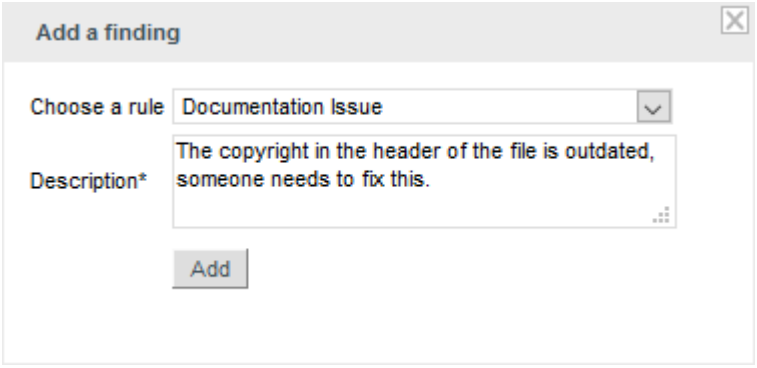
> **Note**
> This feature, like the creation of manual artefacts (see Section 9.2, “Adding and Removing Artefacts Manually”) is only available if your model was configured to support it. Consult your Squore administrator to verify if it is available in your configuration.

In this example, we add a finding to notify of a documentation issue in the Neptune project. Click on the Current version of the project, and display the context menu for the artefact where you consider that the documentation is wrong.



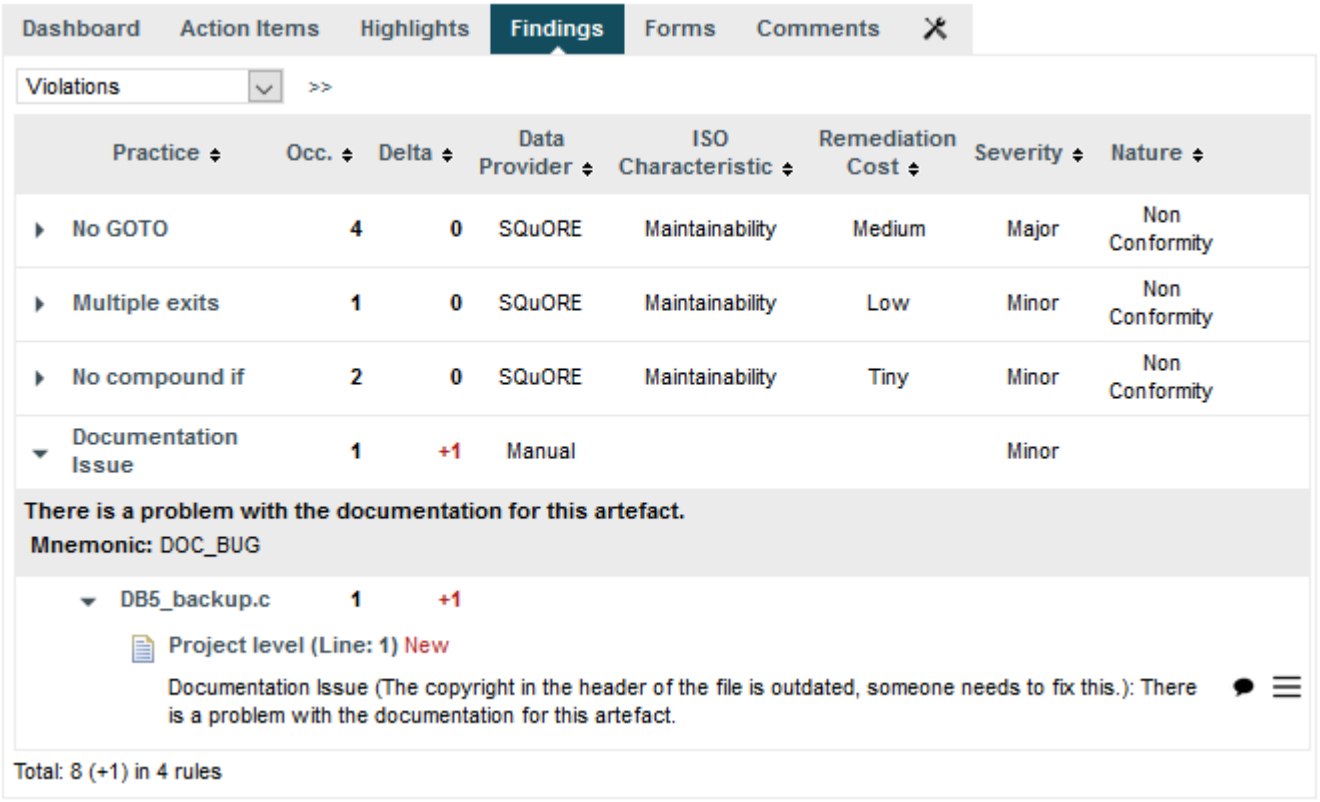
The artefact context menu with the Add a finding... option highlighted

When you click the **Add a finding...** option, a dialog appears and lets you select the type of finding to add, as well as a description of the issue:



The Add a finding... popup

Click **Add** to save the finding. You can check that it was added successfully in the Findings tab of the Explorer:

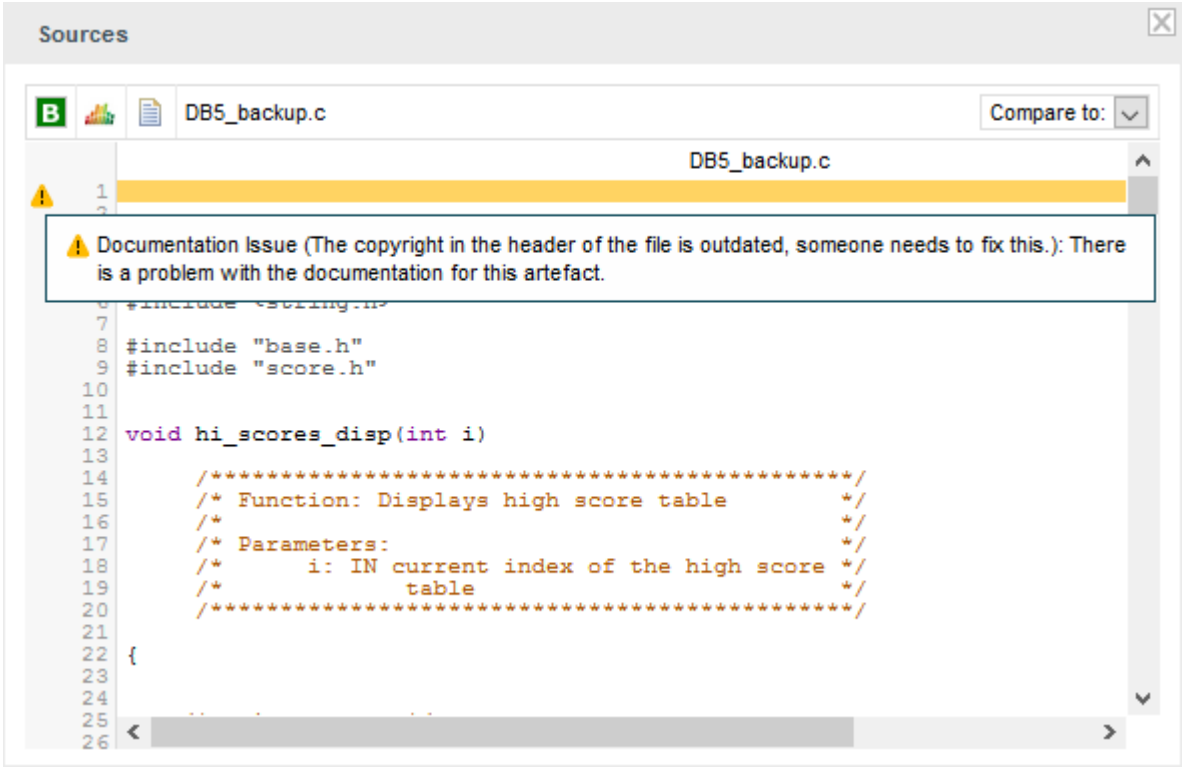


The Findings tab showing the manually added finding

Tip

Manual findings are displayed automatically in the Findings tab like other findings. If you want to filter them, use the advanced filter and select or exclude **[Manual]** in the Data Provider category.

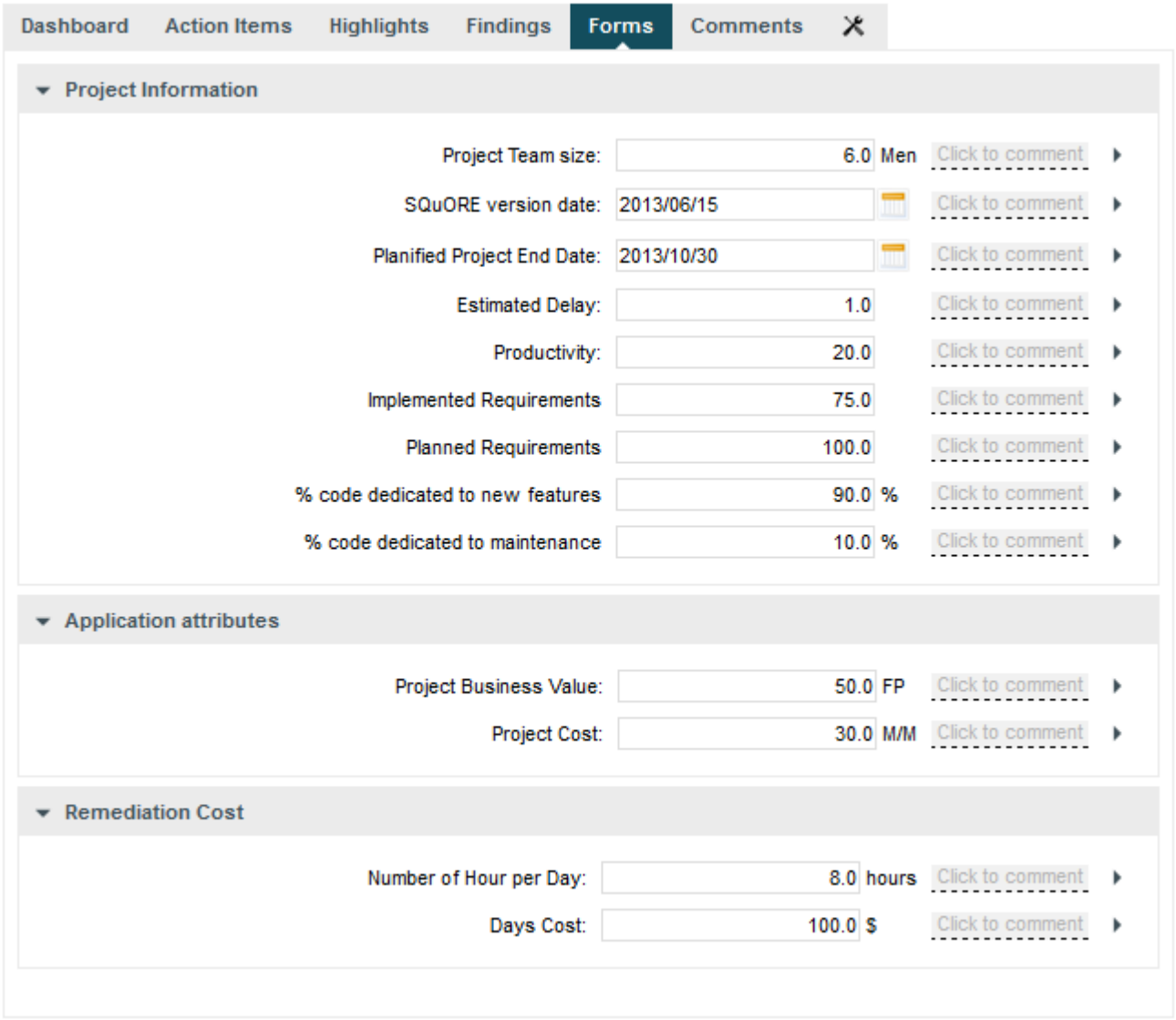
Like regular findings, yout finding also displays in the source code viewer, as show below:



The documentation issue is visible on line 1 of the file it was added to

6.6. Working with Forms and Checklists

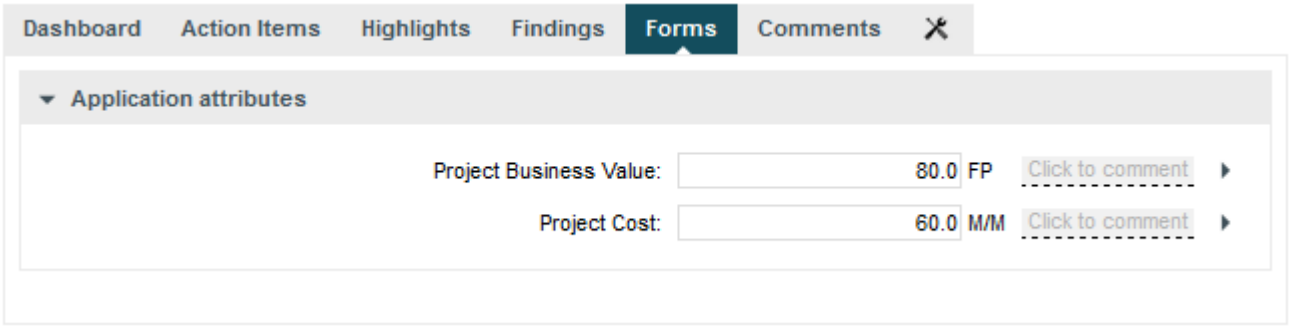
Squore lets you view and edit project attributes in a dedicated form tab of the explorer. You can therefore design your wizards to present checklists to a user. They can fill in the values manually after an analysis and they will be taken into account when creating the next version of the project. There are permissions associated with editing form values, so you can make them read-only for guests but read-write for project managers. The attributes displayed on the Forms tab depend on the type of the current artefact, and values are saved individually for each artefact in the project.



An example form

Note
To begin working with forms, make sure you select the Current version of the project in the tree and that the **Forms** tab is visible in the Explorer.

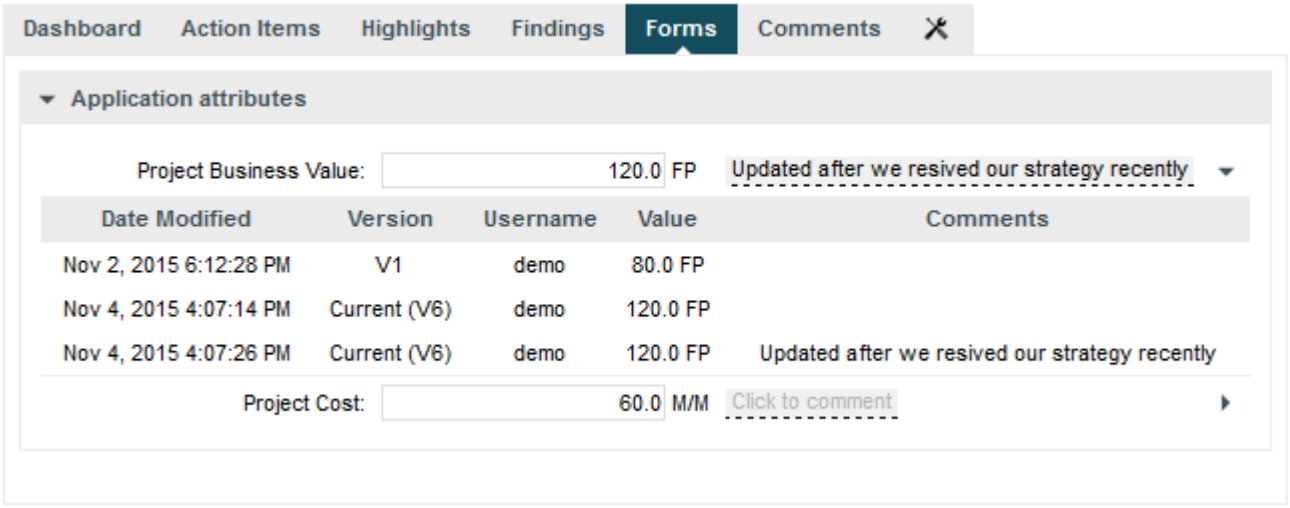
When you click a project in the Project Portfolios and view the Forms tab of the Explorer, all the project attributes available at application level are displayed, as shown below:



The Forms tab for the Earth project

The values displayed correspond to the application attributes passed when the last version of Earth was created. Users with the whose role grants them the Modify Artefacts Attributes privilege can edit the current value of the form for any artefact, and the value will be taken into account during the next analysis.

When you modify the values in the form, you can use the comment field to justify the change you made. A history of the modifications can be displayed by expanding the attribute field, as shown below



A history of modifications for the **Project Business Value** attribute

6.7. What Does This Measure Mean Exactly?

If you have doubts about the measures computed by Squore and their meaning, they can usually be solved by looking at the **Measures** tab of the Explorer. The content of the measures tab is also always refreshed to reflect the data for the current artefact, and is organised in a table displaying the measure's mnemonic, full name, description and value for the current selection, as shown in the picture below.

Dashboard | Action Items | Highlights | Findings | Forms | Measures | Comments

Name	Mnemonic	Description	Value
A_CLASSES	A_CLASSES		0
A_MODULES	A_MODULES		1
Statements in A Functions	A_STAT	Number of executable statements in rated A functions	20
Analysability	FUANA_IDX	Sum of 'Analysability' technical debts divided by the total number of artefacts	0.19
Analysability	ANA	Level of 'Analysability'	0.12
Average Size of Statements	AVGS	Average number of operands and operators per executable statement.	6.71
Average Cyclomatic Complexity	AVGVG	Average Cyclomatic Complexities of the functions defined in the source file(s).	1.5
B_CLASSES	B_CLASSES		0
B_MODULES	B_MODULES		0
Statements in B Functions	B_STAT	Number of executable statements in rated B functions	0
C_CLASSES	C_CLASSES		0
C_MODULES	C_MODULES		3
Statements in C Functions	C_STAT	Number of executable statements in rated C functions	13
Code Cloning Ratio	CCR	Percentage of duplicated code of this artefact	0
Control Flow Token	CFT	Number of tokens in the control flow of functions	19
Algorithmic Cloning Ratio	CFTCR	Percentage of duplicated algorithms of this artefact, using control flow tokens	0
Changeability	FUCHAN_IDX	Sum of 'Changeability' technical debts divided by the total number of artefacts	0
Changeability	CHAN	Level of 'Changeability'	0.05
'Code Cloning' Technical Debt	CL TDEBT	'Code Cloning' Technical Debt	0
Number of Classes	CLASSES	Total number of source code classes.	0

1 2 3 4 5 6 7 8 9 10 » »» »»»

The table of measures for the DB5_backup.c

Measures can be sorted by mnemonic, name, description or value, and the sorting value is remembered when selecting another artefact in the tree so you can easily compare values.

6.8. How Do I Review And Manage Action Items Flagged by Squore?

Searching for issues in your applications can be a manual process, as explained in Section 6.1, “How do I understand and Improve My Ratings?”, but the analysis and decision models configured within Squore can automate this process by automatically suggesting items that require your attention after analysing the latest version of your code. This functionality can be accessed as part of the Explorer, in the **Action Items** tab. In this section, you will learn how to review Squore's suggestions and incorporate them into your own issue management tool.

Note that in order to change the status of action item, you must be working with the current draft version of a project. In order to follow the steps below, ensure that you select the current version of the Earth project,

click on the Action Items tab. A list of action items suggested by Squore appears in a table, as shown in the picture below:

Action Items | Highlights | Findings | Forms | Comments

Type: >>

Id	Type	Since	Action Type	Priority	Scope	Status
559	Poor code layout	V1	Code Review	Low	C File	Open
564	Hardly testable function	V4	Code Review	Medium	C Function	Open
558	Poor code layout	V1	Code Review	Low	C File	Open
568	Hardly testable function	Current (V6)	Code Review	Medium	C Function	Open
569	Potential cloned code	Current (V6)	Code Review	High	C Function	Open
563	Poor code layout	V4	Code Review	Low	C File	Open
561	Poor code layout	V3	Code Review	Low	C File	Open
573	Poor code layout	Current (V6)	Code Review	Low	C File	Open
572	Potential missing break in 'switch' case	Current (V6)	Debt Management	High	C Function	Open
574	Potential missing break in 'switch' case	Current (V6)	Debt Management	High	C Function	Open

acts to Review Set | ClearQuest | Export Selected Items

The action items table for the current version of the Earth project

You can filter action items if needed by using the filters above the table. The name given by Squore to the action item is the name defined in your analysis model for this alert. Priorities are also predefined, and your input is needed to validate or invalidate the reports based on your priorities.

In the action items list, 569, 572 and 574 are high priority, therefore their status should be changed to **Todo**.

If you are unsure about a report, you can click the action item ID to display the full details, which includes the location(s) in the source code that triggered the alarm:

	Id	Type	Since	Action Type	Priority	Scope	Status	Comments
▸	569	Potential cloned code	Current (V6)	Code Review	High	C Function	Open	
▾	572	Potential missing break in 'switch' case	Current (V6)	Debt Management	High	C Function	Open	

Potential missing 'break' statement in 'switch' statement in the function player_plays() in file apps/player.c. Check first if falling through the next case is intentional. If not, add the missing break else document the code to make explicit the purpose and relax the rule.

Artefact: player_plays()

Path: apps/player.c

- Fallthrough (1) player_plays()

Detailed View - 1 reasons

▸	574	Potential missing break in 'switch' case	Current (V6)	Debt Management	High	C Function	Open	

Action Item details for 572

You can review the code in a popup window before you decide to fix or relax the action item.

Finally, you can export the action items generated by Squore and feed them into your own issue tracker: Select the export format you want to use (CSV, ClearQuest, Mantis, XML, or any other custom format you defined in your configuration) and click the **Export** button to download the list to a file. You can also add all artefacts that triggered an action item to your Review Set by clicking the appropriate button.

> **Tip**
> If you are looking for a way to present action items instead of exporting them, you should look into Squore reporting functionality, described in Section 9.3, “Reporting Project Status”

6.9. Can I Perform Advanced Data Mining?

The Capitalisation Base provides statistics aggregates, distribution graphics and correlation coefficients across a portfolio of projects. To begin using the Capitalisation Base to understand historical trends about your projects and find out if your analysis models are suited to your development style, click the **Capitalisation Base** menu item in the Squore toolbar.

Portfolio | Statistics Aggregates | Distribution | Correlation

Name	Version	Rating	Analysis Model	Color	Owner	Build Time
Earth	V5	C	Code ISO-9126 Maintainability Level		demo	Nov 2, 2015 6:14:24 PM
Mars	V3.2.6	D	Code ISO-9126 Maintainability Level		demo	Nov 2, 2015 6:15:21 PM
Mercury	V2010B	D	Code ISO-9126 Maintainability Level		demo	Nov 2, 2015 6:17:56 PM
Neptune	W25	C	Code ISO-9126 Maintainability Level		demo	Nov 2, 2015 6:15:51 PM
Pluto	R9	C	Code ISO-9126 Maintainability Level		demo	Nov 2, 2015 6:16:48 PM
Saturn	Prel	D	Code ISO-9126 Maintainability Level		demo	Nov 2, 2015 6:18:29 PM
Uranus	B625	D	Code ISO-9126 Maintainability Level		demo	Nov 2, 2015 6:17:17 PM
Venus	Beta	A	Code ISO-9126 Maintainability Level		demo	Nov 2, 2015 6:16:20 PM

The Capitalisation Base Projects tab

In the projects tab, choose the projects that will be used to aggregate statistics. In the example below, we will look at statistics for the Earth and Mars projects, which both use the same analysis model and have similar overall ratings. Select Earth and Mars from the list and click the **Statistics Aggregates**.

The Statistics Aggregates tab offers an overview of all your projects' data by providing minimum, maximum, average, number of occurrences, deviation, mod, sum and median results. Results are based on all the measures of an artefact type. This means that you have to specify an artefact type before any data is displayed.

Portfolio | Statistics Aggregates | Distribution | Correlation

APPLICATION

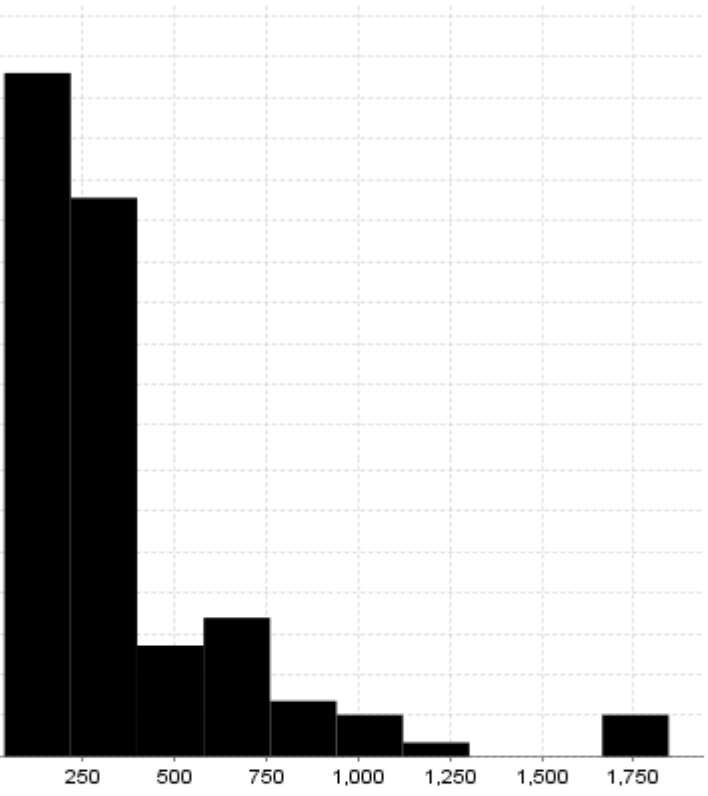
Measure	Min	Max	Occ.	Avg.	Dev.	Sum.	Med.	Mod.
A_CLASSES	0	0	8	0	0	0	0	0 (8: 100%)
A_MODULES	10	64	8	28.38	19.44	227	17	10 (1: 0%)
A_STAT	250	1,136	8	597.88	353.47	4,783	412	250 (1: 0%)
ANA_IDX	0.09	0.2	8	0.14	0.04	1.1	0.12	0.09 (1: 0%)
ANALYSABILITY	0.06	0.19	8	0.13	0.04	1.06	0.14	0.09 (2: 0%)
AVGVG	4.29	10.55	8	6.59	1.89	52.71	6.67	4.29 (1: 0%)
B_CLASSES	0	0	8	0	0	0	0	0 (8: 100%)
B_MODULES	1	44	8	10.38	14.04	83	2.5	2 (3: 0%)
B_STAT	24	1,530	8	370.38	483.91	2,963	98	84 (2: 0%)

The Capitalisation Base Statistics Aggregates at Application level

The Distribution tab offers the possibility to display any kind of distribution. The distribution is based on a measure of an artifact type. As a result, you have to select both an **Artefact type** and a **Measure** before you see any results. Note that you can change the parameters of the distribution graph by adjusting the number of bars, and the minimum and maximum values for the axes. The picture below shows the distribution of lines of code (a measure called LC) across all artefacts of type FILE for Mars and Earth.

Statistics Aggregates | Distribution | Correlation

LC



Use Default

36

1845

10

Frequency | Percentile

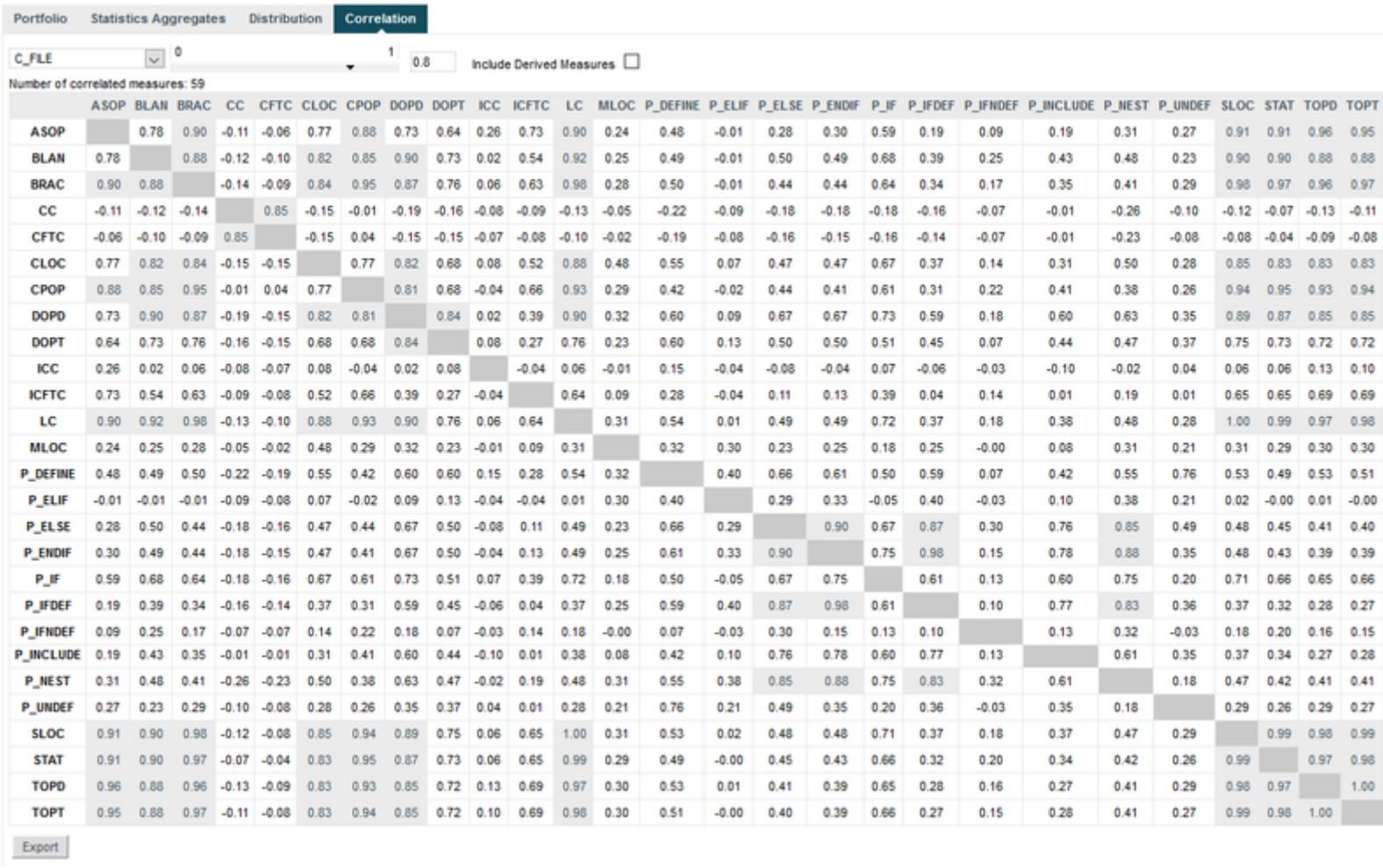
Value	Number	Cumulative Number	Frequency	Cumulative Fr
36	2	2	1.69%	
59	2	4	1.69%	
60	1	5	0.85%	
66	1	6	0.85%	
77	1	7	0.85%	
89	1	8	0.85%	
91	5	13	4.24%	
99	2	15	1.69%	
101	2	17	1.69%	
108	4	21	3.39%	
111	1	22	0.85%	
113	5	27	4.24%	
116	2	29	1.69%	
127	4	33	3.39%	
131	5	38	4.24%	
134	2	40	1.69%	
138	1	41	0.85%	
140	2	43	1.69%	
158	1	44	0.85%	
169	1	45	0.85%	
181	2	47	1.69%	
186	2	49	1.69%	
233	2	51	1.69%	
235	1	52	0.85%	
241	2	54	1.69%	

1 2 3 »

The Capitalisation Base Distribution Graph for lines of code per file

The Correlation tab displays the matrix of correlation of any data stored in the Squore database. Correlations are computed between artefacts of the same type, so you have to select the artefact type before any data is displayed. Squore highlights cells in the table in which correlations are above the threshold defined by moving

the slider or entering a correlation coefficient directly in the text box provided. You can choose to include derived data by checking the box above the matrix table.



	ASOP	BLAN	BRAC	CC	CFTC	CLOC	CPOP	DOPD	DOPT	ICC	ICFTC	LC	MLOC	P_DEFINE	P_ELIF	P_ELSE	P_ENDIF	P_IF	P_IFDEF	P_IFNDEF	P_INCLUDE	P_NEST	P_UNDEF	SLOC	STAT	TOPD	TOPT
ASOP		0.78	0.90	-0.11	-0.06	0.77	0.88	0.73	0.64	0.26	0.73	0.90	0.24	0.48	-0.01	0.28	0.30	0.59	0.19	0.09	0.19	0.31	0.27	0.91	0.91	0.96	0.95
BLAN	0.78		0.88	-0.12	-0.10	0.82	0.85	0.90	0.73	0.02	0.54	0.92	0.25	0.49	-0.01	0.50	0.49	0.68	0.39	0.25	0.43	0.48	0.23	0.90	0.90	0.88	0.88
BRAC	0.90	0.88		-0.14	-0.09	0.84	0.95	0.87	0.76	0.06	0.63	0.98	0.28	0.50	-0.01	0.44	0.44	0.64	0.34	0.17	0.35	0.41	0.29	0.98	0.97	0.96	0.97
CC	-0.11	-0.12	-0.14		0.85	-0.15	-0.01	-0.19	-0.16	-0.08	-0.09	-0.13	-0.05	-0.22	-0.09	-0.18	-0.18	-0.18	-0.16	-0.07	-0.01	-0.26	-0.10	-0.12	-0.07	-0.13	-0.11
CFTC	-0.06	-0.10	-0.09	0.85		-0.15	0.04	-0.15	-0.15	-0.07	-0.08	-0.10	-0.02	-0.19	-0.08	-0.16	-0.15	-0.16	-0.14	-0.07	-0.01	-0.23	-0.08	-0.08	-0.04	-0.09	-0.08
CLOC	0.77	0.82	0.84	-0.15	-0.15		0.77	0.82	0.68	0.08	0.52	0.88	0.48	0.55	0.07	0.47	0.47	0.67	0.37	0.14	0.31	0.50	0.28	0.85	0.83	0.83	0.83
CPOP	0.88	0.85	0.95	-0.01	0.04	0.77		0.81	0.68	-0.04	0.66	0.93	0.29	0.42	-0.02	0.44	0.41	0.61	0.31	0.22	0.41	0.38	0.26	0.94	0.95	0.93	0.94
DOPD	0.73	0.90	0.87	-0.19	-0.15	0.82	0.81		0.84	0.02	0.39	0.90	0.32	0.60	0.09	0.67	0.67	0.73	0.59	0.18	0.60	0.63	0.35	0.89	0.87	0.85	0.85
DOPT	0.64	0.73	0.76	-0.16	-0.15	0.68	0.68	0.84		0.08	0.27	0.76	0.23	0.60	0.13	0.50	0.50	0.51	0.45	0.07	0.44	0.47	0.37	0.75	0.73	0.72	0.72
ICC	0.26	0.02	0.06	-0.08	-0.07	0.08	-0.04	0.02	0.08		-0.04	0.06	-0.01	0.15	-0.04	-0.08	-0.04	0.07	-0.06	-0.03	-0.10	-0.02	0.04	0.06	0.06	0.13	0.10
ICFTC	0.73	0.54	0.63	-0.09	-0.08	0.52	0.66	0.39	0.27	-0.04		0.64	0.09	0.28	-0.04	0.11	0.13	0.39	0.04	0.14	0.01	0.19	0.01	0.65	0.65	0.69	0.69
LC	0.90	0.92	0.98	-0.13	-0.10	0.88	0.93	0.90	0.76	0.06	0.64		0.31	0.54	0.01	0.49	0.49	0.72	0.37	0.18	0.38	0.48	0.28	1.00	0.99	0.97	0.98
MLOC	0.24	0.25	0.28	-0.05	-0.02	0.48	0.29	0.32	0.23	-0.01	0.09	0.31		0.32	0.30	0.23	0.25	0.18	0.25	-0.00	0.08	0.31	0.21	0.31	0.29	0.30	0.30
P_DEFINE	0.48	0.49	0.50	-0.22	-0.19	0.55	0.42	0.60	0.60	0.15	0.28	0.54	0.32		0.40	0.66	0.61	0.50	0.59	0.07	0.42	0.55	0.76	0.53	0.49	0.53	0.51
P_ELIF	-0.01	-0.01	-0.01	-0.09	-0.08	0.07	-0.02	0.09	0.13	-0.04	-0.04	0.01	0.30	0.40		0.29	0.33	-0.05	0.40	-0.03	0.10	0.38	0.21	0.02	-0.00	0.01	-0.00
P_ELSE	0.28	0.50	0.44	-0.18	-0.16	0.47	0.44	0.67	0.50	-0.08	0.11	0.49	0.23	0.66	0.29		0.90	0.67	0.87	0.30	0.76	0.85	0.49	0.48	0.45	0.41	0.40
P_ENDIF	0.30	0.49	0.44	-0.18	-0.15	0.47	0.41	0.67	0.50	-0.04	0.13	0.49	0.25	0.61	0.33	0.90		0.75	0.98	0.15	0.78	0.88	0.35	0.48	0.43	0.39	0.39
P_IF	0.59	0.68	0.64	-0.18	-0.16	0.67	0.61	0.73	0.51	0.07	0.39	0.72	0.18	0.50	-0.05	0.67	0.75		0.61	0.13	0.60	0.75	0.20	0.71	0.66	0.65	0.66
P_IFDEF	0.19	0.39	0.34	-0.16	-0.14	0.37	0.31	0.59	0.45	-0.06	0.04	0.37	0.25	0.59	0.40	0.87	0.98	0.61		0.10	0.77	0.83	0.36	0.37	0.32	0.28	0.27
P_IFNDEF	0.09	0.25	0.17	-0.07	-0.07	0.14	0.22	0.18	0.07	-0.03	0.14	0.18	-0.00	0.07	-0.03	0.30	0.15	0.13	0.10		0.13	0.32	-0.03	0.18	0.20	0.16	0.15
P_INCLUDE	0.19	0.43	0.35	-0.01	-0.01	0.31	0.41	0.60	0.44	-0.10	0.01	0.38	0.08	0.42	0.10	0.76	0.78	0.60	0.77	0.13		0.61	0.35	0.37	0.34	0.27	0.28
P_NEST	0.31	0.48	0.41	-0.26	-0.23	0.50	0.38	0.63	0.47	-0.02	0.19	0.48	0.31	0.55	0.38	0.85	0.88	0.75	0.83	0.32	0.61		0.18	0.47	0.42	0.41	0.41
P_UNDEF	0.27	0.23	0.29	-0.10	-0.08	0.28	0.26	0.35	0.37	0.04	0.01	0.28	0.21	0.76	0.21	0.49	0.35	0.20	0.36	-0.03	0.35	0.18		0.29	0.26	0.29	0.27
SLOC	0.91	0.90	0.98	-0.12	-0.08	0.85	0.94	0.89	0.75	0.06	0.65	1.00	0.31	0.53	0.02	0.48	0.48	0.71	0.37	0.18	0.37	0.47	0.29		0.99	0.98	0.99
STAT	0.91	0.90	0.97	-0.07	-0.04	0.83	0.95	0.87	0.73	0.06	0.65	0.99	0.29	0.49	-0.00	0.45	0.43	0.66	0.32	0.20	0.34	0.42	0.26	0.99		0.97	0.98
TOPD	0.96	0.88	0.96	-0.13	-0.09	0.83	0.93	0.85	0.72	0.13	0.69	0.97	0.30	0.53	0.01	0.41	0.39	0.65	0.28	0.16	0.27	0.41	0.29	0.98	0.97		1.00
TOPT	0.95	0.88	0.97	-0.11	-0.08	0.83	0.94	0.85	0.72	0.10	0.69	0.98	0.30	0.51	-0.00	0.40	0.39	0.66	0.27	0.15	0.28	0.41	0.27	0.99	0.98	1.00	

The Capitalisation Base correlation table for files measures with a highlighting threshold of 0.8

Tip

Base measures are the ones directly reported by various tools included in the analysis. Derived measures are metrics computed based on these base measures or other derived measures. You can choose to export the results of the correlation matrix to a CSV file. The resulting CSV file contains all metrics pairs for which a correlation exists.

7. Track Your Favourite Indicators

By clicking on My Favourites in the main menu bar, you can view all the charts you marked as favourite in the dashboards across all of your projects. You can group charts into lists and reorder them as you see fit. The charts you mark as favourites are also the ones that are accessible to view on your mobile devices when away from your desk. This section covers everything you need to know about favourites and Squore's mobile interface: Squore Mobile.

7.1. Building a cross-project Dashboard in My Favourites

Each of the chart thumbnails has a star (★) icon that you can click to mark a chart as favourite.

Clicking a star icon opens the chart viewer on the Favourites tab, as shown below:

Adding a favourite in the chart viewer

The popup allows you to:

- Type a custom title and description for your chart so that you can for example write down why you are monitoring it.
- Select a list of favourites to add the chart to. By default, your charts are added to a list called Unsorted Favourites. You can create more lists and move charts between lists from the My Favourites page.

- Select a version of the chart to display. The latest version is selected by default (**Last Version**), but you can alternatively select the exact version you clicked on (**Current Version**), or the latest baseline(**Last Baseline**).

When you are satisfied with your choices, click on **Save** to add the chart to your favourites. You can add charts from any project you have access to.

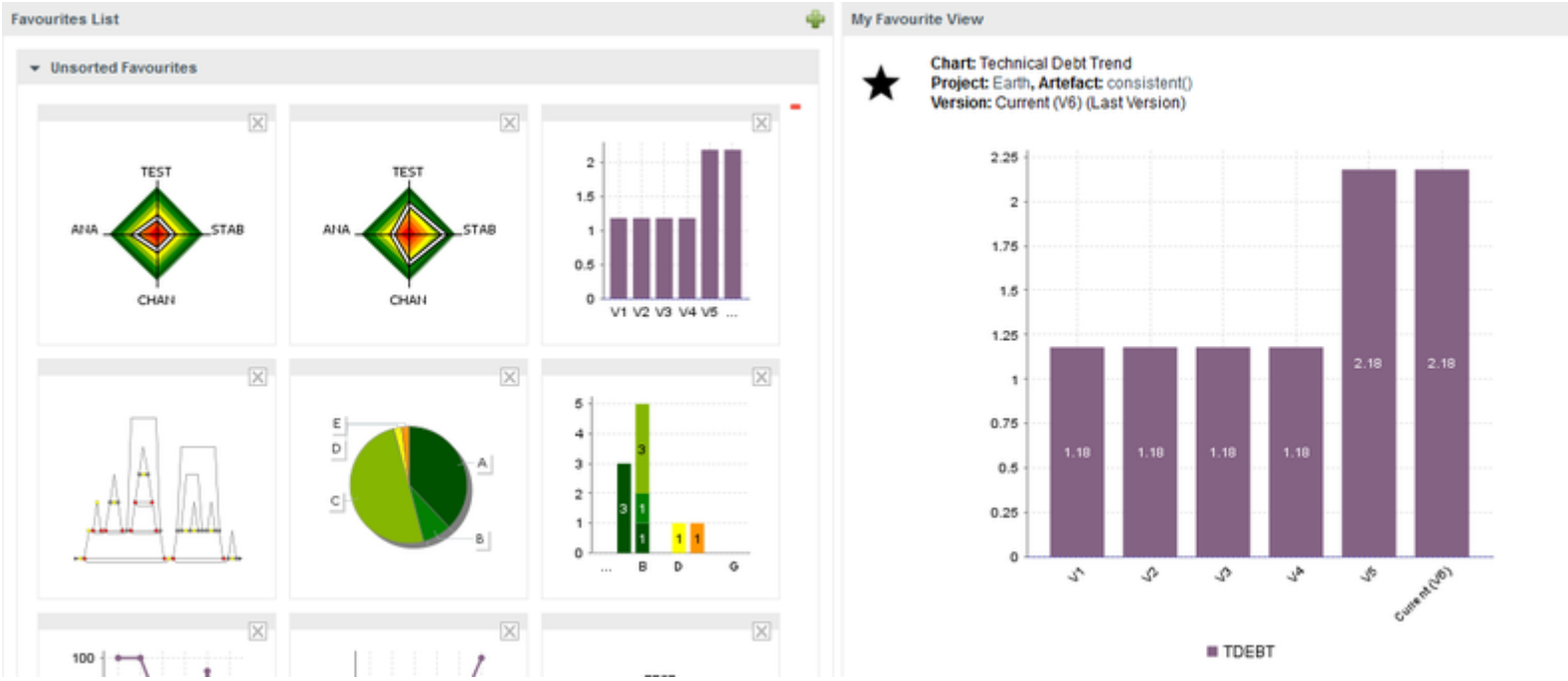
Refer to the next section to learn how to view and manage the charts you saved as favourites.

7.2. Managing Favourites

All the charts you added from the Explorer were added to a list called Unsorted Favourites. You can delete this list and create other lists using the and icons.

When you have more than one list, you can drag and drop charts between lists.

In order to see the full size of a chart you marked as favourite, click its thumbnail on the left pane to open it in the right pane. The screenshot below shows an example of a list of favourites and a maximised chart. Note that the right pane contains links that allow you to go back to the project's or artefact's dashboard directly.

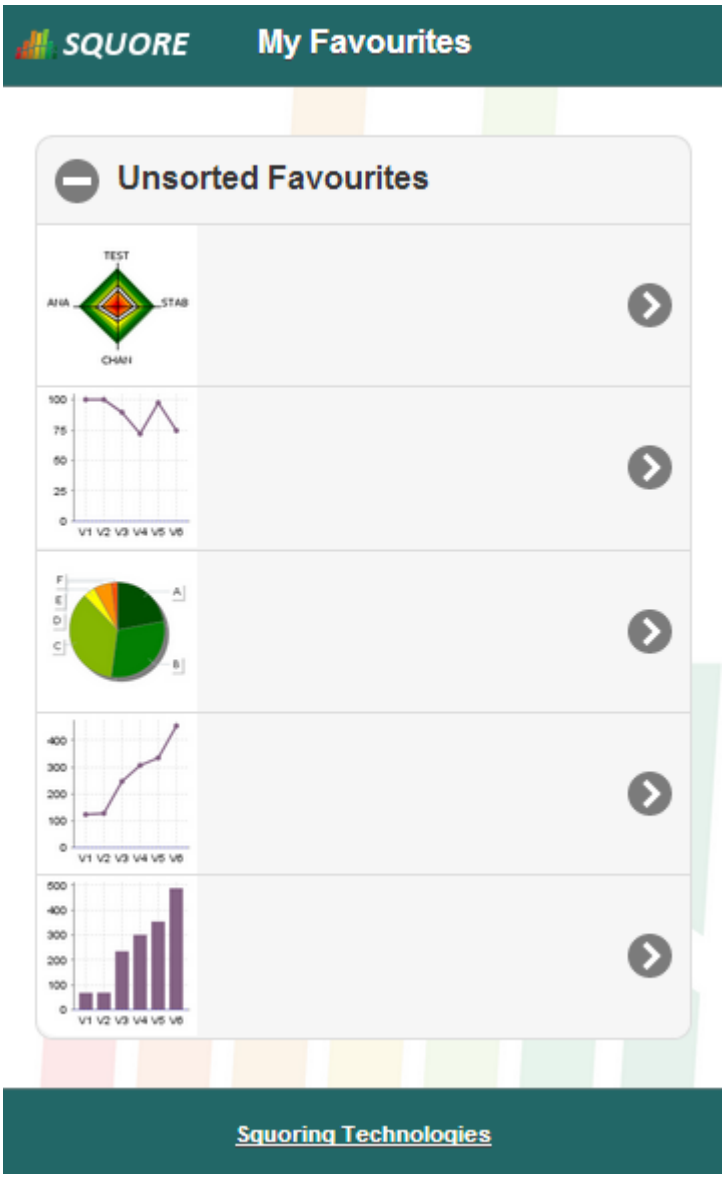


The full **My Favourites** page

7.3. Squore Mobile

The list of charts you marked as favourites in Squore is the list of charts you can access via Squore Mobile

Squore Mobile is a touch-friendly interface for Squore that is accessible from http://localhost:8180/SQuORE_Server/Mobile.



Squore Mobile

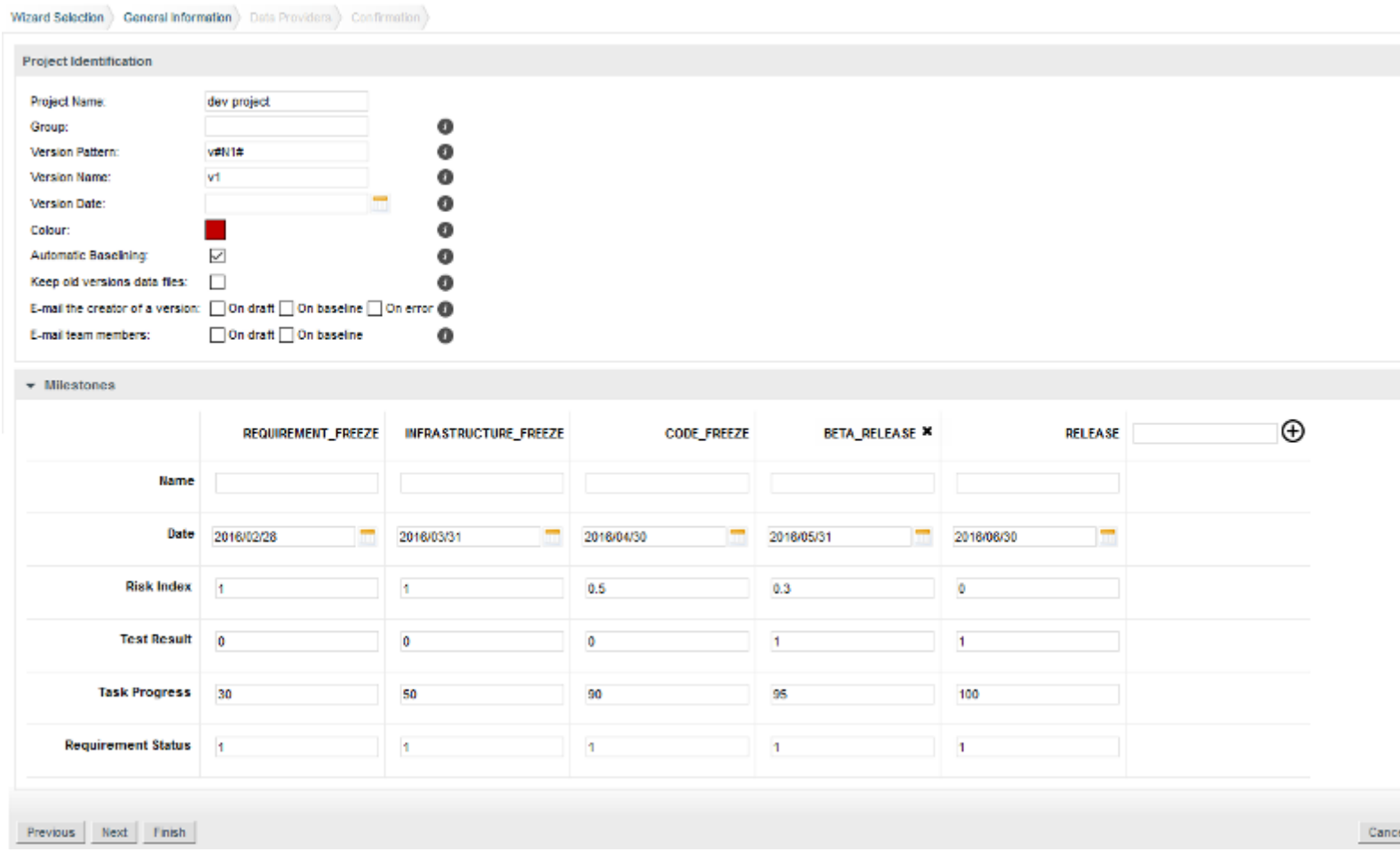
When you log into Squore Mobile, you can swipe through all the charts you added to your favourite lists from your mobile device.

8. Focus on Your Milestones

Squore allows tracking your progress according to milestones, which consist of a series of goals for specific metrics at certain dates in the life of your project. In this chapter, you will learn how to set up these goals and how to read dashboard charts that show deviations from these goals or changes in your project milestones.

8.1. Setting up Goals

Not all models support milestones, but if yours does, you will see a Milestones pane on the first page of the project creation wizard. The Milestones pane is where you can see the existing milestones for a project, with their associated goals and dates.



The Milestones pane in the project wizard

In the example above, our model defines 5 milestones for the lifecycle of our project:

1. *Requirements review*
2. *Infrastructure Complete*
3. *Code Complete*
4. *Beta Release*
5. *Final Release*

Each milestone has a set date and defines goals for 4 key performance indicators in our project:

- **Risk Index**
- **Test Result**
- **Task Progress**
- **Requirement Status**

The Milestones pane allows you to change the dates and goals for your project. If a milestone is optional and is not relevant for your project, you can remove it by clicking the **x** next to its name. This is possible for the *Beta Release* milestone above. By clicking the **+** icon to the right of the last milestone, you can create a new milestone for the project and define your own goals.

When you are satistied with the milestones set for your project, click the **Next** button to continue with the creation of the project.

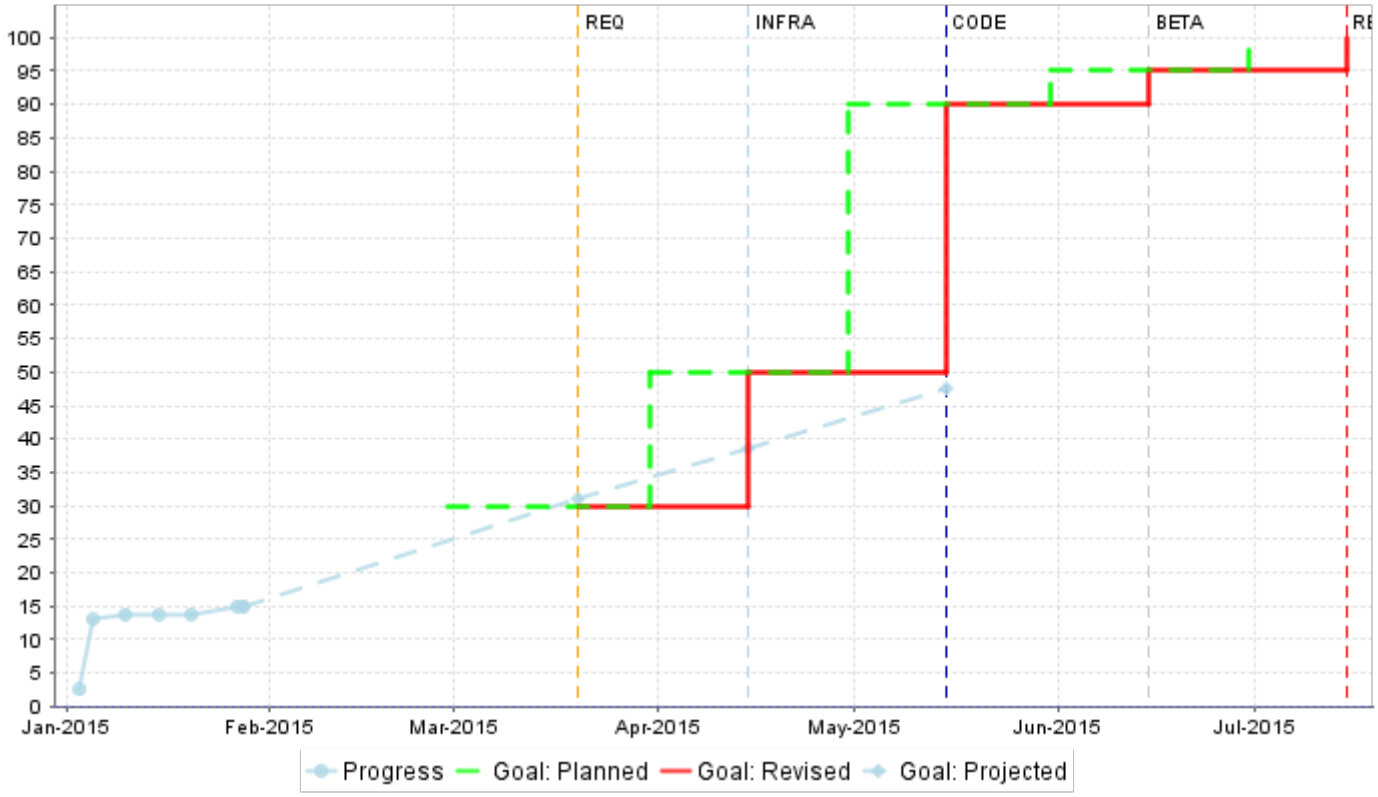
Goals and dates can be modified every time you create a new version of the project if you decide that your schedule slips. Goals and dates are versioned, so your dashboard can always show you when in the timeline of your project you decided to change your milestones.

8.2. Milestones on your Dashboard

When you consult the dashboard of a project that uses milestones, the functionality allows you to:

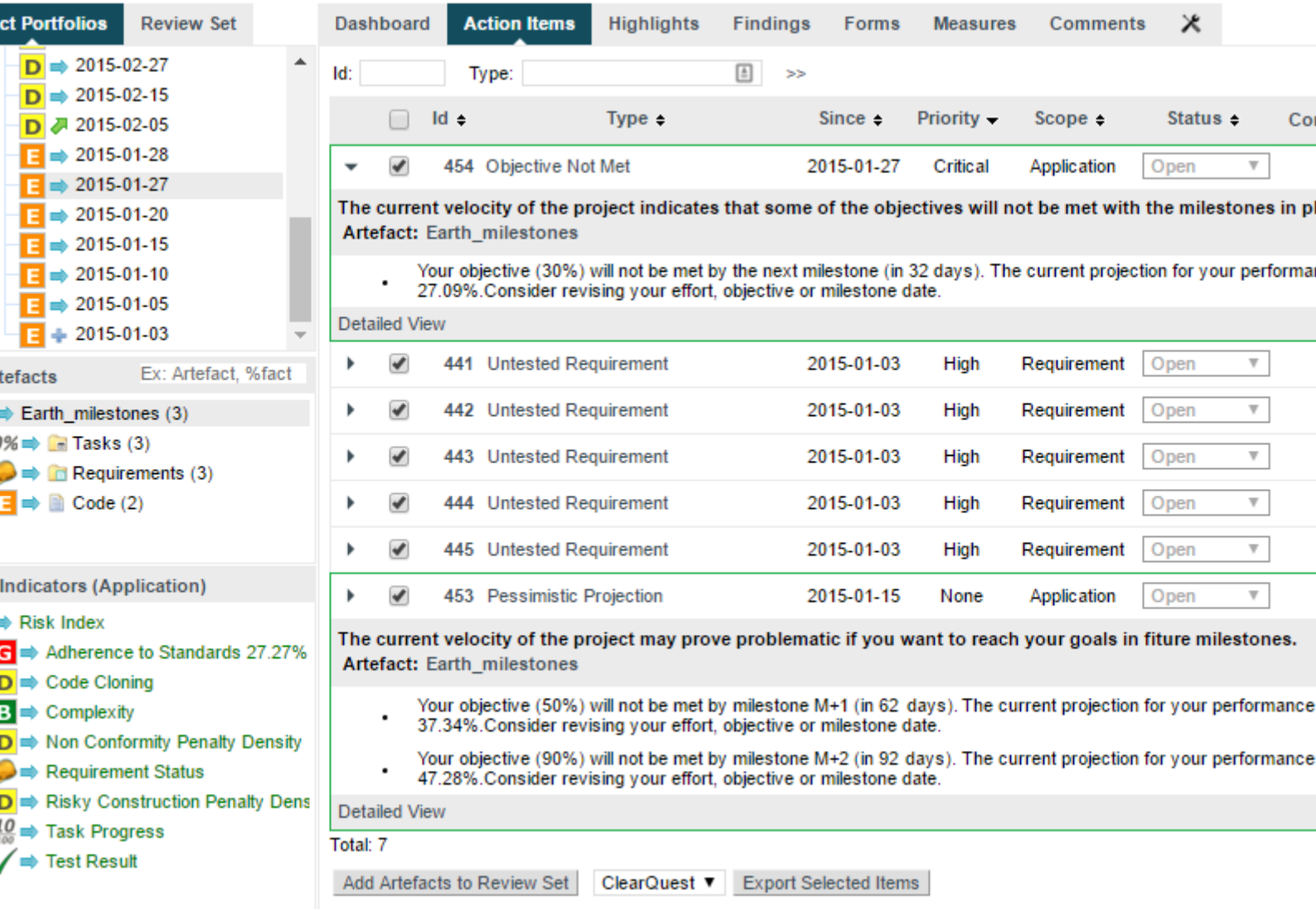
- Display the goals defined for each milestone in your project
- Display the changes made to the goals defined for each milestone
- Display the date changes for your milestones
- Show markers for milestone dates and goals

The following is an example of a chart that mixes objectives, projected performance and milestone date changes:



A chart tracking your progress, projected performance, goals and milestone date slips

Some action items on your model can also take advantage of this feature to warn you about poor performance:



Action items based on milestone dates and goals

Tip

For more information on how you can improve your model with milestones and the above chart and action items, refer to Appendix B, *Milestones Tutorial* and the Configuration Guide.

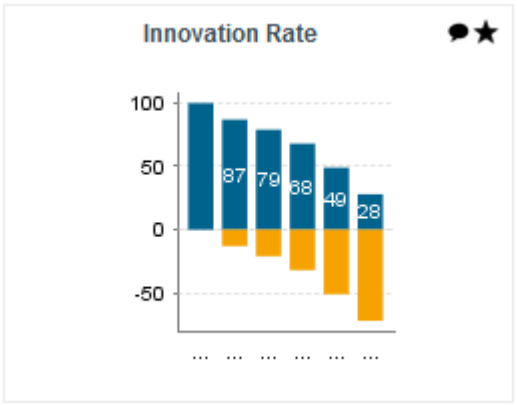
9. Communicating With Squore

9.1. Comments and Notifications

Squore allows posting comments about charts, artefacts, action items and findings. Users in a project team can view and reply to comments when they notice that a discussion thread has received new posts since their last visit. You can also choose when a discussion no longer accepts comments or is removed from the project. In this section, you will learn the basics of commenting all around the dashboard.

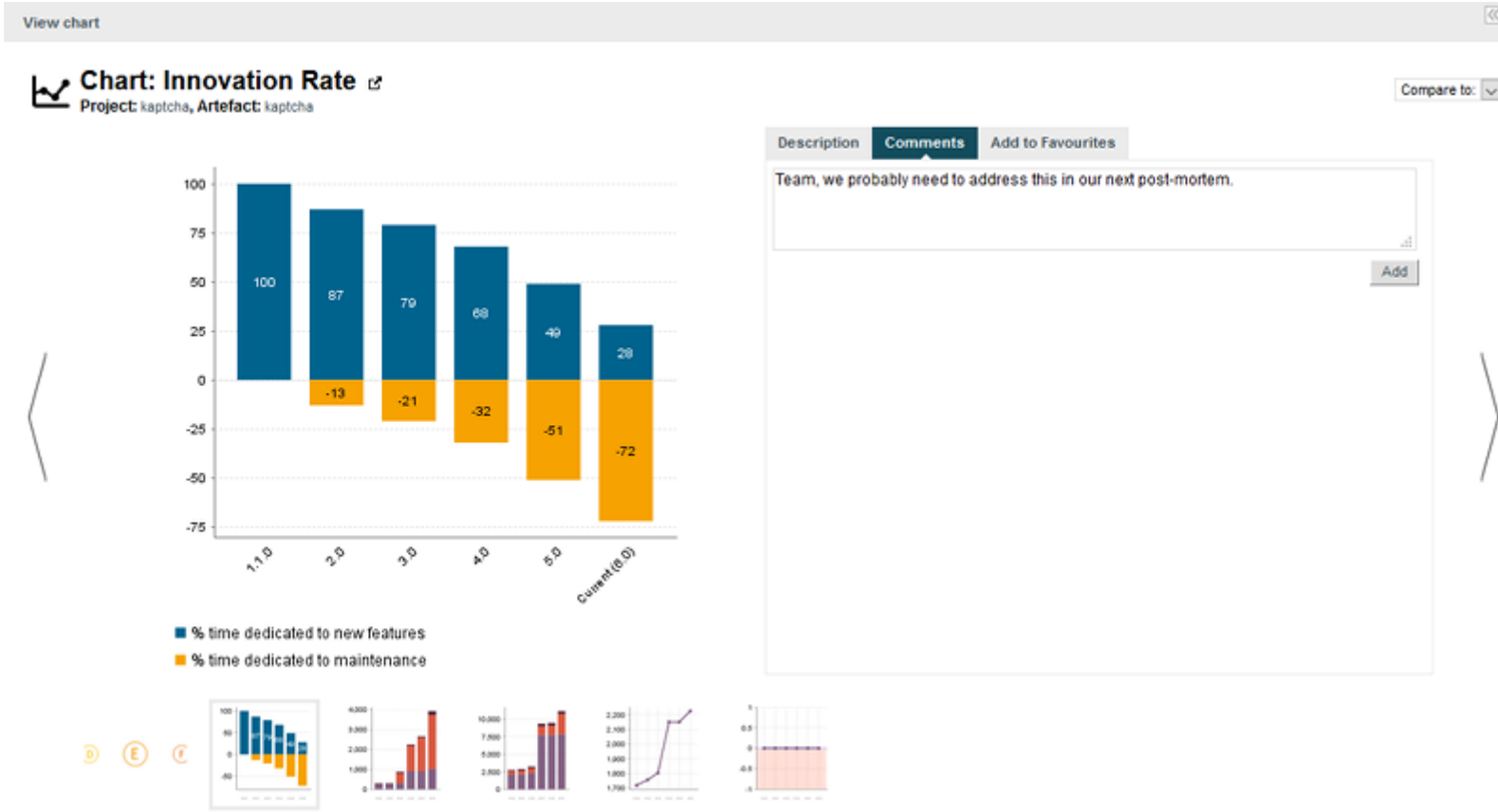
9.1.1. Commenting Charts

Every chart on your dashboard shows a speech bubble icon next to its title, as shown in the picture below:



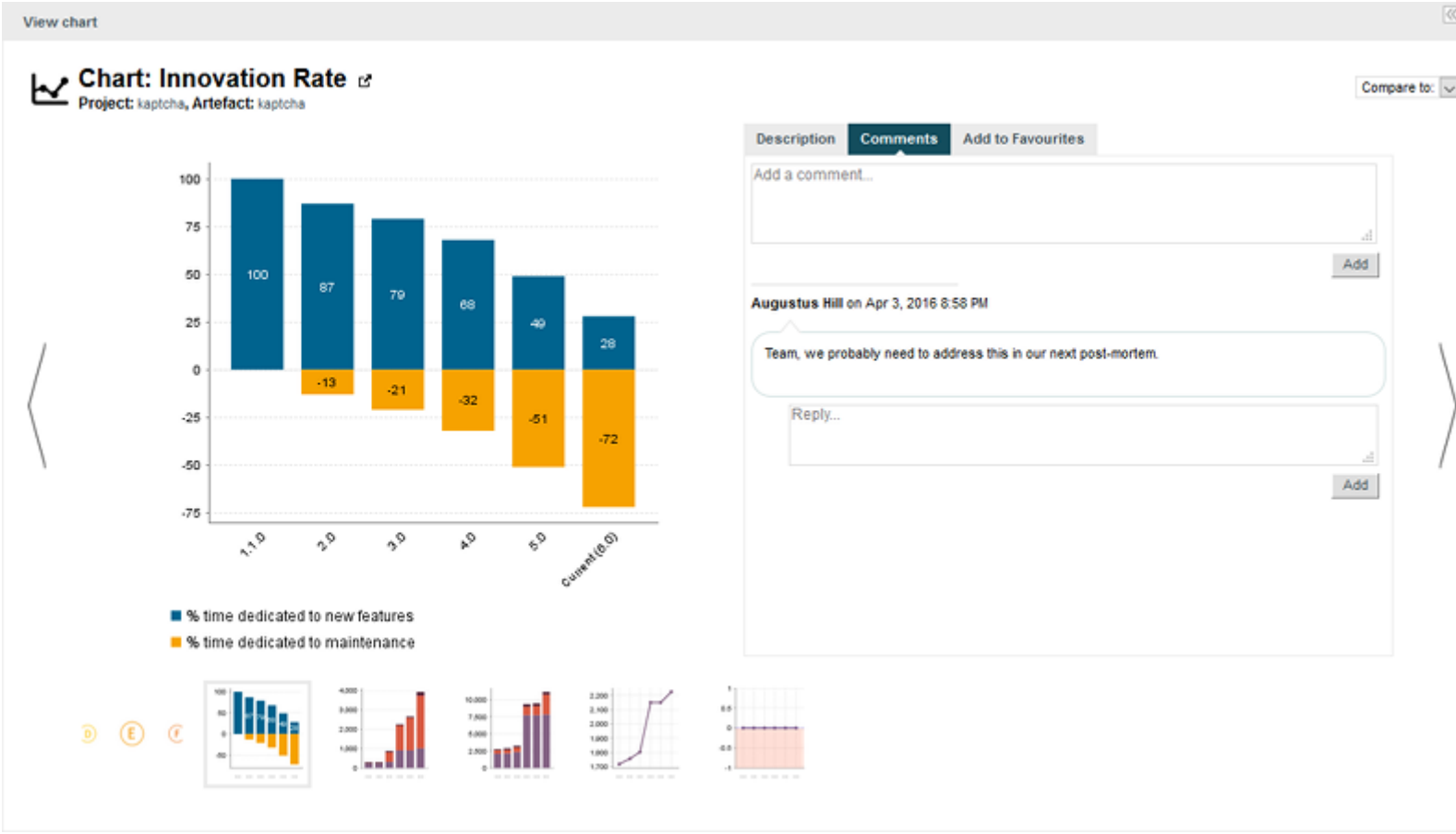
A chart thumbnail showing a speech bubble icon

Clicking the icon brings up the chart viewer on the comment tab, in which you can confirm which chart you are commenting on and type your comment.



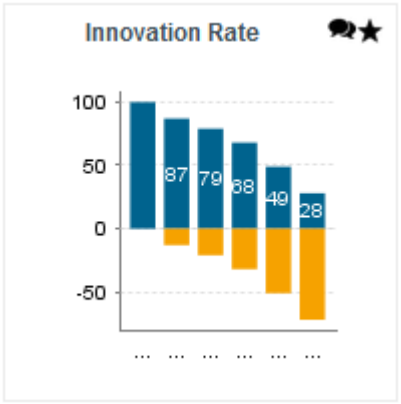
Typing a comment in the chart viewer

When you click **Add**, your comment is saved, and you can reply or add another comment.



The Comment pop-up after adding your first comment

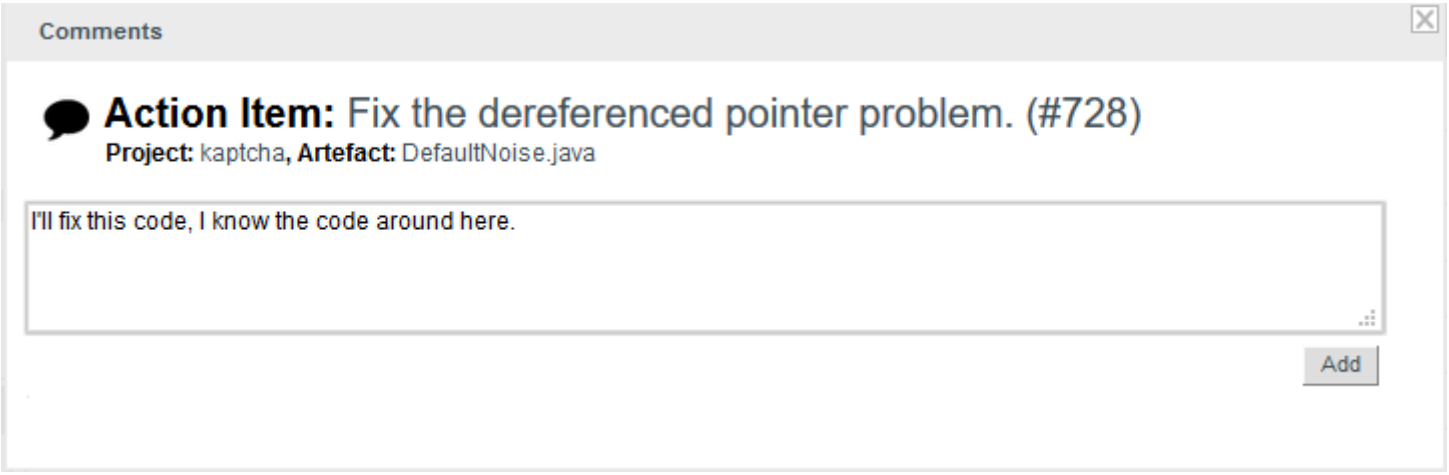
When you close the pop-up, notice that the speech bubble icon next to the chart you commented changes to indicate that a discussion about this item has been started.



A chart thumbnail with a discussion indicator

9.1.2. Commenting Action Items

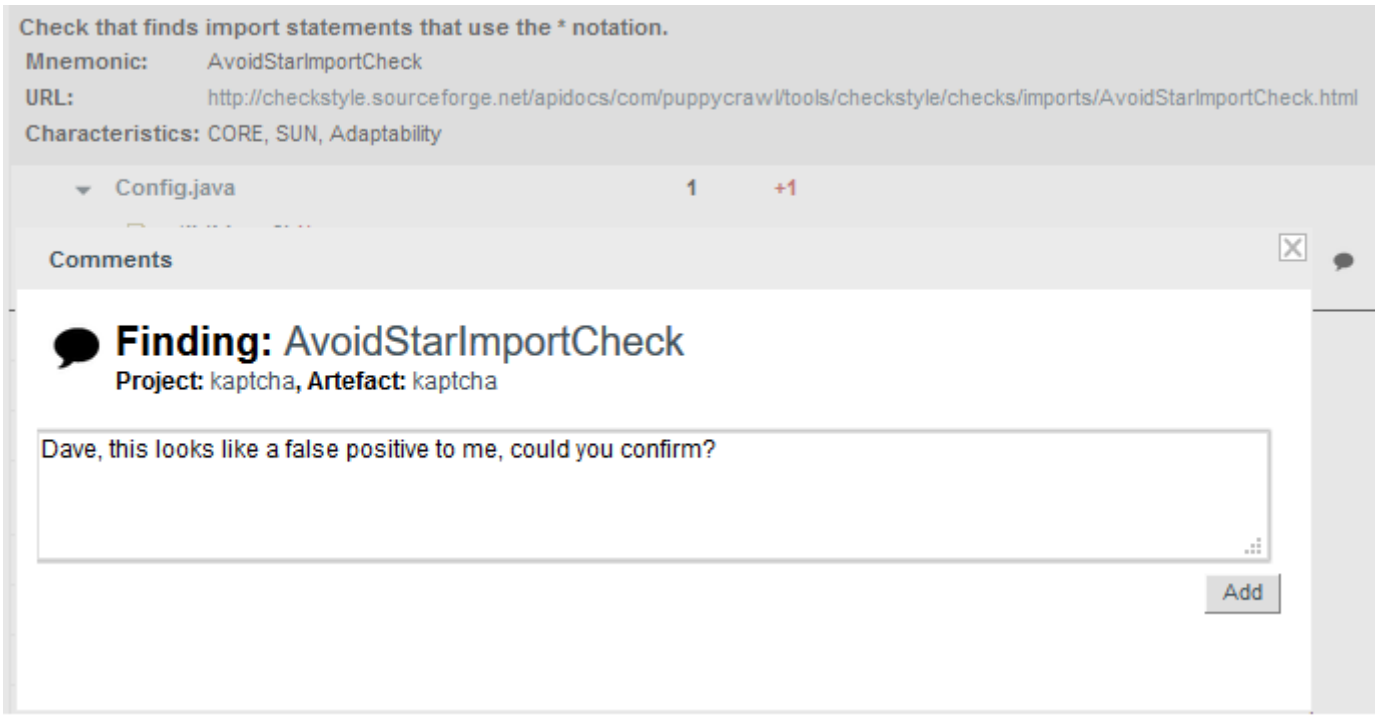
In the Action Items tab, you bring up the comment pop up by clicking the speech bubble in the **Comments** column of the table. Links allow you to jump to the Action Item's detailed description, the application level dashboard or the artefact dashboard directly.



A comment thread initiated about an Action Item

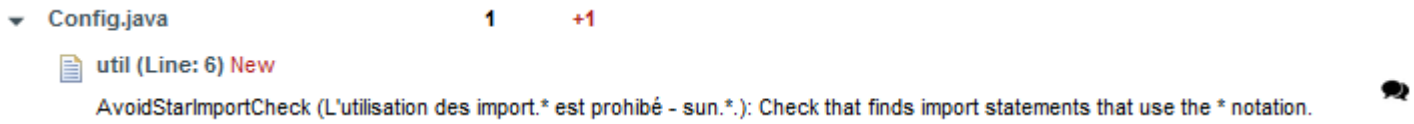
9.1.3. Commenting Findings

On the Findings tab, each violation shows a comment icon that you can click to start a discussion.



A comment thread initiated about an finding

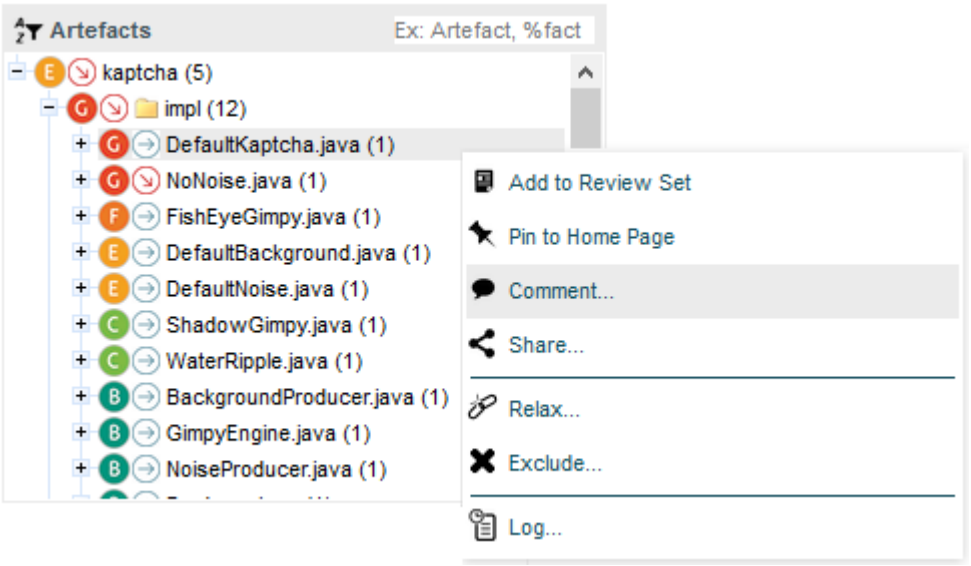
As on the Dashboard and Action Items tabs, the comment icon indicates whether a discussion has been started about a violation.



An ongoing discussion on the Findings tab

9.1.4. Commenting From the Artefact Tree

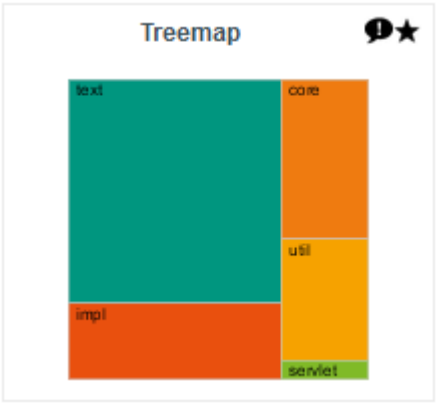
You can start discussions on artefacts by clicking **Comment...** item in the artefact action menu, as shown below:



The artefact context menu item to bring up the comment pop-up for artefacts

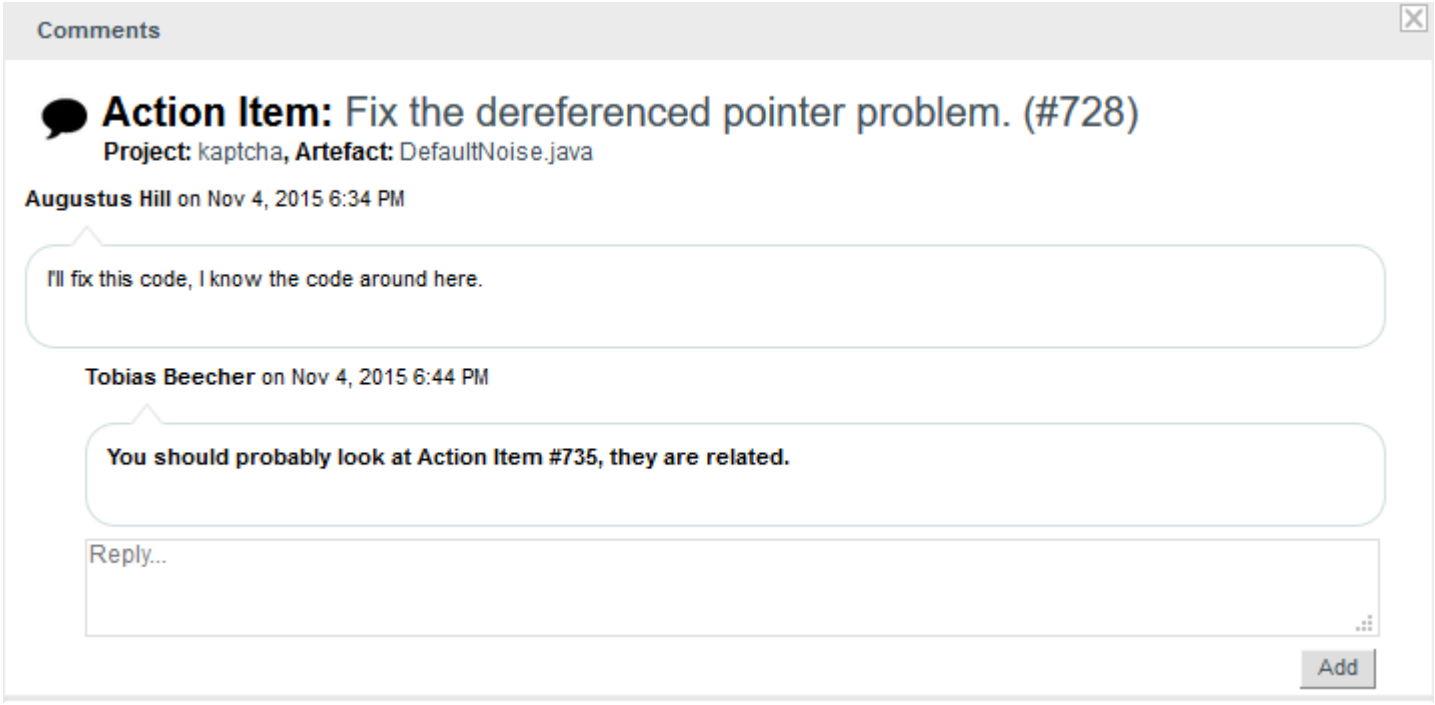
9.1.5. Following Discussions

When you log in to Squore, you can find out which discussions have new comments by looking at the items that show the **New Comment!** icon:



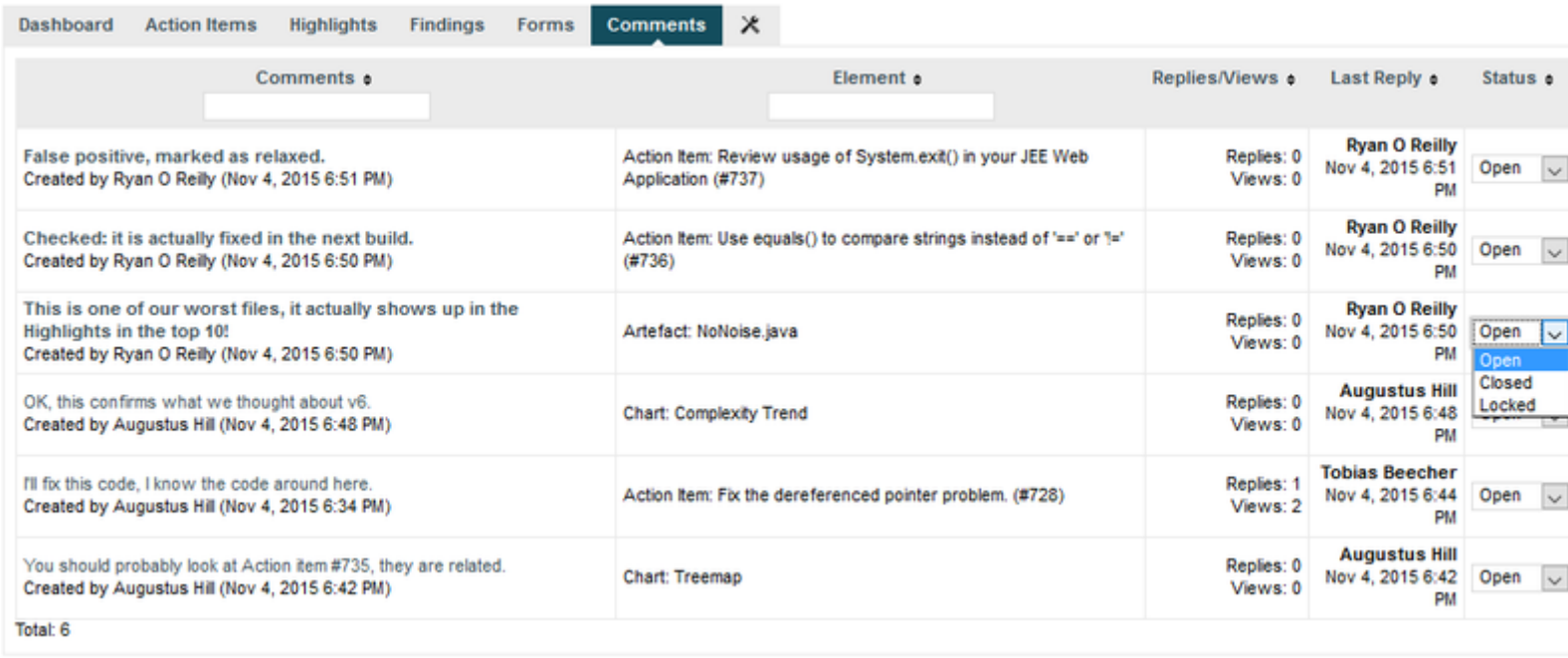
You have unread comments in the discussion about this chart

In the discussion pop-up, new comments since your last visit are highlighted:



A reply to my comment appears in bold

You can also get an exhaustive view of all the discussions for the project by viewing them in the **Comments** tab in the Explorer:



Overview of discussions about a project in the Comments tab

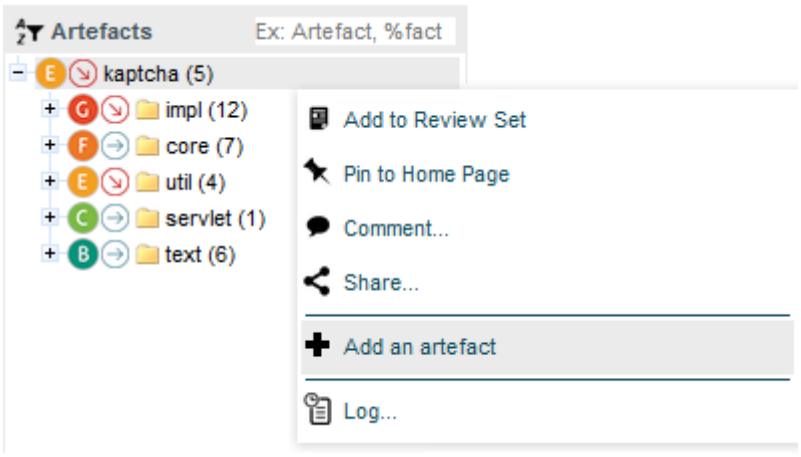
From this view, discussions can be set to one the following statuses:

- **Open:** New comments are accepted in this discussion
- **Closed:** No new comments are accepted in this discussion, and it will be deleted in the next analysis
- **Locked:** No new comments are accepted in this discussion, but the discussion thread will be saved for the next analyses

Tip
Any user in the project team can view and take part in all open conversations in the project.

9.2. Adding and Removing Artefacts Manually

While you review results and comments, you can add artefacts manually to your project as needed. To add an artefact, make sure you are on the Current version of the project and click the node to which you want to add a child artefact. If this node supports adding artefacts, the Add an Artefact option will be available in the menu:

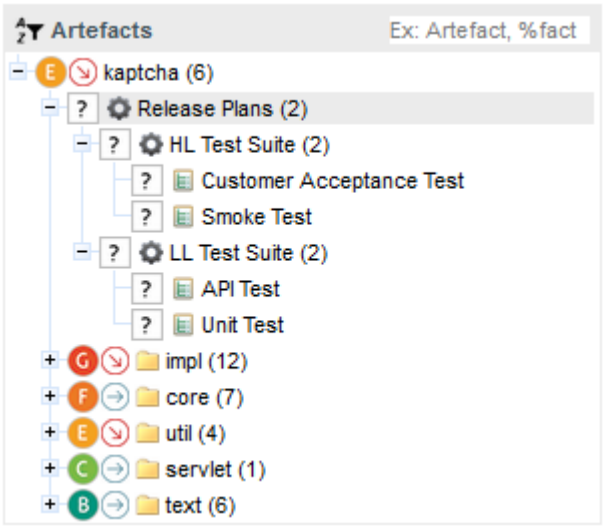


The artefact context menu with the Add an Artefact option highlighted

Click the menu and choose an artefact type and an artefact name to add the artefact to the tree.

Tip
The type of artefact you can add depends on the model you are using. The model also defines where in the tree the new artefacts can be added.

Here is what the Artefact Tree looks like after manually building a test plan tree:



The artefact tree with manual artefacts not yet rated

When you run a new analysis of the project, the new artefacts will get rated according to what is defined in your model.

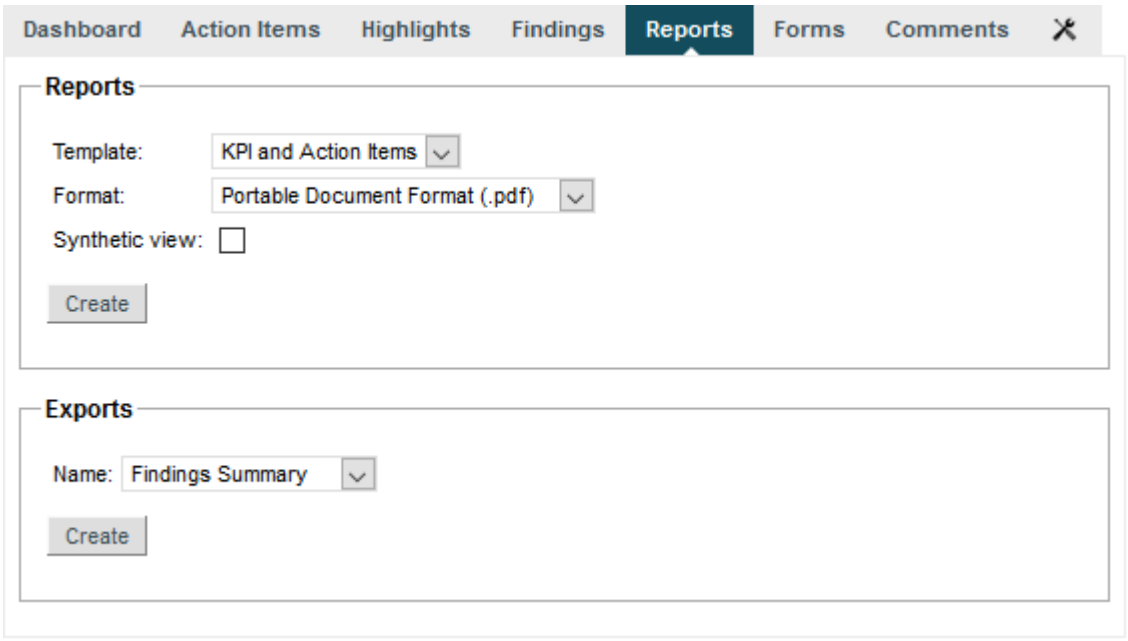
Note

Artefacts that were added manually can also be deleted from the tree. Note that artefact edition is tied to a permission in a user's role within a project. To learn more about roles, refer to Section 3.1.2, “User Roles”

9.3. Reporting Project Status

You can generate reports and export data to csv with Squore so you can communicate your progress to others.

In order to create a report, for the currently selected artefact in the tree, click the **Reports** tab in the Explorer. The Reports page opens as shown in the picture below:



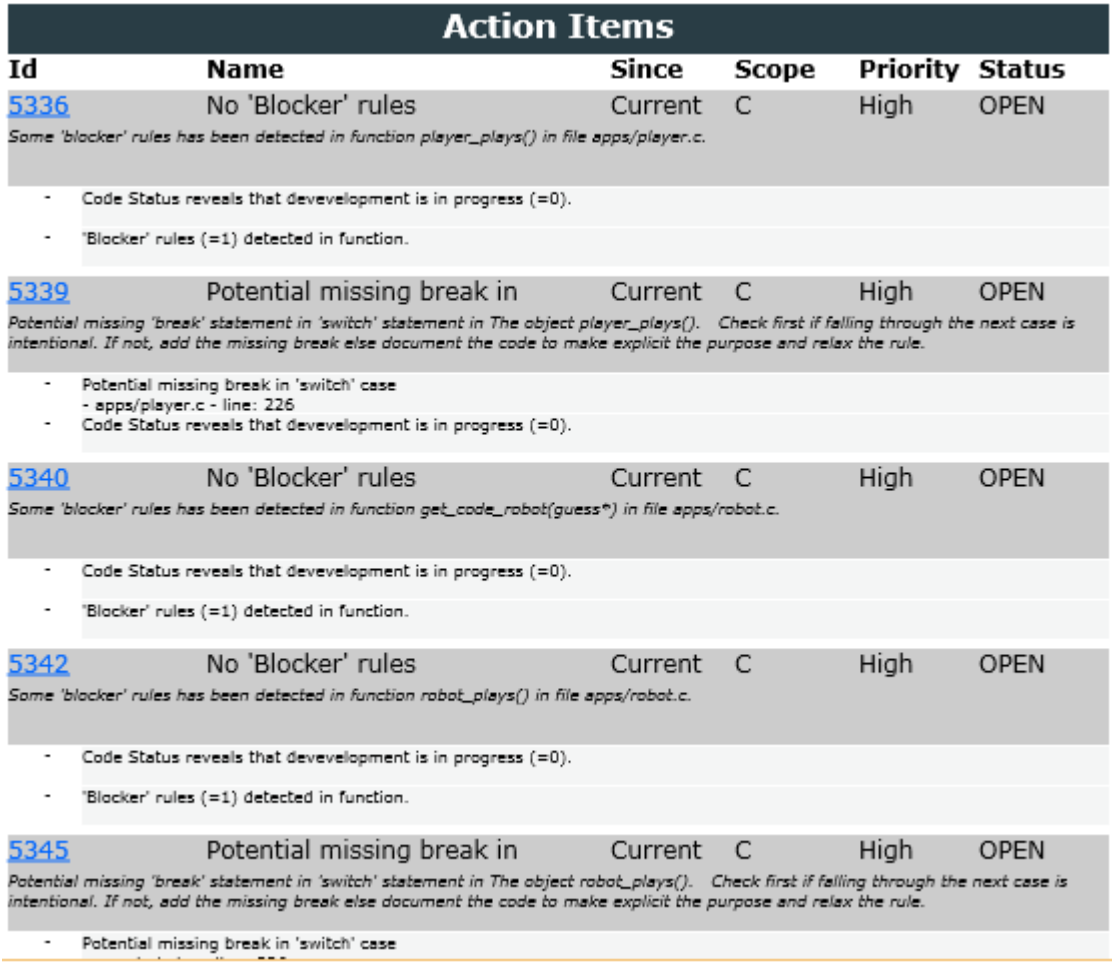
The Reports page

The Reports tab offers a choice of report and export types in various output formats. Reports are primarily used to present information visually including charts and data about action items, findings and relaxed artefacts. The output formats currently supported are .pdf, .pptx, .docx.

Reports can be created in full or synthetic view. The synthetic view omits details about the exact location of violations in the code in the report, but provide a link to read the full details in the Squore web interface. The screenshots below show the difference between a synthetic report [http://openwiki.squoring.com/index.php/File:Report-synthetic-Squoring.pdf] and a full report [http://openwiki.squoring.com/index.php/File:Report-full-Squoring.pdf]. The availability of the full report depends on your licence.

Action Items					
Id	**Name**	**Since**	**Scope**	**Priority**	**Status**
5336	No 'Blocker' rules	Current	C	High	OPEN
5339	Potential missing break in	Current	C	High	OPEN
5340	No 'Blocker' rules	Current	C	High	OPEN
5342	No 'Blocker' rules	Current	C	High	OPEN
5345	Potential missing break in	Current	C	High	OPEN
5338	AI_FU_CLONED_AND_COMPLEX	Current	C	Critical	OPEN
5344	AI_FU_CLONED_AND_COMPLEX	Current	C	Critical	OPEN
5334	More 'High' or 'Major' rules	Current	C	Medium	OPEN
5335	More 'Blocker' or 'Critical' rules	Current	C	High	OPEN
5337	More 'Blocker' or 'Critical' rules	Current	C	High	OPEN
5341	More 'Blocker' or 'Critical' rules	Current	C	High	OPEN
5343	More 'Blocker' or 'Critical' rules	Current	C	High	OPEN
5346	New function F.	Current	C	Critical	OPEN

Details about action items in a synthetic report



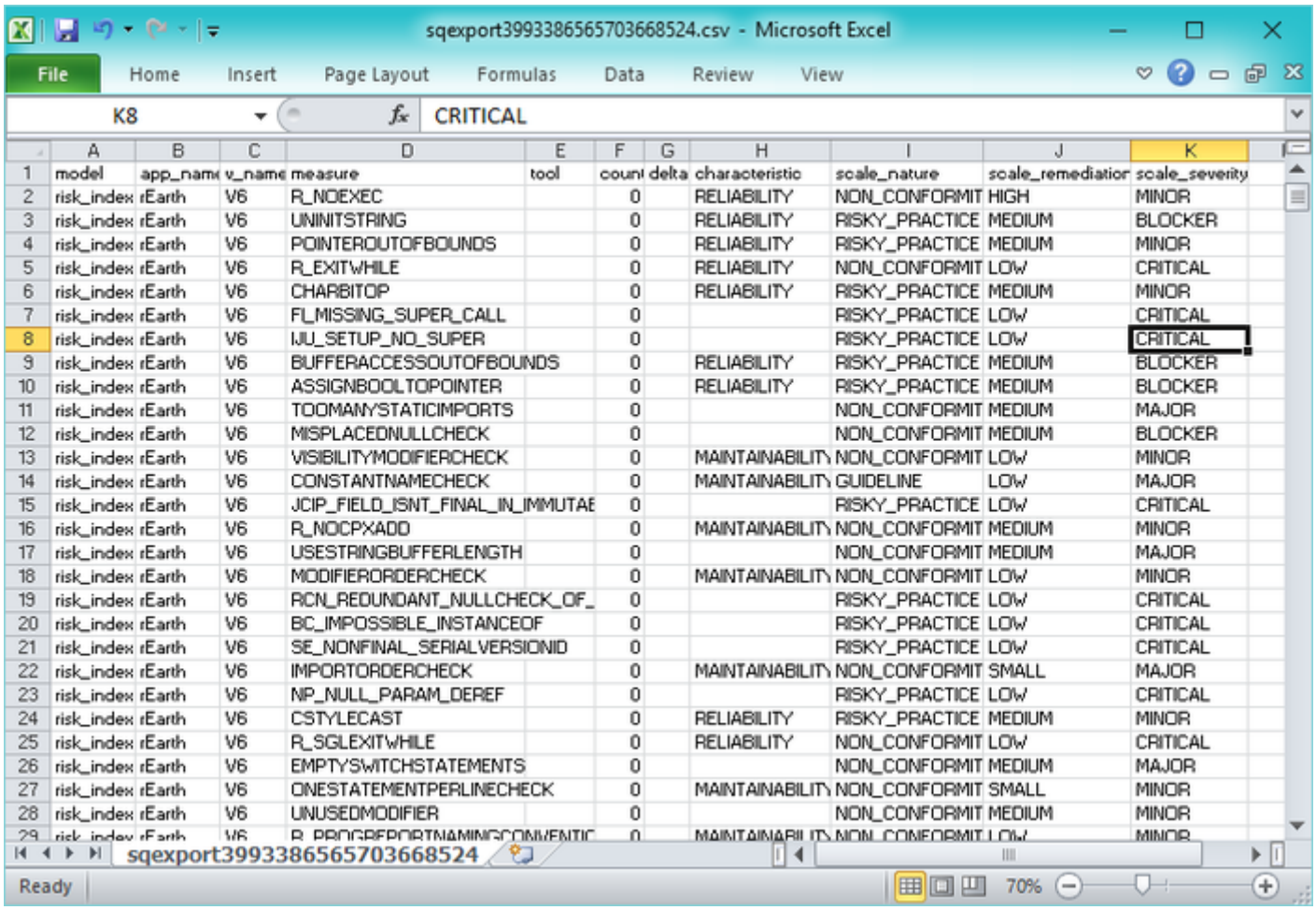
Action Items

Id	Name	Since	Scope	Priority	Status
5336	No 'Blocker' rules	Current	C	High	OPEN
Some 'blocker' rules has been detected in function player_plays() in file apps/player.c.					
- Code Status reveals that devevelopment is in progress (=0).					
- 'Blocker' rules (=1) detected in function.					
5339	Potential missing break in	Current	C	High	OPEN
Potential missing 'break' statement in 'switch' statement in The object player_plays(). Check first if falling through the next case is intentional. If not, add the missing break else document the code to make explicit the purpose and relax the rule.					
- Potential missing break in 'switch' case - apps/player.c - line: 226					
- Code Status reveals that devevelopment is in progress (=0).					
5340	No 'Blocker' rules	Current	C	High	OPEN
Some 'blocker' rules has been detected in function get_code_robot(guess) in file apps/robot.c.*					
- Code Status reveals that devevelopment is in progress (=0).					
- 'Blocker' rules (=1) detected in function.					
5342	No 'Blocker' rules	Current	C	High	OPEN
Some 'blocker' rules has been detected in function robot_plays() in file apps/robot.c.					
- Code Status reveals that devevelopment is in progress (=0).					
- 'Blocker' rules (=1) detected in function.					
5345	Potential missing break in	Current	C	High	OPEN
Potential missing 'break' statement in 'switch' statement in The object robot_plays(). Check first if falling through the next case is intentional. If not, add the missing break else document the code to make explicit the purpose and relax the rule.					
- Potential missing break in 'switch' case					

Details about action items in a full report

Exports can be used to extract information in a CSV file in order to import it into another tool. Clicking the **Create** button generates and downloads the file in your browser. Note that the availability of the export feature depends on your licence.

The following is an example of CSV export file obtained by generating the Findings Summary [http://openwiki.squoring.com/index.php/File:Sqexport-Earth.zip] export:



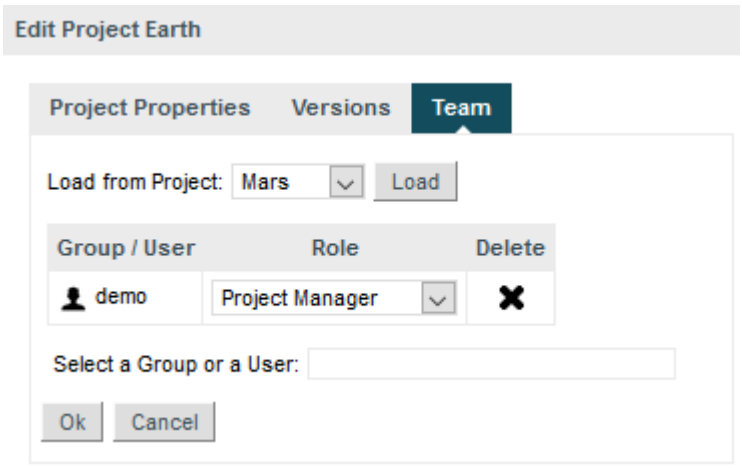
	A	B	C	D	E	F	G	H	I	J	K
1	model	app_name	v_name	measure	tool	count	delta	characteristic	scale_nature	scale_remediation	scale_severity
2	risk_index	rEarth	V6	R_NOEXEC		0		RELIABILITY	NON_CONFORMIT	HIGH	MINOR
3	risk_index	rEarth	V6	UNINITSTRING		0		RELIABILITY	RISKY_PRACTICE	MEDIUM	BLOCKER
4	risk_index	rEarth	V6	POINTEROUTOFBOUNDS		0		RELIABILITY	RISKY_PRACTICE	MEDIUM	MINOR
5	risk_index	rEarth	V6	R_EXITWHILE		0		RELIABILITY	NON_CONFORMIT	LOW	CRITICAL
6	risk_index	rEarth	V6	CHARBITOP		0		RELIABILITY	RISKY_PRACTICE	MEDIUM	MINOR
7	risk_index	rEarth	V6	FL_MISSING_SUPER_CALL		0			RISKY_PRACTICE	LOW	CRITICAL
8	risk_index	rEarth	V6	IJU_SETUP_NO_SUPER		0			RISKY_PRACTICE	LOW	CRITICAL
9	risk_index	rEarth	V6	BUFFERACCESSOUTOFBOUNDS		0		RELIABILITY	RISKY_PRACTICE	MEDIUM	BLOCKER
10	risk_index	rEarth	V6	ASSIGNBOOLTOPOINTER		0		RELIABILITY	RISKY_PRACTICE	MEDIUM	BLOCKER
11	risk_index	rEarth	V6	TOOMANYSTATICIMPORTS		0			NON_CONFORMIT	MEDIUM	MAJOR
12	risk_index	rEarth	V6	MISPLACEDNULLCHECK		0			NON_CONFORMIT	MEDIUM	BLOCKER
13	risk_index	rEarth	V6	VISIBILITYMODIFIERCHECK		0		MAINTAINABILITY	NON_CONFORMIT	LOW	MINOR
14	risk_index	rEarth	V6	CONSTANTNAMECHECK		0		MAINTAINABILITY	GUIDELINE	LOW	MAJOR
15	risk_index	rEarth	V6	JCIP_FIELD_ISNT_FINAL_IN_IMMUTAE		0			RISKY_PRACTICE	LOW	CRITICAL
16	risk_index	rEarth	V6	R_NOCPXADD		0		MAINTAINABILITY	NON_CONFORMIT	MEDIUM	MINOR
17	risk_index	rEarth	V6	USESTRINGBUFFERLENGTH		0			NON_CONFORMIT	MEDIUM	MAJOR
18	risk_index	rEarth	V6	MODIFIERORDERCHECK		0		MAINTAINABILITY	NON_CONFORMIT	LOW	MINOR
19	risk_index	rEarth	V6	RCN_REDUNDANT_NULLCHECK_OF_		0			RISKY_PRACTICE	LOW	CRITICAL
20	risk_index	rEarth	V6	BC_IMPOSSIBLE_INSTANCEOF		0			RISKY_PRACTICE	LOW	CRITICAL
21	risk_index	rEarth	V6	SE_NONFINAL_SERIALVERSIONID		0			RISKY_PRACTICE	LOW	CRITICAL
22	risk_index	rEarth	V6	IMPORTORDERCHECK		0		MAINTAINABILITY	NON_CONFORMIT	SMALL	MAJOR
23	risk_index	rEarth	V6	NP_NULL_PARAM_DEREF		0			RISKY_PRACTICE	LOW	CRITICAL
24	risk_index	rEarth	V6	CSTYLECAST		0		RELIABILITY	RISKY_PRACTICE	MEDIUM	MINOR
25	risk_index	rEarth	V6	R_SGLEXITWHILE		0		RELIABILITY	NON_CONFORMIT	LOW	CRITICAL
26	risk_index	rEarth	V6	EMPTYSWITCHSTATEMENTS		0			NON_CONFORMIT	MEDIUM	MAJOR
27	risk_index	rEarth	V6	ONESTATEMENTPERLINECHECK		0		MAINTAINABILITY	NON_CONFORMIT	SMALL	MINOR
28	risk_index	rEarth	V6	UNUSEDMODIFIER		0			NON_CONFORMIT	MEDIUM	MINOR
29	risk_index	rEarth	V6	R_PROGREPORTNAMINGCONVENTIC		0		MAINTAINABILIT	NON_CONFORMIT	LOW	MINOR

The Findings Summary export lists all the findings for the Earth project in CSV form

Reports and Exports are highly customisable, consult your Squore administrator or refer to the Squore Configuration Guide to learn more about how to tweak the report contents or format.

9.4. Providing Access to Collaborators

When a project is created, only the project creator can view it in Squore by default. In order to make it visible to more users, the project owner has to create a project team of users and groups and assign them permissions. This is done in the **Manage** page of a project in the **Team** tab, as shown below:

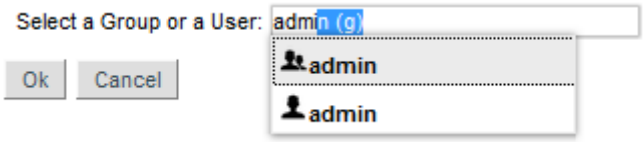


The Team tab

Tip
The project scope can be set directly from the command line when creating a new project, if you use the **teamUser** and **teamGroup** options. For more details, refer to the Command Line Interface manual.

In order to give visibility to the user **admin** over the projects created by the user **demo**, follow these steps:

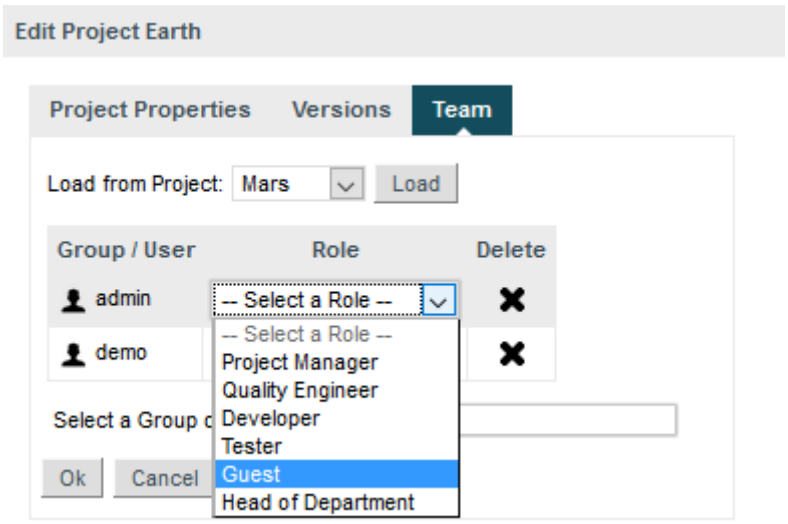
1. Log in as the demo user and go to the My Projects page.
2. Click the Manage icon ( ) for the project Earth
3. Click on the Team tab to view the project team.
4. Type admin in the **Select a Group or a User**. The list will show all users ( ) and groups ( ) available matching the search term.



The users and groups matching admin

Click the admin user to add it to the project team.

5. Now that admin is listed in the project team, you need to pick a role for the user within this project. Select **Guest** from the list.



The roles available for the user in this project

This predefined role allows a user to consult the results of baseline versions of a project without making any changes. For more information about roles, consult Section 3.1, “Understanding Profiles and Roles”.

6. Click **Apply** to apply your changes.

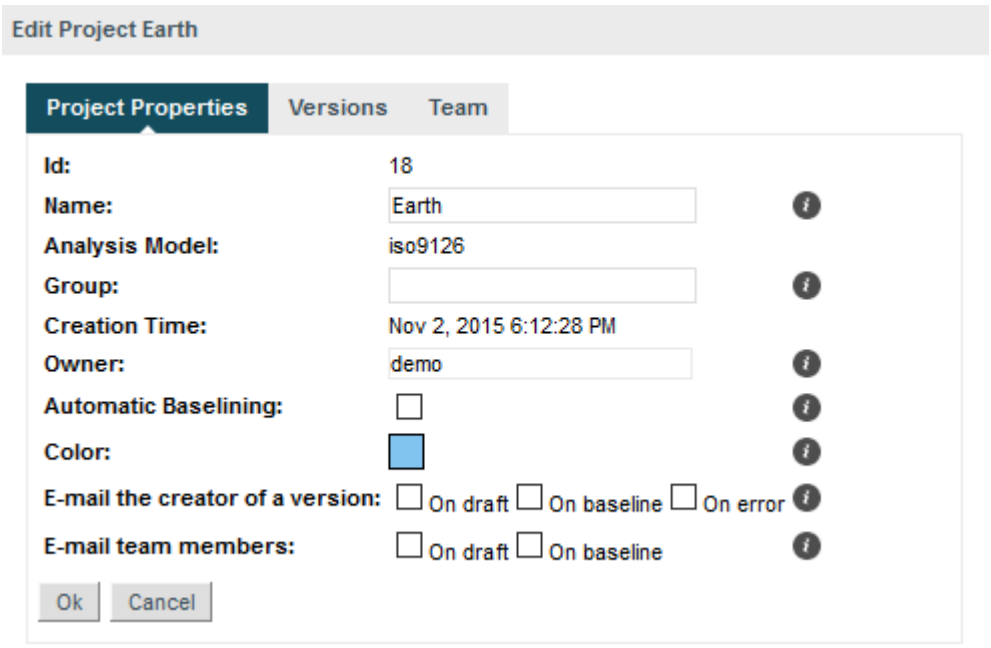
The admin user can now log in and will see the Earth project in their Explorer.

If you want to configure the rest of the sample projects the way you configured Earth, you can copy the project team to another project:

1. Click on **Manage > Team** for the project Mars
2. Select Earth from the **Load from Project** dropdown and click **Load**.
3. The users and their roles have now been copied as they were set up in the Earth project. You can make adjustments or click **Apply** to confirm your changes.

9.5. E-mail Notifications

You can configure each project in Squore so that an e-mail notification is sent out after a new version is created. This functionality is available for users who can create and manage projects, either in the **General Information** section of the project creation wizard, or the in the Project Properties tab of the Manage Project page:



E-mail notification options in Manage Project

The conditions on which you can to trigger an e-mail are:

- **On draft:** sends an e-mail every time a draft version is successfully analysed.
- **On baseline:** sends an e-mail every time a baseline version is successfully analysed, or every time a draft version is baselined.
- **On error:** sends an e-mail every time an analysis ends with the *Warnings* or *Error* status.

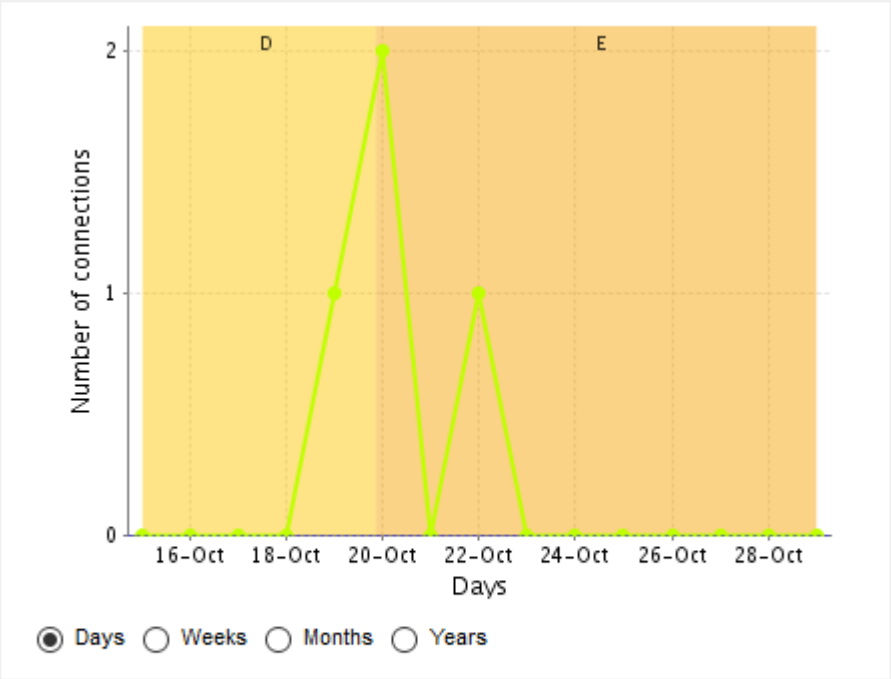
The e-mail contains a description of the version, the number of new artefacts, the number of action items, a list of the new action items and the number of new findings.

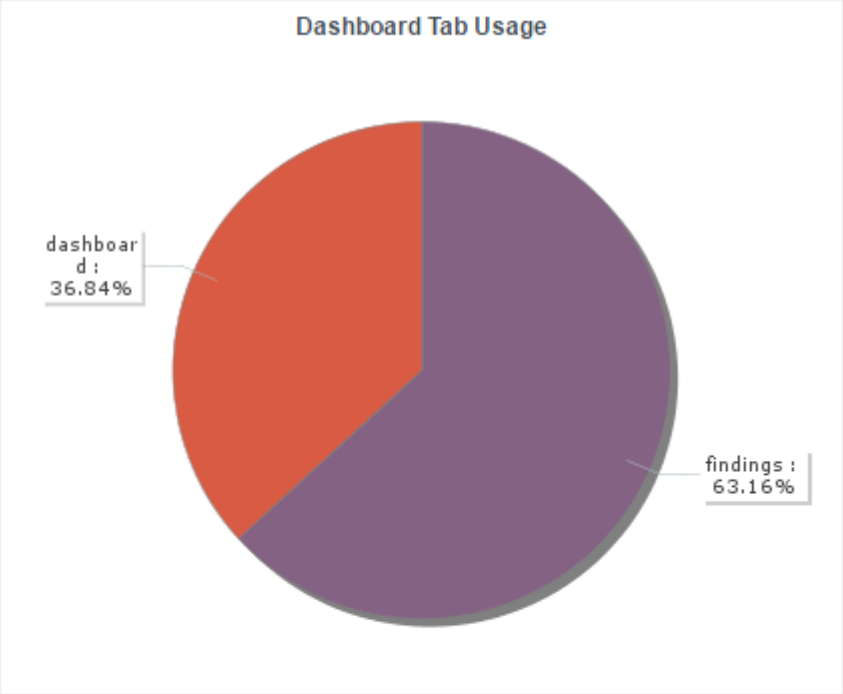
9.6. Usage Statistics

You can get information on how your collaborators are viewing the projects you manage or the models you develop by using the statistics features of Squore. This section describes the information available to project managers and model developers via **Models > Statistics** and the **Manage Project** page.

9.6.1. Statistics for Project Managers

As a project manager, you can use project statistics to investigate the popularity of your project by going to **Manage > Statistics**.





Username	Sessions	Comments
~~admin~~	0	0
jenkins	1	0
~~guest~~	0	0
Total	1	0

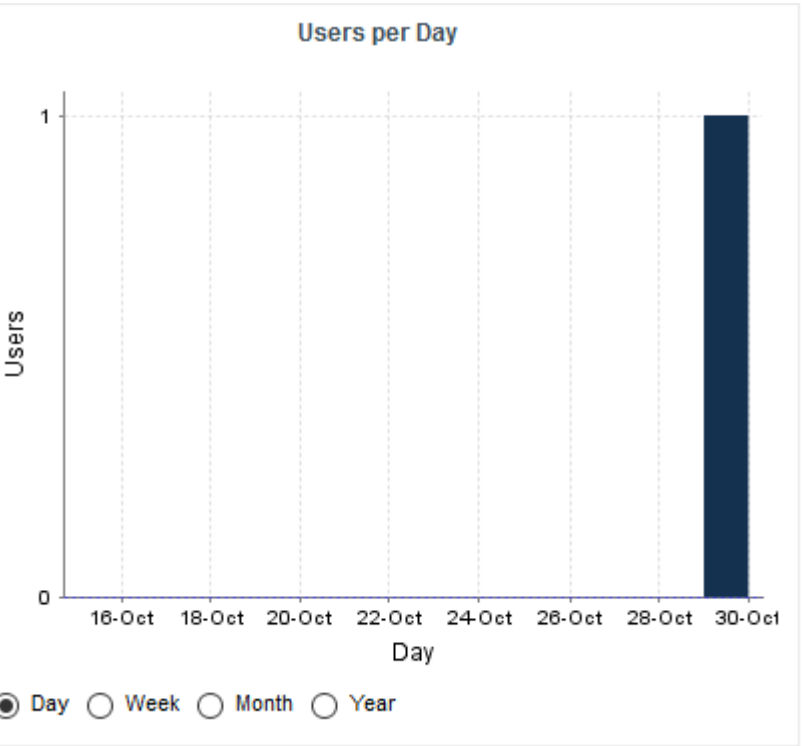
When you select a reporting period, the following information is displayed:

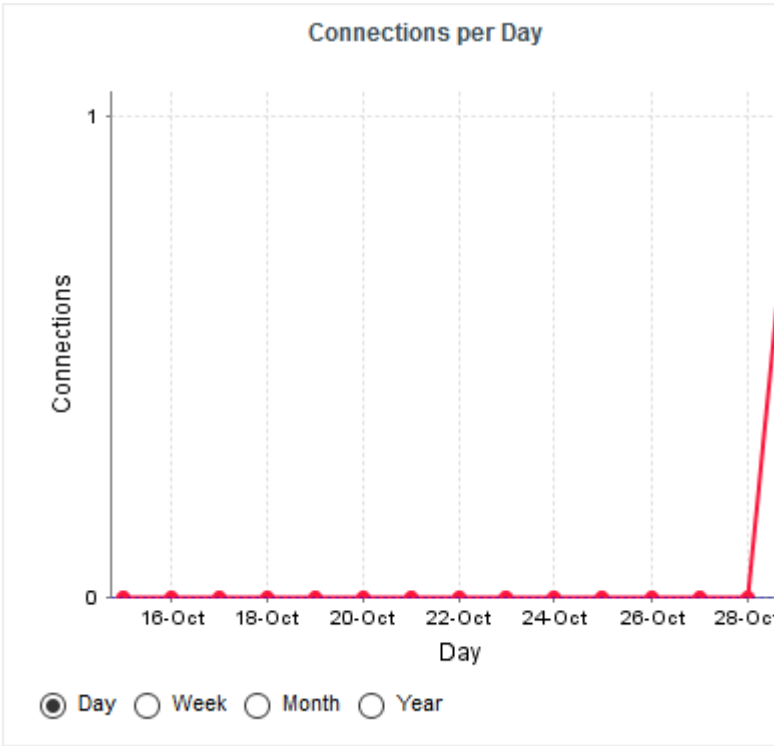
- The trend of the number of views for this project uses the colours from the scale of the root indicator as background to help you correlate the project rating with the number of visits.
- The pie chart helps you understand which of the dashboard tabs is the most visited for this project.
- A table summarises the breakdown of views per user, as well as the number of comments left by each user.

9.6.2. Statistics for Model Developers

You can learn more about the usage of particular features of a model by clicking **Models > Statistics**. For each analysis model, find out how many users consult results, which projects are the most popular and which regions and charts of the dashboard are the most useful for users.

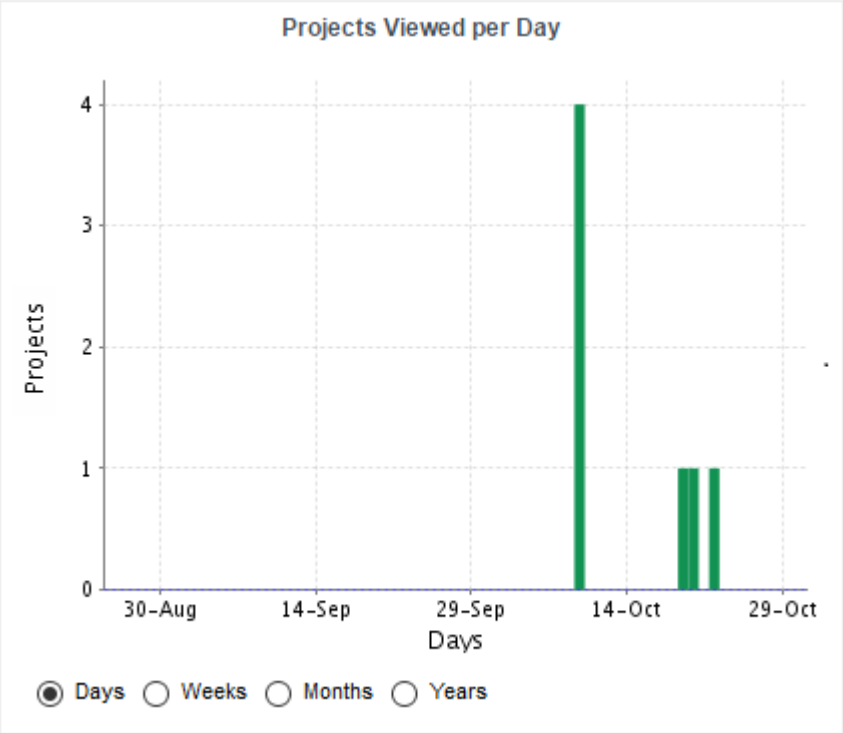
Users





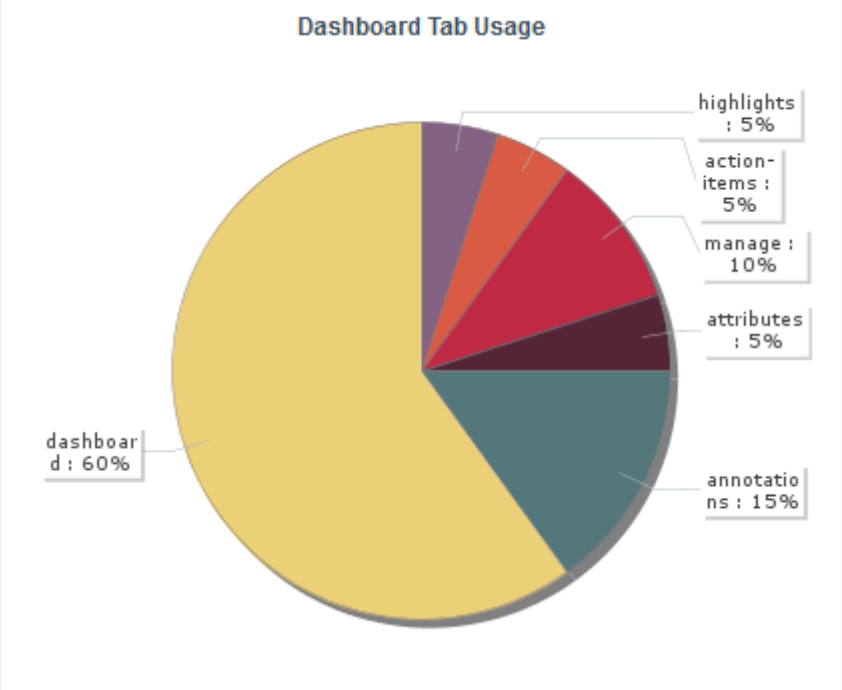
The Users tab displays the information about the number of users and overall connections to the server for projects in this analysis model.

Projects



On the Projects tab, you can check how many projects had visitors over the selected period.

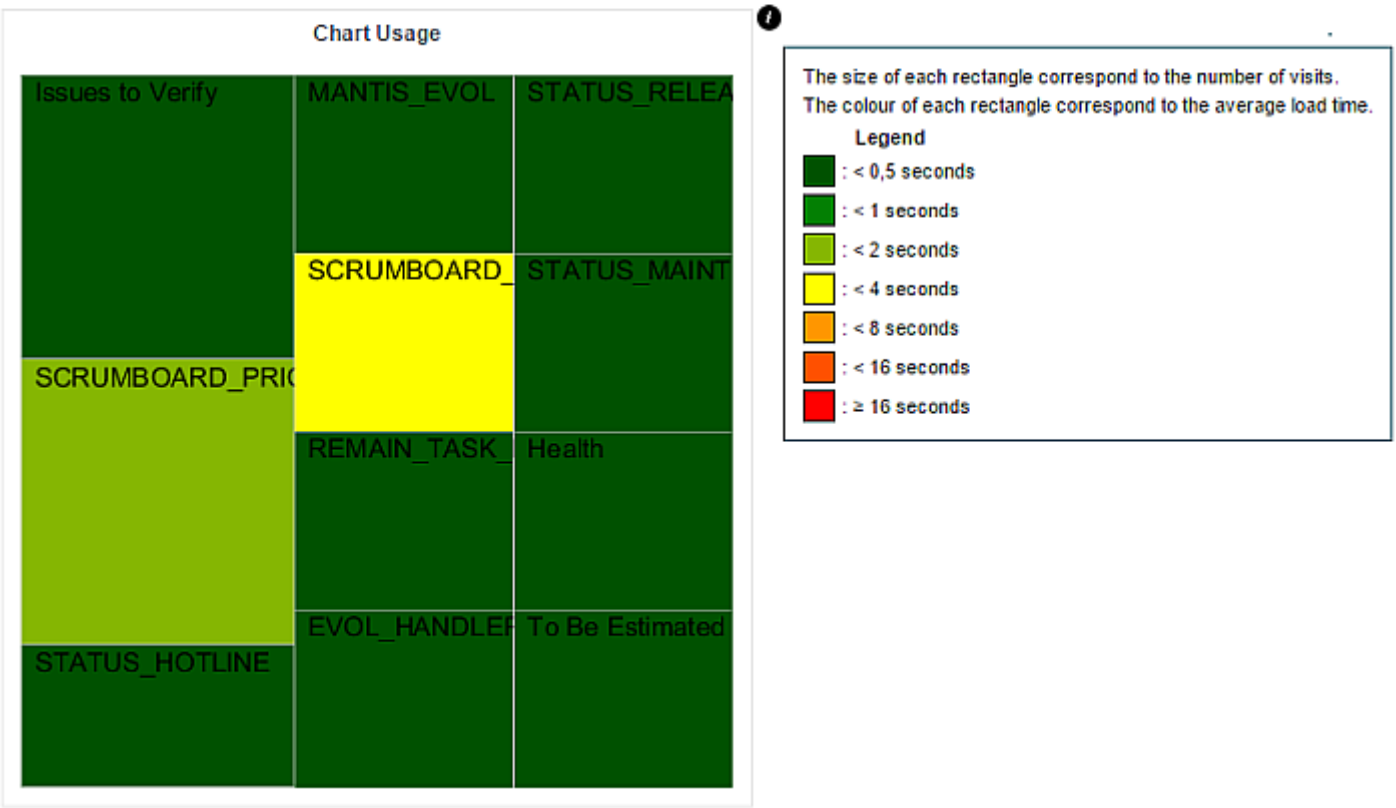
Dashboard



The Dashboard tab allows analysing the usage of each tab on the dashboard. Each tab is represented in a pie chart according to how many views it receives. This information can be used to adjust the default display status of each tab or their availability to end users.

Charts

Chart	Sessions	Average Load Time	Comments
EVOL_HANDLER	1	0	0
Health	1	0	0
Issues to Verify	2	0	0
MANTIS_EVOL	1	0	0
REMAIN_TASK_ID	1	1	0
SCRUMBOARD_APPROVAL	1	2530	0
SCRUMBOARD_PRIORITY	2	1579	0
STATUS_HOTLINE	1	0	0
STATUS_MAINTENANCE	1	0	0
STATUS_RELEASE	1	0	0
To Be Estimated by Handlers	1	1	0
Total	**13**	**437**	**0**



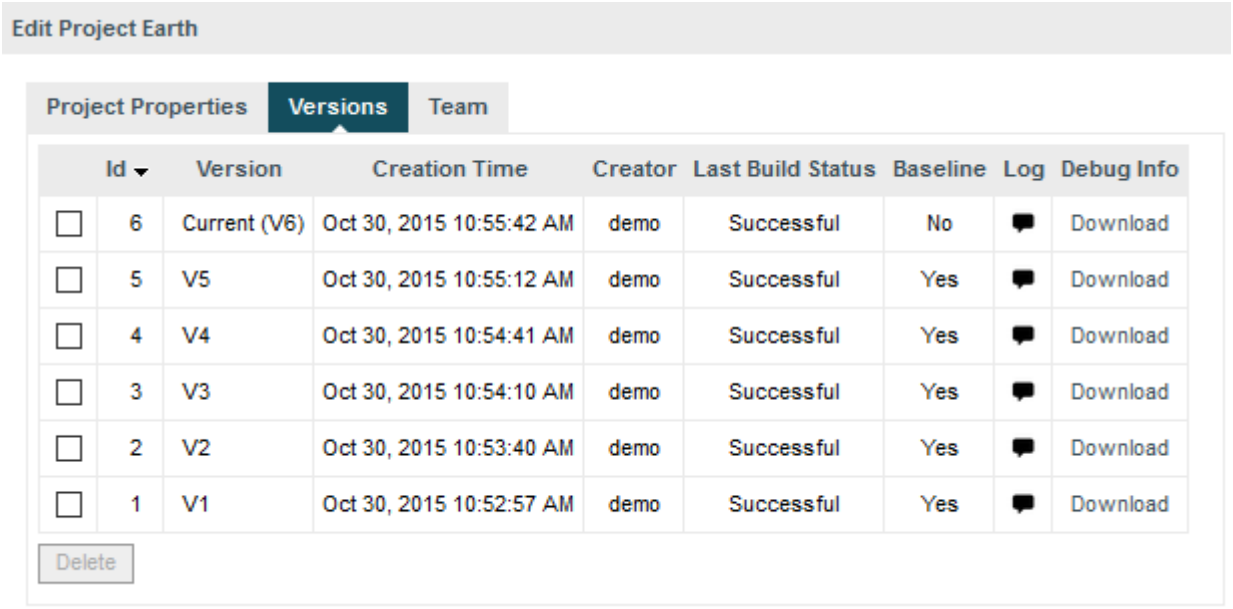
The Charts tab provides information about chart usage in your model: The number of views per chart (per artefact type or for all artefact types), the average loading time and the number of comments.

10. Keep it Tidy: Project Maintenance in Squore

10.1. Can I Delete a Version?

You can delete one or more of the last versions of a project if needed. This can be done from the **My Projects** page if you are the project creator or are a member of a role that allows managing the project.

If you want to delete the last version of the Earth project, log in as the demo user and click **My Projects**. Click the Manage icon ( ) and open the **Versions** tab to view the list of versions created for this project:



The Versions of the Earth project

Tip
The most recent version always appears at the top of the list.

Check the box next to the version you want to delete. All versions created after the version you selected will also be checked. Click the **Delete** button to reach a summary page where you can confirm which versions will be deleted, and click **Confirm** to launch the delete process.

10.2. Can I Delete a Project?

Projects can be deleted by their creator or members of a role that allows to manage projects. In order to delete a project, click **My Projects** and click the delete icon ( ) next to the project you want to delete. After confirming the operation, the project is deleted from the Squore database and cannot be restored.

10.3. Squore Server Administration

A Squore Administrator can access functionality that does not involve working with projects directly. You can access the **Administration** menu if you need to perform any of the following tasks:

- Create, update, remove and deactivate Squore users (**Administration > Users**)
- Create, update, and remove groups (**Administration > Groups**)
- Create, update, and remove profiles (**Administration > Profiles**)
- Create, update, and remove roles (**Administration > Roles**)
- Configure and monitor the Squore Server installation (**Administration > System**)
- View and manage all projects created on Squore Server (**Administration > Projects**)
- Reload the server configuration from disk (**Administration > Reload Configuration**)
- download the server log (**Administration > Server Log**)

For more information about administration functionality, consult the Online Help.

10.4. What About Server Maintenance?

Server maintenance, including database backups need to be carried out by a system administrator directly on Squore Server. If you need to know more about the backup options offered by Squore, refer to the Squore Installation and Administration Guide.

11. Repository Connectors

11.1. Folder Path

11.1.1. Description

The simplest method to analyse source code in Squore is to provide a path to a folder contining your code.

> **Note**
> Remember that the path supplied for the analysis is a path local to the machine running the analysis, which may be different from your local machine. If you analyse source code on your local machine and then send results to the server, you will not be able to view the source code directly in Squore, since it will not have access to the source code on the other machine. A common workaround to this problem is to use UNC paths (`\\Server\Share`, `smb://server/share`...) or a mapped server drive in Windows.

11.1.2. Usage

Folder Path has the following options:

- **Datapath (path, mandatory)** Specify the absolute path to the files you want to include in the analysis. The path specified must be accessible from the server.

The full command line syntax for Folder Path is:

```
-r "type=FROMPATH,path=[text]"
```

11.2. Zip Upload

11.2.1. Description

This Repository Connector allows you to upload a zip file containing your sources to analyse. Select a file to upload in the project creation wizard and it will be extracted and analysed on the server.

> **Note**
> The contents of the zip file are extracted into Squore Server's temp folder. If you want to uploaded files to persist, contact your Squore administrator so that the uploaded zip files and extracted sources are moved to a location that is not deleted at each server restart.

11.2.2. Usage

This Repository Connector is only available from the web UI, not from the command line interface.

11.3. CVS

11.3.1. Description

The Concurrent Versions System (CVS), is a client-server free software revision control system in the field of software development.

For more details, refer to http://savannah.nongnu.org/projects/cvs.

Note
The following is a list of commands used by the CSV Repository Connector to retrieve sources:

- `cvs -d $repository export [-r $branch] $project`
- `cvs -d $repository co -r $artefactPath -d $tmpFolder`

11.3.2. Usage

CVS has the following options:

- **Repository (repository, mandatory)** Specify the location of the CVS Repository.
- **Project (project, mandatory)** Specify the name of the project to get files from.
- **Tag or Branch (branch)** Specify the tag or branch to get the files from.

The full command line syntax for CVS is:

```
-r "type=CVS,repository=[text],project=[text],branch=[text]"
```

11.4. ClearCase

11.4.1. Description

IBM Rational ClearCase is a software configuration management solution that provides version control, workspace management, parallel development support, and build auditing. The command executed on the server to check out source code is: $cleartool $view_root_path $view $vob_root_path.

For more details, refer to http://www-03.ibm.com/software/products/en/clearcase.

Note
The ClearCase tool is configured for Linux by default. It is possible to make it work for Windows by editing the configuration file

11.4.2. Usage

ClearCase has the following options:

- **View root path (view_root_path, mandatory, default: /view)** Specify the absolute path of the ClearCase view.
- **Vob Root Path (vob_root_path, mandatory, default: /projets)** Specify the absolute path of the ClearCase vob.
- **View (view)** Specify the label of the view to analyse sources from. If no view is specified, the current ClearCase view will be used automatically, as retrieved by the command cleartool pwv -s.
- **Server Display View (server_display_view)** When viewing source code from the Explorer after building the project, this parameter is used instead of the view parameter specified earlier. Leave this field empty to use the same value as for view.
- **Sources Path (sub_path)** Specify a path in the view to restrict the scope of the source code to analyse. The value of this field must not contain the vob nor the view. Leave this field empty to analyse the code in the entire view. This parameter is only necessary if you want to restrict to a directory lower than root.

The full command line syntax for ClearCase is:

```
-r
 "type=ClearCase,view_root_path=[text],vob_root_path=[text],view=[text],server_display_view=[te
```

11.5. Perforce

11.5.1. Description

The Perforce server manages a central database and a master repository of file versions. Perforce supports both Git clients and clients that use Perforce's own protocol.

For more details, refer to http://www.perforce.com/.

Note

The Perforce repository connector assumes that the specified depot exists on the specified Perforce server, that Squore can access this depot and that the Perforce user defined has the right to access it. The host where the analysis takes place must have a Perforce command-line client (p4) installed and fully functional. The P4PORT environment variable is not read by Squore. You have to set it in the form. The path to the p4 command can be configured in the perforce_conf.tcl file located in the configuration/repositoryConnectors/Perforce folder. The following is a list of commands used by the Perforce Repository Connector to retrieve sources:

- `p4 -p $p4port [-u username] [-P password] client -i <$tmpFolder/p4conf.txt`
- `p4 -p $p4port [-u username] [-P password] -c $clientName sync "$depot/...@$label"`
- `p4 -p $p4port [-u username] [-P password] client -d $clientName`
- `p4 -p $p4port [-u username] [-P password] print -q -o $outputFile $artefactPath`

The format of the p4conf.txt file is:

```
Client: $clientName
Root: $tmpFolder
Options: noallwrite noclobber nocompress unlocked nomodtime normdir
SubmitOptions: submitunchanged
view:
  $depot/... //$clientName/...
```

11.5.2. Usage

Perforce has the following options:

- **P4PORT (p4port, mandatory)** Specify the value of P4PORT using the format [protocol:]host:port (the protocol is optional). This parameter is necessary even if you have specified an environment variable on the machine where the analysis is running.
- **Depot (depot, mandatory)** Specify the name of the depot (and optionnally subforders) containing the sources to be analysed.
- **Revision (label)** Specify a label, changelist or date to retrieve the corresponding revision of the sources. Leave this field empty to analyse the most recent revision fo the sources.
- **Authentication (useAccountCredentials, default: NO_CREDENTIALS)**
- **Username (username)**
- **Password (password)**

The full command line syntax for Perforce is:

```
-r
 "type=Perforce,p4port=[text],depot=[text],label=[text],useAccountCredentials=[multipleChoice],
```

11.6. Git

11.6.1. Description

Git is a free and open source distributed version control system designed to handle everything from small to very large projects with speed and efficiency.

For more details, refer to http://git-scm.com/.

Note

The following is a list of commands used by the Git Repository Connector to retrieve sources:

- `git clone [$username:$password@]$url $tmpFolder`
- `git checkout $commit`
- `git log -1 "--format=%H"`
- `git config --get remote.origin.url`
- `git clone [$username:$password@]$url $tmpFolder`
- `git checkout $commit`
- `git fetch`
- `git --git-dir=$gitRoot show $artefactPath`

11.6.2. Usage

Git has the following options:

- **URL (url, mandatory)** URL of the git repository to get files from. The local, HTTP(s), SSH and Git protocols are supported.
- **Branch or commit (commit)** This field allows specifying the SHA1 of a commit or a branch name. If a SHA1 is specified, it will be retieved from the default branch. If a branch label is specified, then its latest commit is analysed. Leave this field empty to analyse the latest commit of the default branch.
- **Sub-directory (subDir)** Specify a subfolder name if you want to restrict the analysis to a subpath of the repository root.
- **Authentication (useAccountCredentials, default: NO_CREDENTIALS)**
- **Username (username)**
- **Password (password)**

The full command line syntax for Git is:

```
-r
 "type=Git,url=[text],commit=[text],subDir=[text],useAccountCredentials=[multipleChoice],userna
```

11.7. PTC Integrity

11.7.1. Description

This Repository Connector allows analysing sources hosted in PTC Integrity, a software system lifecycle management and application lifecycle management platform developed by PTC.

For more details, refer to http://www.ptc.com/products/integrity/.

11.7.2. Usage

PTC Integrity has the following options:

- **Server Hostname (hostname, mandatory)** Specify the name of the Integrity server. This value is passed to the command line using the parameter --hostname.
- **Port (port)** Specify the port used to connect to the Integrity server. This value is passed to the command line using the parameter --port.
- **Project (project)** Specify the name of the project containing the sources to be analysed. This value is passed to the command line using the --project parameter.
- **Revision (revision)** Specify the revision number for the sources to be analysed. This value is passed to the command line using the --projectRevision parameter.
- **Scope (scope, default: name:*.c,name:*.h)** Specifies the scope (filter) for the Integrity sandbox extraction. This value is passed to the command line using the --scope parameter.
- **Authentication (useAccountCredentials, default: NO_CREDENTIALS)**
- **Username (username)**
- **Password (password)**

The full command line syntax for PTC Integrity is:

```
-r
 "type=MKS,hostname=[text],port=[text],project=[text],revision=[text],scope=[text],useAccountCr
```

11.8. TFS

11.8.1. Description

Team Foundation Server (TFS) is a Microsoft product which provides source code management, reporting, requirements management, project management, automated builds, lab management, testing and release management capabilities. This Repository Connector provides access to the sources hosted in TFS's revision control system.

For more details, refer to https://www.visualstudio.com/products/tfs-overview-vs.

Note

The TFS repository connector (Team Foundation Server - Team Foundation Version Control) assumes that a TFS command-line client (Visual Studio Client or Team Explorer Everywhere) is installed on the Squore server and fully functional. The configuration of this client must be set up in the tfs_conf.tcl file. The repository connector form must be filled according to the TFS standard (eg. the Project Path must begin with the '$' character...). Note that this repository connector works with a temporary workspace that is deleted at the end of the analysis. The followign is a list of commands used by the TFS Repository Connector to retrieve sources:

- `tf workspace [/login:$username,$password] /server:$url /noprompt /new $workspace`
- `tf workfold [/login:$username,$password] /map $path $tempFolder /workspace:$workspace`
- `tf get [/login:$username,$password] /version:$version /recursive /force $path`
- `tf workspace [/login:$username,$password] /delete $workspace`

- `tf view [/login:$username,$password] /server:$artefactPath`

11.8.2. Usage

TFS has the following options:

- **URL (URL, mandatory)** Specify the URL of the TFS server.
- **Path (path, mandatory)** Path the project to be analysed. This path usually starts with $.
- **Version (version)** Specify the version of the sources to analyse. This field accepts a changeset number, date, or label. Leave the field empty to analyse the most recent revision of the sources.
- **Authentication (useAccountCredentials, default: NO_CREDENTIALS)**
- **Username: (username)**
- **Password (password)**

The full command line syntax for TFS is:

```
-r
 "type=TFS,URL=[text],path=[text],version=[text],useAccountCredentials=[multipleChoice],usernar
```

11.9. Synergy

11.9.1. Description

Rational Synergy is a software tool that provides software configuration management (SCM) capabilities for all artifacts related to software development including source code, documents and images as well as the final built software executable and libraries.

For more details, refer to http://www-03.ibm.com/software/products/en/ratisyne.

Note

The Synergy repository connector assumes that a project already exists and that the Synergy user defined has the right to access it. The host where the analysis takes place must have Synergy installed and fully functional. Note that, as stated in IBM's documentation on http://pic.dhe.ibm.com/infocenter/synhelp/v7m2r0/index.jsp?topic=%2Fcom.ibm.rational.synergy.manage.doc%2Ftopics%2Fsc_t_h_start_cli_session.html, using credentials is only supported on Windows, so use the NO_CREDENTIALS option when Synergy runs on a Linux host. The following is a list of commands used by the Synergy Repository Connector to retrieve sources:

- `ccm start -d $db -nogui -m -q [-s $server] [-pw $password] [-n $user -pw password]`
- `ccm prop "$path@$projectSpec"`
- `ccm copy_to_file_system -path $tempFolder -recurse $projectSpec`
- `ccm cat "$artefactPath@$projectSpec"`
- `ccm stop`

11.9.2. Usage

Synergy has the following options:

- **Server URL (server)** Specify the Synergy server URL, if using a distant server. If specified, the value is used by the Synergy client via the -s parameter.

- **Database (db, mandatory)** Specify the database path to analyse the sources it contains.
- **Project Specification (projectSpec, mandatory)** Specify the project specification for the analysis. Source code contained in this project specification will be analysed recursively.
- **Subfolder (subFolder)** Specify a subfolder name if you want to restrict the scope of the analysis to a particular folder.
- **Authentication: (useAccountCredentials, default: NO_CREDENTIALS)** Note that, as stated in IBM's documentation, using credentials is only supported on Windows. The "No Credentials" must be used option when Synergy runs on a Linux host. For more information, consult http://pic.dhe.ibm.com/infocenter/synhelp/v7m2r0/index.jsp?topic=%2Fcom.ibm.rational.synergy.manage.doc%2Ftopics%2Fsc_t_h_start_cli_session.html.
- **(name)**
- **Password (password)**

The full command line syntax for Synergy is:

```
-r
 "type=Synergy,server=[text],db=[text],projectSpec=[text],subFolder=[text],useAccountCredentia
```

11.10. SVN

11.10.1. Description

Connecting to an SVN server is supported using svn over ssh, or by using a username and password. The command run by the server to extract the source code is svn export --force --non-interactive $url.

For more details, refer to https://subversion.apache.org/.

> **Note**
> The following is a list of commands used by the SVN Repository Connector to retrieve sources (you can edit the common command base or the path to the executable in <SQUORE_HOME>/configuration/repositoryConnectors/SVN/svn_conf.tcl if needed):
>
> - `svn info --xml --non-interactive --trust-server-cert --no-auth-cache [--username $username] [--password $password] [-r $revision] $url`
> - `svn export --force --non-interactive --trust-server-cert --no-auth-cache [--username $username] [--password $password] [-r $revision] $url`

11.10.2. Usage

SVN has the following options:

- **URL (url, mandatory)** Specify the URL of the SVN repository to export and analyse. The following protocols are supported: svn://, svn+ssh://, http://, https://.
- **Revision (rev)** Specify a revision number in this field, or leave it blank to analyse files at the HEAD revision.
- **Authentication (useAccountCredentials, default: NO_CREDENTIALS)**
- **Username (username)**
- **Password (password)**

The full command line syntax for SVN is:

```
-r
 "type=SVN,url=[text],rev=[text],useAccountCredentials=[multipleChoice],username=[text],passwo
```

11.11. Using Multiple Nodes

Squore allows using multiple repositories in the same analysis. If your project consists of some code that is spread over two distinct servers or SVN repositories, you can set up your project so that it includes both locations in the project analysis. This is done by labelling each source code node before specifying parameters, as shown below

```
-r "type=FROMPATH,alias=Node1,path=/home/projects/client-code"
-r "type=FROMPATH,alias=Node2,path=/home/projects/common/lib"
```

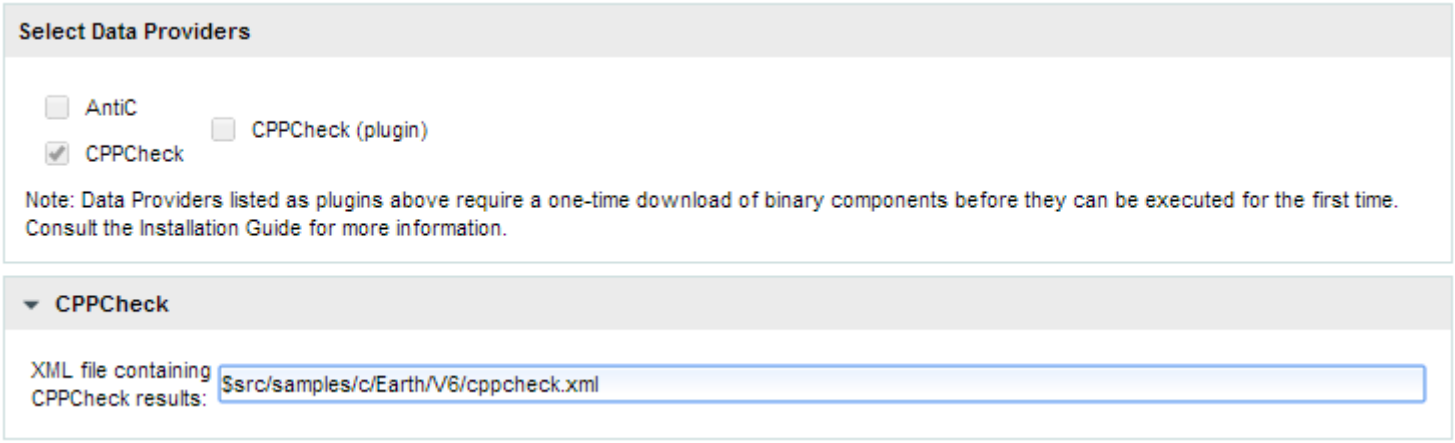
Note that only alpha-numeric characters are allowed to be used as labels. In the artefact tree, each node will appear as a separate top-level folder with the label provided at project creation.

Using multiple nodes, you can also analyse sources using different Repository Connectors in the same analysis:

```
-r "type=FROMPATH,alias=Node1,path=/home/projects/common-config"
-r "type=SVN,alias=Node2,url=svn+ssh://10.10.0.1/var/svn/project/src,rev=HEAD"
```

11.12. Using Data Provider Input Files From Version Control

Input files for Squore's Data Providers, like source code, can be located in your version control system. When this is the case, you need to specify a variable in the input field for the Data Provider instead of an absolute path to the input file.



A Data Provider using an input file extracted from a remote repository

The variable to use varies depending on your scenario:

- **You have only one node of source code in your project**
  In this case, the variable to use is **$src**.
- **You have more than one node of source code in your project**
  In this case, you need to tell Squore in which node the input file is located. This is done using a variable that has the same name as the alias you defined for the source code node in the previous step of the wizard. For example, if your nodes are labelled `Node1` and `Node2` (the default names), then you can refer to them using the **$Node1** and **$Node2** variables.

Tip
When using these variables from the command line on a linux system, the *$* symbol must be escaped:

```
-d "type=PMD,configFile=\$src/pmd_data.xml"
```

12. Data Providers

This chapter describe the Data Providers shipped with Squore and the default parameters that they accept via the Command Line Interface.

12.1. AntiC

12.1.1. Description

AntiC is a part of the jlint static analysis suite and is launched to analyse C and C++ source code and produce findings.

For more details, refer to http://jlint.sourceforge.net/.

> **Note**
> On Linux, the antiC executable must be compiled manually before you run it for the first time by running the command:
>
> ```
> # cd <SQUORE_HOME>/addons/tools/Antic_auto/bin/ && gcc antic.c -o antic
> ```

12.1.2. Usage

AntiC has the following options:

- **Source code directory to analyse (dir)** Leave this parameter empty if you want to analyse all sources specified above.

The full command line syntax for AntiC is:

```
-d "type=Antic_auto,dir=[text]"
```

12.2. Automotive Coverage Import

12.2.1. Description

Automotive Coverage Import: generic import mechanism for coverage results at FUNCTION level

12.2.2. Usage

Automotive Coverage Import has the following options:

- **Enter the CSV file for coverage measures (csv)** CSV File shall contain the following (PATH;NAME;TESTED_C1;OBJECT_C1;TESTED_MCC;OBJECT_MCC;TESTED_MCDC;OBJECT_MCDC)

The full command line syntax for Automotive Coverage Import is:

```
-d "type=Automotive_Coverage,csv=[text]"
```

12.3. Automotive Tag Import

12.3.1. Description

12.3.2. Usage

Automotive Tag Import has the following options:

- **Enter the CSV file for measures (csv)**

The full command line syntax for Automotive Tag Import is:

```
-d "type=Automotive_Tag_Import,csv=[text]"
```

12.4. BullseyeCoverage Code Coverage Analyzer

12.4.1. Description

BullseyeCoverage is a code coverage analyzer for C++ and C. The coverage report file is used to generate metrics.

For more details, refer to http://www.bullseye.com/.

12.4.2. Usage

BullseyeCoverage Code Coverage Analyzer has the following options:

- **HTML report (html)** Specify the path to the HTML report file generated by BullseyeCoverage.

The full command line syntax for BullseyeCoverage Code Coverage Analyzer is:

```
-d "type=BullseyeCoverage,html=[text]"
```

12.5. CPD

12.5.1. Description

CPD is an open source tool which generates Copy/Paste metrics. The dectection of duplicated blocks is set to 100 tokens. CPD provides an XML file which can be imported to generate metrics as well as findings.

For more details, refer to http://pmd.sourceforge.net/pmd-5.3.0/usage/cpd-usage.html.

12.5.2. Usage

CPD has the following options:

- **CPD XML results (xml)** Specify the path to the XML results file generated by CPD. The minimum supported version is PMD/CPD 4.2.5.

The full command line syntax for CPD is:

```
-d "type=CPD,xml=[text]"
```

12.6. CPD (plugin)

12.6.1. Description

CPD is an open source tool which generates Copy/Paste metrics. The dectection of duplicated blocks is set to 100 tokens. CPD provides an XML file which can be imported to generate metrics as well as findings.

For more details, refer to http://pmd.sourceforge.net/pmd-5.3.0/usage/cpd-usage.html.

> **Note**
> This data provider requires an extra download to extract the CPD binary in `<SQUORE_HOME>/addons/tools/CPD_auto/`. For more information, refer to the Installation and Administration Guide's Third-Party Plugins and Applications [../install_admin_manual/index.html#sect_thirdparty_plugins] section.

12.6.2. Usage

CPD (plugin) has the following options:

- **Run CPD during the analysis. (cpd_auto, default: true)** Check this box if you want to run CPD during the analysis in order to generate metrics and findings for the source code specified.

The full command line syntax for CPD (plugin) is:

```
-d "type=CPD_auto,cpd_auto=[booleanChoice]"
```

12.7. Cppcheck

12.7.1. Description

Cppcheck is a static analysis tool for C/C++ applications. The tool provides an XML output which can be imported to generate findings.

For more details, refer to http://cppcheck.sourceforge.net/.

12.7.2. Usage

Cppcheck has the following options:

- **Cppcheck XML results (xml)** Specify the path to the XML results file from Cppcheck. Note that the minimum required version of Cppcheck for this data provider is 1.61.

The full command line syntax for Cppcheck is:

```
-d "type=CPPCheck,xml=[text]"
```

12.8. Cppcheck (plugin)

12.8.1. Description

Cppcheck is a static analysis tool for C/C++ applications. The tool provides an XML output which can be imported to generate findings.

For more details, refer to http://cppcheck.sourceforge.net/.

Note
On Windows, this data provider requires an extra download to extract the Cppcheck binary in <SQUORE_HOME>/addons/tools/CPPCheck_auto/. On Linux, you can install the cppcheck application anywhere you want. The path to the Cppcheck binary for Linux can be configured in config.tcl. For more information, refer to the Installation and Administration Guide's Third-Party Plugins and Applications [../install_admin_manual/index.html#sect_thirdparty_plugins] section.

12.8.2. Usage

Cppcheck (plugin) has the following options:

- **Source code folder (dir)** Specify the folder containing the source files to analyse. If you want to analyse all of source repositories specified for the project, leave this field empty.

The full command line syntax for Cppcheck (plugin) is:

```
-d "type=CPPCheck_auto,dir=[text]"
```

12.9. CPPTest

12.9.1. Description

Parasoft C/C++test is an integrated solution for automating a broad range of best practices proven to improve software development team productivity and software quality for C and C++. The tool provides an XML output file which can be imported to generate findings and metrics.

For more details, refer to http://www.parasoft.com/product/cpptest/.

12.9.2. Usage

CPPTest has the following options:

- **XML results file (xml)** Specify the path to the CPPTest results file. This data provider is compatible with files exported from CPPTest version 7.2.10.34 and up.

The full command line syntax for CPPTest is:

```
-d "type=CPPTest,xml=[text]"
```

12.10. Cantata

12.10.1. Description

Cantata is Test Coverage tools. It provides an XML output which can be imported to generate coverage metrics at function level.

For more details, refer to http://www.qa-systems.com/cantata.html.

12.10.2. Usage

Cantata has the following options:

- **Cantata XML results (xml)** Specify the path to the XML results file from Cantata 6.2

The full command line syntax for Cantata is:

```
-d "type=Cantata,xml=[text]"
```

12.11. CheckStyle

12.11.1. Description

CheckStyle is an open source tool that verifies that Java applications adhere to certain coding standards. It produces an XML file which can be imported to generate findings.

For more details, refer to http://checkstyle.sourceforge.net/.

12.11.2. Usage

CheckStyle has the following options:

- **CheckStyle results file (xml)** Point to the XML file that contains Checkstyle results. Note that the minimum supported version is Checkstyle 5.3.

The full command line syntax for CheckStyle is:

```
-d "type=CheckStyle,xml=[text]"
```

12.12. CheckStyle (plugin)

12.12.1. Description

CheckStyle is an open source tool that verifies that Java applications adhere to certain coding standards. It produces an XML file which can be imported to generate findings.

For more details, refer to http://checkstyle.sourceforge.net/.

> **Note**
> This data provider requires an extra download to extract the CheckStyle binary in `<SQUORE_HOME>/addons/tools/CheckStyle_auto/`. For more information, refer to the Installation and Administration Guide's Third-Party Plugins and Applications [../install_admin_manual/index.html#sect_thirdparty_plugins] section.

12.12.2. Usage

CheckStyle (plugin) has the following options:

- **Configuration file (configFile)** A Checkstyle configuration specifies which modules to plug in and apply to Java source files. Modules are structured in a tree whose root is the Checker module. Specify the name of the configuration file only, and the data provider will try to find it in the CheckStyle_auto folder of your custom configuration. If no custom configuration file is found, a default configuration will be used.
- **Xmx (xmx, default: 1024m)** Maximum amount of memory allocated to the java process launching Checkstyle.

The full command line syntax for CheckStyle (plugin) is:

```
-d "type=CheckStyle_auto,configFile=[text],xmx=[text]"
```

12.13. CheckStyle for SQALE (plugin)

12.13.1. Description

CheckStyle is an open source tool that verifies that Java applications adhere to certain coding standards. It produces an XML file which can be imported to generate findings.

For more details, refer to http://checkstyle.sourceforge.net/.

> **Note**
> This data provider requires an extra download to extract the CheckStyle binary in `<SQUORE_HOME>/addons/tools/CheckStyle_auto_for_SQALE/`. For more information, refer to the Installation and Administration Guide's Third-Party Plugins and Applications [../install_admin_manual/index.html#sect_thirdparty_plugins] section.

12.13.2. Usage

CheckStyle for SQALE (plugin) has the following options:

- **Configuration file (configFile, default: config_checkstyle_for_sqale.xml)** A Checkstyle configuration specifies which modules to plug in and apply to Java source files. Modules are structured in a tree whose root is the Checker module. Specify the name of the configuration file only, and the data provider will try to find it in the CheckStyle_auto folder of your custom configuration. If no custom configuration file is found, a default configuration will be used.
- **Xmx (xmx, default: 1024m)** Maximum amount of memory allocated to the java process launching Checkstyle.

The full command line syntax for CheckStyle for SQALE (plugin) is:

```
-d "type=CheckStyle_auto_for_SQALE,configFile=[text],xmx=[text]"
```

12.14. Cobertura

12.14.1. Description

Cobertura is a free code coverage library for Java. Its XML report file can be imported to generate code coverage metrics for your Java project.

For more details, refer to http://cobertura.github.io/cobertura/.

12.14.2. Usage

Cobertura has the following options:

- **XML report (xml)** Specify the path to the XML report generated by Cobertura.

The full command line syntax for Cobertura is:

```
-d "type=Cobertura,xml=[text]"
```

12.15. CodeSonar

12.15.1. Description

Codesonar is a static analysis tool for C and C++ code designed for zero tolerance defect environments. It provides an XML output file which is imported to generate findings.

For more details, refer to http://www.grammatech.com/codesonar.

12.15.2. Usage

CodeSonar has the following options:

- **XML results file (xml)** Specify the path to the XML results file generated by Codesonar. The minimum version of Codesonar compatible with this data provider is 3.3.

The full command line syntax for CodeSonar is:

```
-d "type=CodeSonar,xml=[text]"
```

12.16. Compiler

12.16.1. Description

Compiler Warning impor allows to import information from compiler

For more details, refer to Compiler.

12.16.2. Usage

Compiler has the following options:

- **Compiler output csv file (Path;Line;Rule;Descr - with: Rule = COMP_ERR|COMPILER_WARN|COMPILER_INFO) (txt, mandatory)**

The full command line syntax for Compiler is:

```
-d "type=Compiler,txt=[text]"
```

12.17. Coverity

12.17.1. Description

Coverity is a static analysis tool for C, C++, Java and C#. It provides an XML output which can be imported to generate findings.

For more details, refer to http://www.coverity.com/.

12.17.2. Usage

Coverity has the following options:

- **XML results file (xml)** Specify the path to the XML file containing Coverity results.

The full command line syntax for Coverity is:

```
-d "type=Coverity,xml=[text]"
```

12.18. FindBugs

12.18.1. Description

Findbugs is an open source tool that looks for bugs in Java code. It produces an XML result file which can be imported to generate findings.

For more details, refer to http://findbugs.sourceforge.net/.

12.18.2. Usage

FindBugs has the following options:

- **XML results file (xml)** Specify the location of the XML file containing Findbugs results. Note that the minimum supported version of FindBugs is 1.3.9.

The full command line syntax for FindBugs is:

```
-d "type=Findbugs,xml=[text]"
```

12.19. FindBugs (plugin)

12.19.1. Description

Findbugs is an open source tool that looks for bugs in Java code. It produces an XML result file which can be imported to generate findings. Note that the data provider requires an extra download to extract the Findbugs binary in [INSTALLDIR]/addons/tools/Findbugs_auto/. You are free to use FindBugs 3.0 or FindBugs 2.0 depending on what your standard is. For more information, refer to the Installation and Administration Manual's "Third-Party Plugins and Applications" section.

For more details, refer to http://findbugs.sourceforge.net/.

> **Note**
> This data provider requires an extra download to extract the Findbugs binary in <SQUORE_HOME>/addons/tools/Findbugs_auto/. For more information, refer to the Installation and Administration Guide's Third-Party Plugins and Applications [../install_admin_manual/index.html#sect_thirdparty_plugins] section.

12.19.2. Usage

FindBugs (plugin) has the following options:

- **Classes (class_dir, mandatory)** Specify the folders and/or jar files for your project in classpath format, or point to a text file that contains one folder or jar file per line.
- **Auxiliary Class path (auxiliarypath)** Specify a list of folders and/or jars in classpath format, or specify the path to a text file that contains one folder or jar per line. This information will be passed to FindBugs via the -auxclasspath parameter.
- **Memory Allocation (xmx, default: 1024m)** Maximum amount of memory allocated to the java process launching FindBugs.

The full command line syntax for FindBugs (plugin) is:

```
-d "type=Findbugs_auto,class_dir=[text],auxiliarypath=[text],xmx=[text]"
```

12.20. Function Relaxer

12.20.1. Description

12.20.2. Usage

Function Relaxer has the following options:

- **Enter the CSV file for measures (csv)**

The full command line syntax for Function Relaxer is:

```
-d "type=Function_Relaxer,csv=[text]"
```

12.21. FxCop

12.21.1. Description

FxCop is an application that analyzes managed code assemblies (code that targets the .NET Framework common language runtime) and reports information about the assemblies, such as possible design, localization, performance, and security improvements. FxCop generates an XML results file which can be imported to generate findings.

For more details, refer to https://msdn.microsoft.com/en-us/library/bb429476(v=vs.80).aspx.

12.21.2. Usage

FxCop has the following options:

- **XML results file (xml)** Specify the XML file containing FxCop's analysis results. Note that the minimum supported version of FxCop is 1.35.

The full command line syntax for FxCop is:

```
-d "type=FxCop,xml=[text]"
```

12.22. GCov

12.22.1. Description

GCov is a Code coverage program for C application. GCov generates raw text files which can be imported to generate metrics.

For more details, refer to http://gcc.gnu.org/onlinedocs/gcc/Gcov.html.

12.22.2. Usage

GCov has the following options:

- **Directory containing results files (dir)** Specify the path of the root directory containing the GCov results files.
- **Results files extension (ext, default: *.c.gcov)** Specify the file extension of GCov results files.

The full command line syntax for GCov is:

```
-d "type=GCov,dir=[text],ext=[text]"
```

12.23. GNATcheck

12.23.1. Description

GNATcheck is an extensible rule-based tool that allows developers to completely define a coding standard. The results are output to a log file that can be imported to generate findings.

For more details, refer to http://www.adacore.com/gnatpro/toolsuite/gnatcheck/.

12.23.2. Usage

GNATcheck has the following options:

- **Log file (txt)** Specify the path to the log file generated by the GNATcheck run.

The full command line syntax for GNATcheck is:

```
-d "type=GnatCheck,txt=[text]"
```

12.24. GNATCompiler

12.24.1. Description

GNATCompiler is a free-software compiler for the Ada programming language which forms part of the GNU Compiler Collection. It supports all versions of the language, i.e. Ada 2012, Ada 2005, Ada 95 and Ada 83. It creates a log file that can be imported to generate findings.

For more details, refer to http://www.adacore.com/gnatpro/toolsuite/compilation/.

12.24.2. Usage

GNATCompiler has the following options:

- **Log file (log)** Specify the path to the log file containing the compiler warnings.

The full command line syntax for GNATCompiler is:

```
-d "type=GnatCompiler,log=[text]"
```

12.25. JUnit

12.25.1. Description

JUnit is a simple framework to write repeatable tests. It is an instance of the xUnit architecture for unit testing frameworks. JUnit XML result files are imported to generate findings and the total number of tests is made available as a measure.

For more details, refer to http://junit.org/.

12.25.2. Usage

JUnit has the following options:

- **Results folder (resultDir, mandatory)** Specify the path to the folder containing the JUnit results. The data provider will parse all available XML files. Note that the minimum support version of JUnit is 4.10.

The full command line syntax for JUnit is:

```
-d "type=JUnit,resultDir=[text]"
```

12.26. JaCoCo

12.26.1. Description

JaCoCo is a free code coverage library for Java. Its XML report file can be imported to generate code coverage metrics for your Java project.

For more details, refer to http://www.eclemma.org/jacoco/.

12.26.2. Usage

JaCoCo has the following options:

- **XML report (xml, mandatory)** Specify the path to the XML report generated by JaCoCo. Note that the folder containing the XML file must also contain JaCoCo's report DTD file, available from http://www.eclemma.org/jacoco/trunk/coverage/report.dtd. XML report files are supported from version 0.6.5.

The full command line syntax for JaCoCo is:

```
-d "type=Jacoco,xml=[text]"
```

12.27. Klocwork

12.27.1. Description

Klocwork is a static analysis tool. Its XML result file can be imported to generate findings.

For more details, refer to http://www.klocwork.com.

12.27.2. Usage

Klocwork has the following options:

- **XML results file (xml)** Specify the path to the XML results file exported from Klocwork. Note that Klocwork version 9.6.1 is the minimum required version.

The full command line syntax for Klocwork is:

```
-d "type=Klocwork,xml=[text]"
```

12.28. Rational Logiscope

12.28.1. Description

The Logiscope suite allows the evaluation of source code quality in order to reduce maintenance cost, error correction or test effort. It can be applied to verify C, C++, Java and Ada languages and produces a CSV results file that can be imported to generate findings.

For more details, refer to http://www.kalimetrix.com/en/logiscope.

12.28.2. Usage

Rational Logiscope has the following options:

- **RuleChecker results file (csv)** Specify the path to the CSV results file from Logiscope.

The full command line syntax for Rational Logiscope is:

```
-d "type=Logiscope,csv=[text]"
```

12.29. MemUsage

12.29.1. Description

12.29.2. Usage

MemUsage has the following options:

- **Memory Usage excel file (excel)**

The full command line syntax for MemUsage is:

```
-d "type=MemUsage,excel=[text]"
```

12.30. NCover

12.30.1. Description

NCover is a Code coverage program for C# application. NCover generates an XML results file which can be imported to generate metrics.

For more details, refer to http://www.ncover.com/.

12.30.2. Usage

NCover has the following options:

- **XML results file (xml)** Specify the location of the XML results file generated by NCover. Note that the minimum supported version is NCover 3.0.

The full command line syntax for NCover is:

```
-d "type=NCover,xml=[text]"
```

12.31. Oracle PLSQL compiler Warning checker

12.31.1. Description

This data provider reads an Oracle compiler log file and imports the warnings as findings. Findings extracted from the log file are filtered using a prefix parameter.

For more details, refer to http://www.oracle.com/.

12.31.2. Usage

Oracle PLSQL compiler Warning checker has the following options:

- **Compiler log file (log)**
- **Prefixes (prefix)** Prefixes and their replacements are specified as pairs using the syntax [prefix1|node1;prefix2|node2]. Leave this field empty to disable filtering. The parsing algorithm looks for lines fitting this pattern: [PATH;SCHEMA;ARTE_ID;ARTE_TYPE;LINE;COL;SEVERITY_TYPE;WARNING_ID;SEVERITY_ID;DESCR] and keeps lines where [PATH] begins with one of the input prefixes. In each kept [PATH], [prefix] is replaced by [node]. If [node] is empty, [prefix] is removed from [PATH], but not replaced. Some valid syntaxes for prefix: One prefix to remove: svn://aaaa:12345/valid/path/from/svn One prefix to replace: svn://aaaa:12345/valid/path/from/svn|node1 Two prefixes to remove: svn://aaaa:12345/valid/path/from/svn|;svn://bbbb:12345/valid/path/from/other_svn| Two prefixes to remove: svn://aaaa:12345/valid/path/from/svn;svn://bbbb:12345/valid/path/from/other_svn Two prefixes to replace: svn://aaaa:12345/valid/path/from/svn|node1;svn://bbbb:12345/valid/path/from/other_svn|node2

The full command line syntax for Oracle PLSQL compiler Warning checker is:

```
-d "type=Oracle_PLSQLCompiler,log=[text],prefix=[text]"
```

12.32. MISRA Rule Checking using PC-lint

12.32.1. Description

PC-lint is a static code analyser. The PC-lint data provider reads an PC-lint log file and imports MISRA violations as findings.

For more details, refer to http://www.gimpel.com/html/pcl.htm.

12.32.2. Usage

MISRA Rule Checking using PC-lint has the following options:

- **Log file folder (logDir)** Specify the path to the folder containing the PC-lint log files.
- **Extensions to exclude (excludedExtensions, default: .h;.H)** Specify the file extensions to exclude from the reported violations.

The full command line syntax for MISRA Rule Checking using PC-lint is:

```
-d "type=PC_Lint_MISRA,logDir=[text],excludedExtensions=[text]"
```

12.33. PMD

12.33.1. Description

PMD scans Java source code and looks for potential problems like possible bugs, dead code, sub-optimal code, overcomplicated expressions, duplicate code... The XML results file it generates is read to create findings.

For more details, refer to http://pmd.sourceforge.net.

12.33.2. Usage

PMD has the following options:

- **XML results file (xml)** Specify the path to the PMD XML results file. Note that the minimum supported version of PMD for this data provider is 4.2.5.

The full command line syntax for PMD is:

```
-d "type=PMD,xml=[text]"
```

12.34. PMD (plugin)

12.34.1. Description

PMD scans Java source code and looks for potential problems like possible bugs, dead code, sub-optimal code, overcomplicated expressions, duplicate code ... The XML results file it generates is read to create findings.

For more details, refer to http://pmd.sourceforge.net.

> **Note**
> This data provider requires an extra download to extract the PMD binary in `<SQUORE_HOME>/addons/tools/PMD_auto/`. For more information, refer to the Installation and Administration Guide's Third-Party Plugins and Applications [../install_admin_manual/index.html#sect_thirdparty_plugins] section.

12.34.2. Usage

PMD (plugin) has the following options:

- **Ruleset file (configFile)** Specify the path to the PMD XML ruleset you want to use for this analysis. If you do not specify a ruleset, the default one from INSTALLDIR/addons/tools/PMD_autow ill be used.

The full command line syntax for PMD (plugin) is:

```
-d "type=PMD_auto,configFile=[text]"
```

12.35. Polyspace

12.35.1. Description

Polyspace is a static analysis tool which includes a MISRA checker. It produces an XML output which can be imported to generate findings. Polyspace Verifier detects RTE (RunTime Error) such as Division by zero, Illegal Deferencement Pointer, Out of bound array index... Such information is turned into statistical measures at function level. Number of Red (justified/non-justified), Number of Grey (justified/non-justified), Number of Orange (justified/non-justified), Number of Green.

For more details, refer to http://www.mathworks.com/products/polyspace/index.html.

12.35.2. Usage

Polyspace has the following options:

- **XML results file (xml)** Specify the path to the XML results file generated by Polyspace.

The full command line syntax for Polyspace is:

```
-d "type=Polyspace,xml=[text]"
```

12.36. MISRA Rule Checking using Polyspace

12.36.1. Description

Polyspace is a static analysis tool which includes a MISRA checker. It produces an XML output which can be imported to generate findings. Polyspace Verifier detects RTE (RunTime Error) such as Division by zero, Illegal Deferencement Pointer, Out of bound array index... Such information is turned into statistical measures at function level. Number of Red (justified/non-justified), Number of Grey (justified/non-justified), Number of Orange (justified/non-justified), Number of Green.

For more details, refer to http://www.mathworks.com/products/polyspace/index.html.

12.36.2. Usage

MISRA Rule Checking using Polyspace has the following options:

- **Results folder (resultDir)** Specify the folder containing the Polyspace results. The data provider will parse all sub-folders searching for XML result files called "MISRA-CPP-report.xml" or "MISRA-C-report.xml" located in a "Polyspace-Doc" folder and aggregate results.
- **Unit by Unit (unitByUnit, default: true)** Check this box if the Polyspace verification was run unit by unit.

The full command line syntax for MISRA Rule Checking using Polyspace is:

```
-d "type=Polyspace_MISRA,resultDir=[text],unitByUnit=[booleanChoice]"
```

12.37. Polyspace (plugin)

12.37.1. Description

Polyspace is a static analysis tool which includes a MISRA checker. It produces an binary output format which can be imported to generate findings. Polyspace Verifier detects RTE (RunTime Error) such as Division by zero, Illegal Deferencement Pointer, Out of bound array index... Such information is turned into statistical measures at function level. Number of Red (justified/non-justified), Number of Grey (justified/non-justified), Number

of Orange (justified/non-justified), Number of Green. Note that this data provider requires an extra download to extract the Polyspace Export binary in [INSTALLDIR]/addons/tools/Polyspace_RTE/. For more information, refer to the Installation and Administration Manual's "Third-Party Plugins and Applications" section.

For more details, refer to http://www.mathworks.com/products/polyspace/index.html.

> **Note**
> This data provider requires an extra download to extract the Polyspace Export binary in <SQUORE_HOME>/addons/tools/Polyspace_RTE. For more information, refer to the Installation and Administration Guide's Third-Party Plugins and Applications [../install_admin_manual/index.html#sect_thirdparty_plugins] section.

12.37.2. Usage

Polyspace (plugin) has the following options:

- **Results folder (resultDir)** Specify the folder containing the Polyspace results. The data provider will run the polyspace-export binary on all sub-folders to export results to XML and aggregate them.
- **Unit by Unit (unitByUnit, default: true)** Check this box if the Polyspace verification was run unit by unit.

The full command line syntax for Polyspace (plugin) is:

```
-d "type=Polyspace_RTE,resultDir=[text],unitByUnit=[booleanChoice]"
```

12.38. MISRA Rule Checking with QAC

12.38.1. Description

QAC identifies problems in C source code caused by language usage that is dangerous, overly complex, non-portable, difficult to maintain, or simply diverges from coding standards. Its CSV results file can be imported to generate findings.

For more details, refer to http://www.phaedsys.com/principals/programmingresearch/pr-qac.html.

12.38.2. Usage

MISRA Rule Checking with QAC has the following options:

- **Code Folder (logDir)** Specify the path to the folder that contains the annotated files to process. For the findings to be successfully linked to their corresponding artefact, several requirements have to be met: - The annotated file name should be [Original source file name].txt e.g. The annotation of file "controller.c" should be called "controller.c.txt" - The annotated file location in the annotated directory should match the associated source file location in the source directory. e.g. The annotation for source file "[SOURCE_DIR]/subDir1/subDir2/controller.c" should be located in "[ANNOTATIONS_DIR]/subDir1/subDir2/controller.c.txt" The previous comment suggests that the source and annotated directory are different. However, these directories can of course be identical, which ensures that locations of source and annotated files are the same.
- **Extension (ext, default: html)** Specify the extension used by QAC to create annotated files.

The full command line syntax for MISRA Rule Checking with QAC is:

```
-d "type=QAC_MISRA,logDir=[text],ext=[text]"
```

12.39. Unit Test Code Coverage from Rational Test RealTime

12.39.1. Description

Rational Test RealTime is a cross-platform solution for component testing and runtime analysis of embedded software. Metrics are generated from its CSV results file.

For more details, refer to http://www-01.ibm.com/software/awdtools/test/realtime/.

12.39.2. Usage

Unit Test Code Coverage from Rational Test RealTime has the following options:

- **.xrd folder (logDir)** Specify the path to the folder containing the .xrd files generated by RTRT.
- **Excluded file extensions (excludedExtensions, default: .h;.H)**

The full command line syntax for Unit Test Code Coverage from Rational Test RealTime is:

```
-d "type=RTRT,logDir=[text],excludedExtensions=[text]"
```

12.40. ReqIF

12.40.1. Description

RIF/ReqIF (Requirements Interchange Format) is an XML file format that can be used to exchange requirements, along with its associated metadata, between software tools from different vendors.

For more details, refer to http://www.omg.org/spec/ReqIF/.

12.40.2. Usage

ReqIF has the following options:

- **ReqIF file (file)** Specify the path to the XML ReqIF file. Note that the XML file will be validated using the schema available from http://www.omg.org/spec/ReqIF/20110401/reqif.xsd.
- **Spec Object Type (objType, default: _AUTO_)** Specify the SPEC_OBJECT_TYPE property LONG-NAME to be used to process the ReqIf file. Using the _AUTO_ value will let the Data Provider extract the value fro the ReqIf file, and assumes that there is only one such definition.

The full command line syntax for ReqIF is:

```
-d "type=ReqIf,file=[text],objType=[text]"
```

12.41. SQL Code Guard

12.41.1. Description

SQL Code Guard is a free solution for SQL Server that provides fast and comprehensive static analysis for T-Sql code, shows code complexity and objects dependencies.

For more details, refer to http://www.sqlcodeguard.com.

12.41.2. Usage

SQL Code Guard has the following options:

- **XML results (xml)** Specify the path to the XML files containing SQL Code Guard results.

The full command line syntax for SQL Code Guard is:

```
-d "type=SQLCodeGuard,xml=[text]"
```

12.42. Squan Sources

12.42.1. Description

Squan Sources provides basic-level analysis of your source code.

For more details, refer to http://www.squoring.com.

> **Note**
> The analyser can output info and warning messages in the build logs. Recent additions to those logs include better handling of structures in C code, which will produce these messages:
>
> - [Analyzer] Unknown syntax declaration for function XXXXX at line yyy to indicate that we whould have found a function but, probably due to preprocessing directives, we are not able to parse it.
> - [Analyzer] Unbalanced () blocks found in the file. Probably due to preprocessing directives, parenthesis in the file are not well balanced.
> - [Analyzer] Unbalanced {} blocks found in the file. Probably due to preprocessing directives, curly brackets in the file are not well balanced.
>
> > **Tip**
> > You can specify the languages for your source code by passing pairs of language and extensions to the **languages** paramater. For example, a project mixing php and javascript files can be analysed with:
> >
> > ```
> > --dp "type=SQuORE,languages=php:.php;javascript:.js,.JS"
> > ```

12.42.2. Usage

Squan Sources has the following options:

- **Languages (languages)** Check the boxes for the languages used in the specified source repositories. Adjust the list of file extensions as necessary. Note that two languages cannot use the same file extension, and that the list of extensions is case-sensitive. Tip: Leave all the boxes unchecked and Squan Sources will auto-detect the language parser to use.
- **Force full analysis (rebuild_all, default: false)** Analyses are incremental by default. Check this box if you want to force the source code parser to analyse all files instead of only the ones that have changed since the previous analysis. This is useful if you added new rule files or text parsing rules and you want to re-evaluate all files based on your modifications.
- **Generate control graphs (genCG, default: true)** This option allows generating a control graph for every function in your code. The control graph is visible in the dashboard of the function when the analysis completes.
- **Use qualified names (qualified, default: false)** Note: This option cannot be modified in subsequent runs after you create the first version of your project.

- **Limit analysis depth (depth, default: false)** Use this option to limit the depth of the analysis to file-level only. This means that Squan Sources will not create any class or function artefacts for your project.
- **Add a 'Source Code' node (scnode, default: false)** Using this options groups all source nodes under a common source code node instead of directly under the APPLICATION node. This is useful if other data providers group non-code artefacts like tests or requirements together under their own top-level node. This option can only be set when you create a new project and cannot be modified when creating a new version of your project.
- **'Source Code' node label (scnode_name, default: Source Code)** Specify a custom label for your main source code node. Note: this option is not modifiable. It only applies to projects where you use the "Add a 'Source Code' node" option. When left blank, it defaults to "Source Code".
- **Compact folders (compact_folder, default: true)** When using this option, folders with only one son are aggregates together. This avoids creating many unnecessary levels in the artefact tree to get to the first level of files in your project. This option cannot be changed after you have created the first version of your project.
- **Content exclusion via regexp (pattern)** Specify a PERL regular expression to automatically exclude files from the analysis if their contents match the regular expression. Leave this field empty to disable content-based file exclusion.
- **File Filtering (files_choice, default: Exclude)** Specify a pattern and an action to take for matching file names. Leave the pattern empty to disable file filtering.
- **pattern (pattern_files)** Use a shell-like wildcard e.g. '*-test.c'. * Matches any sequence of characters in string, including a null string. ? Matches any single character in string. [chars] Matches any character in the set given by chars. If a sequence of the form x-y appears in chars, then any character between x and y, inclusive, will match. On Windows, this is used with the -nocase option, meaning that the end points of the range are converted to lower case first. Whereas {[A-z]} matches '_' when matching case-sensitively ('_' falls between the 'Z' and 'a'), with -nocase this is considered like {[A-Za-z]}. \x Matches the single character x. This provides a way of avoiding the special interpretation of the characters *?[] in pattern. Tip: Use ; to separate multiple patterns.
- **Folder Filtering (dir_choice, default: Exclude)** Specify a pattern and an action to take for matching folder names. Leave the pattern empty to disable folder filtering.
- **pattern (pattern_dir)** Use a shell-like wildcard e.g. 'Test_*'. * Matches any sequence of characters in string, including a null string. ? Matches any single character in string. [chars] Matches any character in the set given by chars. If a sequence of the form x-y appears in chars, then any character between x and y, inclusive, will match. On Windows, this is used with the -nocase option, meaning that the end points of the range are converted to lower case first. Whereas {[A-z]} matches '_' when matching case-sensitively ('_' falls between the 'Z' and 'a'), with -nocase this is considered like {[A-Za-z]}. \x Matches the single character x. This provides a way of avoiding the special interpretation of the characters *?[] in pattern. Tip: Use ; to separate multiple patterns.
- **Detect algorithmic cloning (clAlg, default: true)** When checking this box, Squan Sources launches a cloning detection tool capable of finding algorithmic cloning in your code.
- **Detect text cloning (clTxt, default: true)** When checking this box, Squan Sources launches a cloning detection tool capable of finding text duplication in your code.
- **Backwards-compatible cloning (clBw, default: false)** When checking this box, the cloning detection tool is run in a way that produces metrics that are backwards-compatible with earlier versions of this product (2014-A): exact matching is used for algorithmic cloning and a 5% margin is used for text duplication. This legacy behaviour should only be used if you are using an old configuration that was developed before 2014-B.
- **Cloning fault ratio (clFR, default: 0.1)** This threshold defines how much cloning between two artefacts is necessary for them to be considered as clones by the cloning detection tool. For example, a fault ratio of

0.1 means that two artefacts are considered clones if less than 10% of their contents differ. Note that this option is ignored if you are using backwards-compatible cloning.

- **Detect Open Source cloning (deprecated) (clOS, default: false)** This option is no longer supported and should not be used anymore.
- **Compute Textual stability (genTs, default: true)** This option allows keeping track of the stability of the code analysed for each version. The computed stability is available on the dashboard as a metric called and can be interpreted as 0% meaning completely changed and 100% meaning not changed at all.
- **Compute Algorithmic stability (genAs, default: true)** This option allows keeping track of the stability of the code analysed for each version. The computed stability is available on the dashboard as a metric called Stability Index (SI) and can be interpreted as 0% meaning completely changed and 100% meaning not changed at all.
- **Detect artefact renaming (clRen, default: true)** This option allows Squan Sources to detect artefacts that have been moved since the previous version, ensuring that the stability metrics of the previous artefact are passed to the new one. This is typically useful if you have moved a file to a different folder in your source tree and do not want to lose the previous metrics generated for this file. If you do not use this option, moved artefacts will be considered as new artefacts.
- **Additional parameters (additional_param)** These additional parameters can be used to pass instructions to external processes started by this data provider. This value is generally left empty in most cases.

The full command line syntax for Squan Sources is:

```
-d
 "type=SQuORE,languages=[multipleChoice],rebuild_all=[booleanChoice],genCG=[booleanChoice],qua
```

12.43. Squore Import

12.43.1. Description

Squore Import is a data provider used to import the results of another data provider analysis. It is generally only used for debugging purposes.

For more details, refer to http://www.squoring.com.

12.43.2. Usage

Squore Import has the following options:

- **XML folder (inputDir)** Specify the folder that contains the squore_data_*.xml files that you want to import.

The full command line syntax for Squore Import is:

```
-d "type=SQuOREImport,inputDir=[text]"
```

12.44. Squore Virtual Project

12.44.1. Description

Squore Virtual Project is a data provider that can use the output of several projects to compile metrics in a meta-project composed of the import sub-projects.

For more details, refer to http://www.squoring.com.

12.44.2. Usage

Squore Virtual Project has the following options:

- **Paths to output.xml files (output)** Specify the paths to all the output.xml files you want to include in the virtual project. Separate paths using ';'.

The full command line syntax for Squore Virtual Project is:

```
-d "type=SQuOREVirtualProject,output=[text]"
```

12.45. StyleCop

12.45.1. Description

StyleCop is a C# code analysis tool. Its XML output is imported to generate findings.

For more details, refer to https://stylecop.codeplex.com/.

12.45.2. Usage

StyleCop has the following options:

- **XML results file (xml)** Specify the path to the StyleCop XML results file. The minimum version compatible with this data provider is 4.7.

The full command line syntax for StyleCop is:

```
-d "type=StyleCop,xml=[text]"
```

12.46. StyleCop (plugin)

12.46.1. Description

StyleCop is a C# code analysis tool. Its XML output is imported to generate findings.

For more details, refer to https://stylecop.codeplex.com/.

> **Note**
> Note that this data provider is not supported on Linux. On windows, this data provider requires an extra download to extract the StyleCop binary in `<SQUORE_HOME>/addons/tools/StyleCop_auto/`. For more information, refer to the Installation and Administration Guide's Third-Party Plugins and Applications [../install_admin_manual/index.html#sect_thirdparty_plugins] section.

12.46.2. Usage

StyleCop (plugin) has the following options:

- **Solution (sln)** Specify the path to the .sln file to analyse. Leave empty to analyse all .sln found in the source repository.

The full command line syntax for StyleCop (plugin) is:

```
-d "type=StyleCop_auto,sln=[text]"
```

12.47. Tessy

12.47.1. Description

Tessy is a tool automating module/unit testing of embedded software written in dialects of C/C++. Tessy generates an XML results file which can be imported to generate metrics.

For more details, refer to http://www.hitex.com/index.php?id=172.

12.47.2. Usage

Tessy has the following options:

- **Results folder (resultDir)** Specify the top folder containing XML result files from Tessy. Note that this data provider will recursively scan sub-folders looking for index.xml files to aggregate results.

The full command line syntax for Tessy is:

```
-d "type=Tessy,resultDir=[text]"
```

12.48. VectorCAST 6.3

12.48.1. Description

VectorCAST 6.3

For more details, refer to VectorCAST 6.3.

12.48.2. Usage

VectorCAST 6.3 has the following options:

- **HTML Report (html_report)** Enter the path to the HTML report which contains the Coverage results

The full command line syntax for VectorCAST 6.3 is:

```
-d "type=VectorCAST,html_report=[text]"
```

12.49. OSLC

12.49.1. Description

OSLC-CM allows retrieving information from Change Management systems following the OSLC standard. Metrics and artefacts are created by connecting to the OSLC system and retrieving issues with the specified query.

For more details, refer to http://open-services.net/.

12.49.2. Usage

OSLC has the following options:

- **Change Server (server)** Specify the URL of the project you want to query on the OSLC server. Typically the URL will look like this: http://myserver:8600/change/oslc/db/3454a67f-656ddd4348e5/role/User/
- **Query (query)** Specify the query to send to the OSLC server (e.g.: release="9TDE/TDE_00_01_00_00"). It is passed to the request URL via the ?oslc_cm.query= parameter.
- **Query Properties (properties, default: request_type,problem_number,crstatus,severity,submission_area,functionality,mb_code,professional_line,ir_submitted** Specify the properties to add to the query. They are passed to the OSLC query URL using the ? oslc_cm.properties= parameter.
- **Login (login)**
- **Password (password)**

The full command line syntax for OSLC is:

```
-d
 "type=oslc_cm,server=[text],query=[text],properties=[text],login=[text],password=[password]"
```

12.50. pep8

12.50.1. Description

pep8 is a tool to check your Python code against some of the style conventions in PEP 88. Its CSV report file is imported to generate findings.

For more details, refer to https://pypi.python.org/pypi/pep8.

12.50.2. Usage

pep8 has the following options:

- **CSV results file (csv)** Specify the path to the CSV report file created by pep8.

The full command line syntax for pep8 is:

```
-d "type=pep8,csv=[text]"
```

12.51. pylint

12.51.1. Description

Pylint is a Python source code analyzer which looks for programming errors, helps enforcing a coding standard and sniffs for some code smells (as defined in Martin Fowler's Refactoring book). Pylint results are imported to generate findings for Python code.

For more details, refer to http://www.pylint.org/.

12.51.2. Usage

pylint has the following options:

- **CSV results file (csv)** Specify the path to the CSV file containing pylint results. Note that the minimum version supported is 1.1.0.

The full command line syntax for pylint is:

```
-d "type=pylint,csv=[text]"
```

12.52. Qac_8_2

12.52.1. Description

QA-C is a static analysis tool for MISRA checking.

For more details, refer to http://www.programmingresearch.com/static-analysis-software/qac-qacpp-static-analyzers/.

12.52.2. Usage

Qac_8_2 has the following options:

- **QAC output file (.tab file) (txt, mandatory)**

The full command line syntax for Qac_8_2 is:

```
-d "type=qac,txt=[text]"
```

12.53. Creating your own Data Providers

You can create your own Data Providers by using the built-in frameworks included in Squore. Each solution uses a different approach, but the overall goal is to produce one or more CSV files that your Data Provider will send to Squore to associate metrics, findings, textual information or links to artefacts in your project.

This section helps you choose the right framework for your custom Data Provider and covers the basics of creating a custom configuration folder to extend Squore.

12.53.1. Choosing the Right Data Provider Framework

The following is a list of the available Data Provider frameworks:

	Import Metrics	Import Textual Information	Import Findings	Import Links	Create Artefacts	Parse Subfolders
CSV	✓	✓	✗	✗	✓	✓
CSVPerl	✓	✓	✗	✗	✓	✓
Generic	✓	✓	✓	✓	✓	✗
GenericPerl	✓	✓	✓	✓	✓	✓
FindingsPerl	✗	✗	✓	✗	✗	✓
ExcelMetrics	✓	✓	✓	✗	✓	✓

✓ Supported
✓ Your Perl script needs to handle subfolder parsing
✗ Not Supported

Data Provider frameworks and their capabilities

1. **Csv**

The Csv framework is used to import metrics or textual information and attach them to artefacts of type Application or File. While parsing one or more input CSV files, if it finds the same metric for the same artefact several times, it will only use the last occurrence of the metric and ignore the previous ones. Note that the type of artefacts you can attach metrics to is limited to Application and File artefacts. If you are working with File artefacts, you can let the Data Provider create the artefacts by itself if they do not exist already. Refer to the full Csv Reference for more information.

2. **CsvPerl**
   The CsvPerl framework offers the same functionality as Csv, but instead of dealing with the raw input files directly, it allows you to run a perl script to modify them and produce a CSV file with the expected input format for the Csv framework. Refer to the full CsvPerl Reference for more information.
3. **FindingsPerl**
   The FindingsPerl framework is used to import findings and attach them to existing artefacts. Optionally, if an artefact cannot be found in your project, the finding can be attached to the root node of the project instead. When launching a Data Provider based on the FindingsPerl framework, a perl script is run first. This perl script is used to generate a CSV file with the expected format which will then be parsed by the framework. Refer to the full FindingsPerl Reference for more information.
4. **Generic**
   The Generic framework is the most flexible Data Provider framework, since it allows attaching metrics, findings, textual information and links to artefacts. If the artefacts do not exist in your project, they will be created automatically. It takes one or more CSV files as input (one per type of information you want to import) and works with any type of artefact. Refer to the full Generic Reference for more information.
5. **GenericPerl**
   The GenericPerl framework is an extension of the Generic framework that starts by running a perl script in order to generate the metrics, findings, information and links files. It is useful if you have an input file whose format needs to be converted to match the one expected by the Generic framework, or if you need to retrieve and modify information exported from a web service on your network. Refer to the full GenericPerl Reference for more information.
6. **ExcelMetrics**
   The ExcelMetrics framework is used to extract information from one or more Microsoft Excel files (.xls or .xslx). A detailed configuration file allows defining how the Excel document should be read and what information should be extracted. This framework allows importing metrics, findings and textual information to existing artefacts or artefacts that will be created by the Data Provider. Refer to the full ExcelMetrics Reference for more information.

The Data Providers that are not based on these frameworks can do a lot more than just import information from CSV files. Here is a non-exhaustive list of what some of them do:

- Use XSLT files to transform XML files
- Read information from microsoft Word Files
- Parse HTML test result files
- Query web services
- Export data from OSLC systems
- Launch external processes

If you are interested in developping Data Providers that go beyond the scope of what is described in the open frameworks, consult Squoring Technologies to learn more about the available training courses in writing Data Providers.

12.53.2. Extending a Framework

After you choose the framework to extend, you should follow these steps to make your custom Data Provider known to Squore:

1. Create a new configuration `tools` folder to save your work in your custom configuration folder: `MyConfiguration/configuration/tools`.
2. Create a new folder for your data provider inside the new `tools` folder: **CustomDP**. This folder needs to contain the following files:
   - **form.xml** defines the input parameters for the Data Provider, and the base framework to use
   - **form_en.properties** contains the strings displayed in the web interface for this Data Provider
   - **config.tcl** contains the parameters for your custom Data Provider that are specific to the selected framework
   - **CustomDP.pl** is the perl script that is executed automatically if your custom Data Provider uses one of the *Perl frameworks.
3. Edit Squore Server's configuration file to register your new configuration path, as described in the Installation and Administration Guide.
4. Log into the web interface as a Squore administrator and reload the configuration.

Your new Data Provider is now known to Squore and can be triggered in analyses. Note that you may have to modify your Squore configuration to make your wizard aware of the new Data Provider and your model aware of the new metrics it provides. Refer to the relevant sections of the Configuration Guide for more information.

Appendix A. Data Provider Frameworks

```
=======
= Csv =
=======

The Csv framework is used to import metrics or textual information and attach
 them to artefacts of type Application, File or Function. While parsing one
 or more input CSV files, if it finds the same metric for the same artefact
 several times, it will only use the last occurrence of the metric and ignore
 the previous ones. Note that the type of artefacts you can attach metrics to
 is limited to Application, File and Function artefacts. If you are working with
 File artefacts, you can let the Data Provider create the artefacts by itself if
 they do not exist already.

============
= form.xml =
============

You can customise form.xml to either:
- specify the path to a single CSV file to import
- specify a pattern to import all csv files matching this pattern in a directory

In order to import a single CSV file:
=====================================
<?xml version="1.0" encoding="UTF-8"?>
<tags baseName="Csv" needSources="true">
 <tag type="text" key="csv" defaultValue="/path/to/mydata.csv" />
</tags>

Notes:
- The csv key is mandatory.
- Since Csv-based data providers commonly rely on artefacts created by Squan
 Sources, you can set the needSources attribute to force users to specify at
 least one repository connector when creating a project.

In order to import all files matching a pattern in a folder:
============================================================
<?xml version="1.0" encoding="UTF-8"?>
<tags baseName="Csv" needSources="true">
 <!-- Root directory containing Csv files to import-->
 <tag type="text" key="dir" defaultValue="/path/to/mydata" />
 <!-- Pattern that needs to be matched by a file name in order to import it-->
 <tag type="text" key="ext" defaultValue="*.csv" />
 <!-- search for files in sub-folders -->
 <tag type="booleanChoice" defaultValue="true" key="sub" />
</tags>

Notes:
- The dir and ext keys are mandatory
- The sub key is optional (and its value set to false if not specified)


==============
= config.tcl =
==============

Sample config.tcl file:
```

```
======================
# The separator used in the input CSV file
# Usually \t or ;
set Separator "\t"

# ArtefactLevel is one of:
#      Application: to import data at application level
#      File: to import data at file level. In this case ArtefactKey has to be set
#             to the value of the header (key) of the column containing the file
 path
#     in the input CSV file.
#      Function : to import data at function level, in this case:
#                 ArtefactKey has to be set to the value of the header (key) of
 the column containing the path of the file
#                 FunctionKey has to be set to the value of the header (key) of
 the column containing the name and signature of the function
# Note that the values are case-sensitive.
set ArtefactLevel File
set ArtefactKey File

# The delimiter used in the input CSV file
# This is normally left empty, except when you know that some of the values in
 the CSV file
# contain the separator itself, for example:
# "A text containing ; the separator";no problem;end
# In this case, you need to set the delimiter to \" in order for the data
 provider to find 3 values instead of 4.
# To include the delimiter itself in a value, you need to escape it by
 duplicating it, for example:
# "A text containing "" the delimiter";no problemo;end
# Default: none
set ::Delimiter

# Should the File paths be case-insensitive?
# true or false (default)
# This is used when searching for a matching artefact in already-existing
 artefacts.
set PathsAreCaseInsensitive "false"

# Should file artefacts declared in the input CSV file be created automatically?
# true (default) or false
set CreateMissingFile "true"

# FileOrganisation defines the layout of the input CSV file and is one of:
#     header::column: values are referenced from the column header
#     header::line: NOT AVAILABLE
#     alternate::line: lines are a sequence of {Key Value}
#     alternate::column: columns are a sequence of {Key Value}
# There are more examples of possible CSV layouts later in this document
set FileOrganisation header::column

# Metric2Key contains a case-sensitive list of paired metric IDs:
#     {MeasureID KeyName [Format]}
# where:
#   - MeasureID is the id of the measure as defined in your analysis model
#   - KeyName, depending on the FileOrganisation, is either the name of the
 column or the name
#      in the cell preceding the value to import as found in the input CSV file
#   - Format is the optional format of the data, the only accepted format
```

```
#      is "text" to attach textual information to an artefact, for normal metrics
 omit this field
set Metric2Key {
 {BRANCHES Branchs}
 {VERSIONS Versions}
 {CREATED Created}
 {IDENTICAL Identical}
 {ADDED Added}
 {REMOV Removed}
 {MODIF Modified}
 {COMMENT Comment text}
}


==========================
= Sample CSV Input Files =
==========================

Example 1:
==========
 FileOrganisation : header::column
 ArtefactLevel : File
 ArtefactKey   : Path

Path Branchs Versions
./foo.c 15  105
./bar.c 12  58

Example 2:
==========
 FileOrganisation : alternate::line
 ArtefactLevel : File
 ArtefactKey   : Path

Path ./foo.c Branchs 15 Versions 105
Path ./bar.c Branchs 12 Versions 58

Example 3:
==========
 FileOrganisation : header::column
 ArtefactLevel : Application

ChangeRequest Corrected Open
27    15   11

Example 4:
==========
 FileOrganisation : alternate::column
 ArtefactLevel : Application

ChangeRequest 15
Corrected  11

Example 5:
==========
 FileOrganisation : alternate::column
 ArtefactLevel : File
 ArtefactKey   : Path
```

```
Path ./foo.c
Branchs 15
Versions 105
Path ./bar.c
Branchs 12
Versions 58

Example 6:
==========
 FileOrganisation : header::column
 ArtefactLevel : Function
 ArtefactKey   : Path
 FunctionKey   : Name

Path Name Decisions Tested
./foo.c end_game(int*,int*) 15  3
./bar.c bar(char) 12  6

Working With Paths:
===================

- Path seperators are unified: you do not need to worry about handling
 differences between Windows and Linux
- With the option PathsAreCaseInsensitive, case is ignored when searching for
 files in the Squore internal data
- Paths known by Squore are relative paths starting at the root of what was
 specified in the repository connector durign the analysis. This relative path is
 the one used to match with a path in a csv file.

Here is a valid example of file matching:
  1. You provide C:\A\B\C\D as the root folder in a repository connector
  2. C:\A\B\C\D contains E\e.c then Squore will know E/e.c as a file

  3. You provide a csv file produced on linux and containing
    /tmp/X/Y/E/e.c as path, then Squore will be able to match it with the known
 file.

Squore uses the longest possible match.
In case of conflict, no file is found and a message is sent to the log.
```

```
===========
= CsvPerl =
===========

The CsvPerl framework offers the same functionality as Csv, but instead of
 dealing with the raw input files directly, it allows you to run a perl script
 to modify them and produce a CSV file with the expected input format for the Csv
 framework.


============
= form.xml =
============

In your form.xml, specify the input parameters you need for your Data Provider.
Our example will use two parameters: a path to a CSV file and another text
 parameter:

<?xml version="1.0" encoding="UTF-8"?>
```

```
<tags baseName="CsvPerl" needSources="true">
 <tag type="text" key="csv" defaultValue="/path/to/csv" />
 <tag type="text" key="param" defaultValue="MyValue" />
</tags>

- Since Csv-based data providers commonly rely on artefacts created by Squan
 Sources, you can set the needSources attribute to force users to specify at
 least one repository connector when creating a project.


==============
= config.tcl =
==============

Refer to the description of config.tcl for the Csv framework.

For CsvPerl one more option is possible:

# The variable NeedSources is used to request the perl script to be executed once
 for each
# repository node of the project. In that case an additional parameter is sent to
 the
# perl script (see below for its position)
#set ::NeedSources 1


===========================
= Sample CSV Input Files =
===========================

Refer to the examples for the Csv framework.


===============
= Perl Script =
===============

The perl scipt will receive as arguments:
 - all parameters defined in form.xml (as -${key} $value)
 - the input directory to process (only if ::NeedSources is set to 1 in the
 config.tcl file)
 - the location of the output directory where temporary files can be generated
 - the full path of the csv file to be generated

For the form.xml we created earlier in this document, the command line will be:
 perl <configuration_folder>/tools/CustomDP/CustomDP.pl -csv /path/to/csv -param
 MyValue <output_folder> <output_folder>/CustomDP.csv

Example of perl script:
======================
#!/usr/bin/perl
use strict;
use warnings;
$|=1 ;

($csvKey, $csvValue, $paramKey, $paramValue, $output_folder, $output_csv) =
 @ARGV;

 # Parse input CSV file
```

```
 # ...

 # Write results to CSV
 open(CSVFILE, ">" . ${output_csv}) || die "perl: can not write: $!\n";
 binmode(CSVFILE, ":utf8");
 print CSVFILE  "ChangeRequest;15";
 close CSVFILE;

exit 0;
```

```
===========
= Generic =
===========

The Generic framework is the most flexible Data Provider framework, since
 it allows attaching metrics, findings, textual information and links to
 artefacts. If the artefacts do not exist in your project, they will be created
 automatically. It takes one or more CSV files as input (one per type of
 information you want to import) and works with any type of artefact.


============
= form.xml =
============

In form.xml, allow users to specify the path to a CSV file for each type of data
 you want to import.
You can set needSources to true or false, depending on whether or not you want
 to require the use of a repository connector when your custom Data Provider is
 used.

Example of form.xml file:
=========================
<?xml version="1.0" encoding="UTF-8"?>
<tags baseName="Generic" needSources="false">
 <!-- Path to CSV file containing Metrics data -->
 <tag type="text" key="csv" defaultValue="mydata.csv" />
 <!-- Path to CSV file containing Findings data: -->
 <tag type="text" key="fdg" defaultValue="mydata_fdg.csv" />
 <!-- Path to CSV file containing Information data: -->
 <tag type="text" key="inf" defaultValue="mydata_inf.csv" />
 <!-- Path to CSV file containing Links data: -->
 <tag type="text" key="lnk" defaultValue="mydata_lnk.csv" />
</tags>

Note: All tags are optional. You only need to specify the tag element for the
 type of data you want to import with your custom Data Provider.


==============
= config.tcl =
==============

Sample config.tcl file:
=======================
# The separator used in the input csv files
# Usually \t or ; or ,
# In our example below, a space is used.
set Separator " "
```

```
# The path separator in an artefact's path
# in the input CSV file.
# Note that artefact is spellt with an "i"
# and not an "e" in this option.
set ArtifactPathSeparator "/"

# If the data provider needs to specify a different toolName (optional)
set SpecifyToolName 1

# Metric2Key contains a case-sensitive list of paired metric IDs:
#     {MeasureID KeyName [Format]}
# where:
#   - MeasureID is the id of the measure as defined in your analysis model
#   - KeyName is the name in the cell preceding the value to import as found in
 the input CSV file
#   - Format is the optional format of the data, the only accepted format
#      is "text" to attach textual information to an artefact. Note that the same
 result can also
#       be achieved with Info2Key (see below). For normal metrics omit this
 field.
set Metric2Key {
 {CHANGES Changed}
}

# Finding2Key contains a case-sensitive list of paired rule IDs:
#     {FindingID KeyName}
# where:
#   - FindingID is the id of the rule as defined in your analysis model
#   - KeyName is the name in the finding name in the input CSV file
set Finding2Key {
 {R_NOTLINKED NotLinked}
}

# Info2Key contains a case-sensitive list of paired info IDs:
#     {InfoID KeyName}
# where:
#   - InfoID is the id of the textual information as defiend in your analysis
 model
#   - KeyName is the name of the information name in the input CSV file
set Info2Key
 {SPECIAL_LABEL Label}
}

# Ignore findings for artefacts that are not part of the project (orphan
 findings)
# When set to 1, the findings are ignored
# When set to 0, the findings are imported and attached to the APPLICATION node
# (default: 1)
set IgnoreIfArtefactNotFound 1

# For findings of a type that is not in your ruleset, set a default rule ID.
# The value for this parameter must be a valid rule ID from your analysys model.
# (default: empty)
set UnknownRuleId UNKNOWN_RULE

# Save the total count of orphan findings as a metric at application level
# Specify the ID of the metric to use in your analysys model
# to store the information
```

```
# (default: empty)
set OrphanArteCountId NB_ORPHANS

# Save the total count of unknown rules as a metric at application level
# Specify the ID of the metric to use in your analysys model
# to store the information
# (default: empty)
set OrphanRulesCountId NB_UNKNOWN_RULES

# Save the list of unknown rule IDs as textual information at application level
# Specify the ID of the metric to use in your analysys model
# to store the information
# (default: empty)
set OrphanRulesListId UNKNOWN_RULES_INFO


====================
=  CSV File Format =
====================

All the examples listed below assume the use of the following config.tcl:

set Separator ","
set ArtifactPathSeparator "/"
set Metric2Key {
 {CHANGES Changed}
}
set Finding2Key {
 {R_NOTLINKED NotLinked}
}
set Info2Key
 {SPECIAL_LABEL Label}
}


Layout for Metrics File:
========================
 ==> artefact_type artefact_path (Key Value)*

 When the parent artefact type is not given it defaults to
 <artefact_type>_FOLDER.
 Example:
 REQ_MODULE,Requirements/Module
 REQUIREMENT,Requirements/Module/My_Req,Changed,1

 will produce the following artefact tree:
 Application
      Requirements (type: REQ_MODULE_FOLDER)
          Module (type: REQ_MODULE)
              My_Req : (type: REQUIREMENT) with 1 metric CHANGES = 1

Note: the key "Changed" is mapped to the metric "CHANGES", as specified by the
 Metric2Key parameter, so that it matches what is expected by the model.


Layout for Findings File:
=========================
 ==> artefact_type artefact_path key message
```

```
 When the parent artefact type is not given it defaults to
 <artefact_type>_FOLDER.
 Example:
 REQ_MODULE,Requirements/Module
 REQUIREMENT,Requirements/Module/My_Req,NotLinked,A Requirememement should always
 been linked

 will produce the following artefact tree:
 Application
      Requirements (type: REQ_MODULE_FOLDER)
          Module (type: REQ_MODULE)
              My_Req (type: REQUIREMENT) with 1 finding R_NOTLINKED whose
 description is "A Requirememement should always been linked"

Note: the key "NotLinked" is mapped to the finding "R_NOTLINKED", as specified by
 the Finding2Key parameter, so that it matches what is expected by the model.

Layout for Textual Information File:
====================================
 ==> artefact_type artefact_path label value

 When the parent artefact type is not given it defaults to
 <artefact_type>_FOLDER.
 Example:
 REQ_MODULE,Requirements/Module
 REQUIREMENT,Requirements/Module/My_Req,Label,This is the label of the req

 will produce the following artefact tree:
 Application
      Requirements (type: REQ_MODULE_FOLDER)
          Module (type: REQ_MODULE)
              My_Req (type: REQUIREMENT) with 1 information of type SPECIAL_LABEL
 whose content is "This is the label of the req"

Note: the label "Label" is mapped to the finding "SPECIAL_LABEL", as specified by
 the Info2Key parameter, so that it matches what is expected by the model.


Layout for Links File:
======================
 ==> artefact_type artefact_path dest_artefact_type dest_artefact_path link_type

 When the parent artefact type is not given it defaults to <artefact_type>_FOLDER
 Example:
 REQ_MODULE Requirements/Module
 TEST_MODULE Tests/Module
 REQUIREMENT Requirements/Module/My_Req TEST Tests/Module/My_test TESTED_BY

 will produce the following artefact tree:
 Application
 Requirements (type: REQ_MODULE_FOLDER)
  Module (type: REQ_MODULE)
   My_Req (type: REQUIREMENT) ------>
 Tests (type: TEST_MODULE_FOLDER)           |
  Module (type: TEST_MODULE)              |
   My_Test (type: TEST) <------------+ link (type: TESTED_BY)

The TESTED_BY relationship is created with My_Req as source of the link and
 My_test as the destination
```

```
CSV file organisation when SpecifyToolName is set to 1
======================================================
When the variable SpecifyToolName is set to 1 (or true) a column has to be added
at the beginning of each line in each csv file. This column can be empty or
 filled with a different toolName.

 Example:
 ,REQ_MODULE,Requirements/Module
 MyReqChecker,REQUIREMENT,Requirements/Module/My_Req Label,This is the label of
 the req

The finding of type Label will be set as reported by the tool "MyReqChecker".
```

```
===============
= GenericPerl =
===============

The GenericPerl framework is an extension of the Generic framework that starts
 by running a perl script in order to generate the metrics, findings, information
 and links files. It is useful if you have an input file whose format needs to be
 converted to match the one expected by the Generic framework, or if you need to
 retrieve and modify information exported from a web service on your network.


============
= form.xml =
============

In your form.xml, specify the input parameters you need for your Data Provider.
Our example will use two parameters: a path to a CSV file and another text
 parameter:

<?xml version="1.0" encoding="UTF-8"?>
<tags baseName="CsvPerl" needSources="false">
 <tag type="text" key="csv" defaultValue="/path/to/csv" />
 <tag type="text" key="param" defaultValue="MyValue" />
</tags>


==============
= config.tcl =
==============

Refer to the description of config.tcl for the Generic framework for the basic
 options.
Additionally, the following options are available for the GenericPerl framework,
 in order to know which type of information your custom Data Provider should try
 to import.

# If the data provider needs to specify a different toolName (optional)
#set SpecifyToolName 1

# Set to 1 to import metrics csv file, 0 otherwise


# ImportMetrics
# When set to 1, your custom Data Provider (CustomDP) will try to import
# metrics from a file called CustomDP.mtr.csv that your perl script
```

```
# should generate according to the expected format described in the
# documentation of the Generic framework.
set ImportMetrics 1

# ImportInfos
# When set to 1, your custom Data Provider (CustomDP) will try to import
# textual information from a file called CustomDP.inf.csv that your perl script
# should generate according to the expected format described in the
# documentation of the Generic framework.
set ImportInfos 0

# ImportFindings
# When set to 1, your custom Data Provider (CustomDP) will try to import
# findings from a file called CustomDP.fdg.csv that your perl script
# should generate according to the expected format described in the
# documentation of the Generic framework.
set ImportFindings 1

# ImportLinks
# When set to 1, your custom Data Provider (CustomDP) will try to import
# artefact links from a file called CustomDP.lnk.csv that your perl script
# should generate according to the expected format described in the
# documentation of the Generic framework.
set ImportLinks 0

# Ignore findings for artefacts that are not part of the project (orphan
 findings)
# When set to 1, the findings are ignored
# When set to 0, the findings are imported and attached to the APPLICATION node
# (default: 1)
set IgnoreIfArtefactNotFound 1

# For findings of a type that is not in your ruleset, set a default rule ID.
# The value for this parameter must be a valid rule ID from your analysys model.
# (default: empty)
set UnknownRuleId UNKNOWN_RULE

# Save the total count of orphan findings as a metric at application level
# Specify the ID of the metric to use in your analysys model
# to store the information
# (default: empty)
set OrphanArteCountId NB_ORPHANS

# Save the total count of unknown rules as a metric at application level
# Specify the ID of the metric to use in your analysys model
# to store the information
# (default: empty)
set OrphanRulesCountId NB_UNKNOWN_RULES

# Save the list of unknown rule IDs as textual information at application level
# Specify the ID of the metric to use in your analysys model
# to store the information
# (default: empty)
set OrphanRulesListId UNKNOWN_RULES_INFO

====================
=  CSV File Format =
====================
```

```
Refer to the examples in the Generic framework.


===============
= Perl Script =
===============

The perl scipt will receive as arguments:
- all parameters defined in form.xml (as -${key} $value)
- the location of the output directory where temporary files can be generated
- the full path of the metric csv file to be generated (if ImportMetrics is set
 to 1 in config.tcl)
- the full path of the findings csv file to be generated (if ImportFindings is
 set to 1 in config.tcl)
- the full path of the textual information csv file to be generated (if
 ImportInfos is set to 1 in config.tcl)
- the full path of the links csv file to be generated (if ImportLinks is set to 1
 in config.tcl)
- the full path to the output directory used by this data provider in the
 previous analysis

For the form.xml and config.tcl we created earlier in this document, the command
 line will be:
 perl <configuration_folder>/tools/CustomDP/CustomDP.pl -csv /path/to/csv -
param MyValue <output_folder> <output_folder>/CustomDP.mtr.csv <output_folder>/
CustomDP.fdg.csv <previous_output_folder>


Example of perl script:
======================
#!/usr/bin/perl
use strict;
use warnings;
$|=1 ;

($csvKey, $csvValue, $paramKey, $paramValue, $output_folder, $output_metrics_csv,
 $output_findings_csv, $prev_data_dir) = @ARGV;

 # Parse input CSV file
 # ...

 # Write metrics to CSV
 open(METRICS_FILE, ">" . ${output_metrics_csv}) || die "perl: can not write: $!
\n";
 binmode(METRICS_FILE, ":utf8");
 print METRICS_FILE  "REQUIREMENTS;Requirements/All_Requirements;NB_REQ;15";
 close METRICS_FILE;

 # Write findings to CSV
 open(FINDINGS_FILE, ">" . ${output_findings_csv}) || die "perl: can not write:
 $!\n";
 binmode(FINDINGS_FILE, ":utf8");
 print FINDINGS_FILE  "REQUIREMENTS;Requirements/All_Requirements;R_LOW_REQS;
\"The minimum number of requirement should be at least 25.\"";
 close FINDINGS_FILE;

exit 0;
```

```
================
```

```
= FindingsPerl =
================

The FindingsPerl framework is used to import findings and attach them to existing
 artefacts. Optionally, if an artefact cannot be found in your project, the
 finding can be attached to the root node of the project instead. When launching
 a Data Provider based on the FindingsPerl framework, a perl script is run first.
 This perl script is used to generate a CSV file with the expected format which
 will then be parsed by the framework.


============
= form.xml =
============

In your form.xml, specify the input parameters you need for your Data Provider.
Our example will use two parameters: a path to a CSV file and another text
 parameter:

<?xml version="1.0" encoding="UTF-8"?>
<tags baseName="CsvPerl" needSources="true">
 <tag type="text" key="csv" defaultValue="/path/to/csv" />
 <tag type="text" key="param" defaultValue="MyValue" />
</tags>

- Since FindingsPerl-based data providers commonly rely on artefacts created by
 Squan Sources, you can set the needSources attribute to force users to specify
 at least one repository connector when creating a project.


==============
= config.tcl =
==============


Sample config.tcl file:
=======================
# The separator to be used in the generated CSV file
# Usually \t or ;
set Separator ";"

# Should the perl script execcuted once for each repository node of the project ?
# 1 or 0 (default)
# If true an additional parameter is sent to the
# perl script (see below for its position)
set ::NeedSources 0

# Should the violated rules definitions be generated?
# true or false (default)
# This creates a ruleset file with rules that are not already
# part of your analysis model so you can review it and add
# the rules manually if needed.
set generateRulesDefinitions false

# Should the File paths be case-insensitive?
# true or false (default)
# This is used when searching for a matching artefact in already-existing
 artefacts.
set PathsAreCaseInsensitive false
```

```
# Should file artefacts declared in the input CSV file be created automatically?
# true (default) or false
set CreateMissingFile true

# Ignore findings for artefacts that are not part of the project (orphan
 findings)
# When set to 0, the findings are imported and attached to the APPLICATION node
 instead of the real artefact
# When set to 1, the findings are not imported at all
# (default: 0)
set IgnoreIfArtefactNotFound 0

# For findings of a type that is not in your ruleset, set a default rule ID.
# The value for this parameter must be a valid rule ID from your analysis model.
# (default: empty)
set UnknownRuleId UNKNOWN_RULE

# Save the total count of orphan findings as a metric at application level
# Specify the ID of the metric to use in your analysys model
# to store the information
# (default: empty)
set OrphanArteCountId NB_ORPHANS

# Save the total count of unknown rules as a metric at application level
# Specify the ID of the metric to use in your analysys model
# to store the information
# (default: empty)
set OrphanRulesCountId NB_UNKNOWN_RULES

# Save the list of unknown rule IDs as textual information at application level
# Specify the ID of the metric to use in your analysys model
# to store the information
# (default: empty)
set OrphanRulesListId UNKNOWN_RULES_INFO

# The tool version to specify in the generated rules definitions
# The default value is ""
# Note that the toolName is the name of the folder you created
# for your custom Data Provider
set ToolVersion ""

# FileOrganisation defines the layout of the CSV file that is produced by your
 perl script:
#     header::column: values are referenced from the column header
#     header::line: NOT AVAILABLE
#     alternate::line: NOT AVAILABLE
#     alternate::column: NOT AVAILABLE
set FileOrganisation header::column

# In order to attach a finding to an artefact of type FILE:
#   - Tool (optional) if present it overrides the name of the tool providing the
 finding
#   - Path has to be the path of the file
#   - Type has to be set to FILE
#   - Line can be either empty or the line in the file where the finding is
 located
#   Rule is the rule identifier, can be used as is or translated using Rule2Key
#   Descr is the description message, which can be empty
```

```
#
# In order to attach a finding to an artefact of type FUNCTION:
#   - Tool (optional) if present it overrides the name of the tool providing the
 finding
#   - Path has to be the path of the file containing the function
#   - Type has to be FUNCTION
#   - If line is an integer, the system will try to find an artefact function
#  at the given line of the file
#   - If no Line or Line is not an integer, Name is used to find an artefact in
#   the given file having name and signature as found in this column.
# (Line and Name are optional columns)

# Rule2Key contains a case-sensitive list of paired rule IDs:
#     {RuleID KeyName}
# where:
#   - RuleID is the id of the rule as defined in your analysis model
#   - KeyName is the rule ID as written by your perl script in the produced CSV
 file
# Note: Rules that are not mapped keep their original name. The list of unmapped
 rules is in the log file generated by your Data Provider.
set Rule2Key {
 { ExtractedRuleID_1 MappedRuleId_1  }
 { ExtractedRuleID_2 MappedRuleId_2  }
}


====================
=  CSV File Format =
====================

According to the options defined earlier in config.tcl, a valid csv file would
 be:

Path;Type;Line;Name;Rule;Descr
/src/project/module1/f1.c;FILE;12;;R1;Rule R1 is violated because variable v1
/src/project/module1/f1.c;FUNCTION;202;;R4;Rule R4 is violated because function
 f1
/src/project/module2/f2.c;FUNCTION;42;;R1;Rule R1 is violated because variable v2
/src/project/module2/f2.c;FUNCTION;;skip_line(int);R1;Rule R1 is violated because
 variable v2

Working With Paths:
===================

- Path seperators are unified: you do not need to worry about handling
 differences between Windows and Linux
- With the option PathsAreCaseInsensitive, case is ignored when searching for
 files in the Squore internal data
- Paths known by Squore are relative paths starting at the root of what was
 specified in the repository connector durign the analysis. This relative path is
 the one used to match with a path in a csv file.

Here is a valid example of file matching:
  1. You provide C:\A\B\C\D as the root folder in a repository connector
  2. C:\A\B\C\D contains E\e.c then Squore will know E/e.c as a file

  3. You provide a csv file produced on linux and containing
    /tmp/X/Y/E/e.c as path, then Squore will be able to match it with the known
 file.
```

```
Squore uses the longest possible match.
In case of conflict, no file is found and a message is sent to the log.


===============
= Perl Script =
===============

The perl scipt will receive as arguments:
 - all parameters defined in form.xml (as -${key} $value)
 - the input directory to process (only if ::NeedSources is set to 1)
 - the location of the output directory where temporary files can be generated
 - the full path of the findings csv file to be generated

For the form.xml and config.tcl we created earlier in this document, the command
 line will be:
 perl <configuration_folder>/tools/CustomDP/CustomDP.pl -csv /path/to/csv -
param MyValue <output_folder> <output_folder>/CustomDP.fdg.csv <output_folder>/
CustomDP.fdg.csv

Example of perl script:
======================
#!/usr/bin/perl
use strict;
use warnings;
$|=1 ;

($csvKey, $csvValue, $paramKey, $paramValue, $output_folder, $output_csv) =
 @ARGV;

 # Parse input CSV file
 # ...

 # Write results to CSV
 open(CSVFILE, ">" . ${output_csv}) || die "perl: can not write: $!\n";
 binmode(CSVFILE, ":utf8");
 print CSVFILE "Path;Type;Line;Name;Rule;Descr";
 print CSVFILE "/src/project/module1/f1.c;FILE;12;;R1;Rule R1 is violated because
 variable v1";
 close CSVFILE;

exit 0;
```

```
================
= ExcelMetrics =
================

The ExcelMetrics framework is used to extract information from one or more
 Microsoft Excel files (.xls or .xslx). A detailed configuration file allows
 defining how the Excel document should be read and what information should
 be extracted. This framework allows importing metrics, findings and textual
 information to existing artefacts or artefacts that will be created by the Data
 Provider.


============
= form.xml =
============
```

```
You can customise form.xml to either:
- specify the path to a single Excel file to import
- specify a pattern to import all Excel files matching this pattern in a
 directory

In order to import a single Excel file:
=====================================
<?xml version="1.0" encoding="UTF-8"?>
<tags baseName="ExcelMetrics" needSources="false">
 <tag type="text" key="excel" defaultValue="/path/to/mydata.xslx" />
</tags>

Notes:
- The excel key is mandatory.

In order to import all files matching a patter in a folder:
============================================================
<?xml version="1.0" encoding="UTF-8"?>
<tags baseName="ExcelMetrics" needSources="false">
 <!-- Root directory containing Excel files to import-->
 <tag type="text" key="dir" defaultValue="/path/to/mydata" />
 <!-- Pattern that needs to be matched by a file name in order to import it-->
 <tag type="text" key="ext" defaultValue="*.xlsx" />
 <!-- search for files in sub-folders -->
 <tag type="booleanChoice" defaultValue="true" key="sub" />
</tags>


Notes:
- The dir and ext keys are mandatory
- The sub key is optional (and its value set to false if not specified)


==============
= config.tcl =
==============

Sample config.tcl file:
=======================
# The separator to be used in the generated csv file
# Usually \t or ; or ,
set Separator  ";"

# The path separator in an artefact's path
# in the generated CSV file.
set ArtefactPathSeparator "/"

# Ignore findings for artefacts that are not part of the project (orphan
 findings)
# When set to 1, the findings are ignored
# When set to 0, the findings are imported and attached to the APPLICATION node
# (default: 1)
set IgnoreIfArtefactNotFound 1

# For findings of a type that is not in your ruleset, set a default rule ID.
# The value for this parameter must be a valid rule ID from your analysys model.
# (default: empty)
set UnknownRuleId UNKNOWN_RULE
```

```
# Save the total count of orphan findings as a metric at application level
# Specify the ID of the metric to use in your analysys model
# to store the information
# (default: empty)
set OrphanArteCountId NB_ORPHANS

# Save the total count of unknown rules as a metric at application level
# Specify the ID of the metric to use in your analysys model
# to store the information
# (default: empty)
set OrphanRulesCountId NB_UNKNOWN_RULES

# Save the list of unknown rule IDs as textual information at application level
# Specify the ID of the metric to use in your analysys model
# to store the information
# (default: empty)
set OrphanRulesListId UNKNOWN_RULES_INFO

# The list of the Excel sheets to read, each sheet has the number of the first
 line to read
# A Perl regexp pattern can be used instead of the name of the sheet (the first
 sheet matching
# the pattern will be considered)
set Sheets {{Baselines 5} {ChangeNotes 5}}

# ######################
# # COMMON DEFINITIONS #
# ######################
#
# - <value> is a list of column specifications whose values will be concatened.
 When no column name is present, the
#         text is taken as it appears. Optional sheet name can be added (with !
 char to separate from the column name)
#  Examples:
#            - {C:} the value will be the value in column C on the current row
#            - {C: B:} the value will be the concatenation of values found in
 column C and B of the current row
#            - {Deliveries} the value will be Deliveries
#            - {BJ: " - " BL:} the value will be the concatenation of value found
 in column BJ,
#              string " - " and the value found in column BL fo the current row
#            - {OtherSheet!C:} the value will be the value in column C from the
 sheet OtherSheet on the current row
#
#  - <condition> is a list of conditions. An empty condition is always true. A
 condition is a column name followed by colon,
#              optionally followed by a perl regexp. Optional sheet name can be
 added (with ! char to separate from the column name)
#  Examples:
#       - {B:} the value in column B must be empty on the current row
#       - {B:.+} the value in column B can not be empty on the current row
#       - {B:R_.+} the value in column B is a word starting by R_ on the current
 row
#       - {A: B:.+ C:R_.+} the value in column A must be empty and the value in
 column B must contain something and
#        the column C contains a word starting with R_  on the current row
#       - {OtherSheet!B:.+} the value in column B from sheet OtherSheet on the
 current row can not be empty.
```

```
# #############
# # ARTEFACTS #
# #############
# The variable is a list of artefact hierarchy specification:
# {ArtefactHierarchySpec1 ArtefactHierarchySpec2 ... ArtefactHierarchySpecN}
# where each ArtefactHierarchySpecx is a list of ArtefactSpec
#
# An ArtefactSpec is a list of items, each item being:
# {<(sheetName!)?artefactType> <conditions> <name> <parentType>? <parentName>?}
# where:
#    - <(sheetName!)?artefactType>: allows specifying the type. Optional
 sheetName can be added (with ! char to separate from the type) to limit
#                                   the artefact search in one specific sheet.
 When Sheets are given with regexp, the same regexp has to be used
#                                   for the sheetName.
#                                   If the type is followed by a question mark
 (?), this level of artefact is optional.
#                                   If the type is followed by a plus char (+),
 this level is repeatable on the next row
#    - <condition>: see COMMON DEFINITIONS
#    - <value>: the name of the artefact to build, see COMMON DEFINITIONS
#
#   - <parentType>: This element is optional. When present, it means that the
 current element will be attached to a parent having this type
#   - <parentValue>: This is a list like <value> to build the name of the
 artefact of type <parentType>. If such artefact is not found,
#                  the current artefact does not match
#
# Note: to add metrics at application level, specify an APPLICATION artefact
 which will match only one line:
#       e.g. {APPLICATION {A:.+} {}} will recognize as application the line
 having column A not empty.
set ArtefactsSpecs {
 {
  {DELIVERY {} {Deliveries}}
  {RELEASE {E:.+} {E:}}
  {SPRINT {O:SW_Software} {Q:}}
 }
 {
  {DELIVERY {} {Deliveries}}
  {RELEASE {O:SY_System} {Q:}}
 }
 {
  {WP {BL:.+ AF:.+} {BJ: " - " BL:} SPRINT {AF:}}
  {ChangeNotes!TASK {D:(added|changed|unchanged) T:imes} {W: AD:}}
 }
 {
  {WP {} {{Unplanned imes}} SPRINT {AF:}}
  {TASK {BL: D:(added|changed|unchanged) T:imes W:.+} {W: AD:}}
 }
}

# ############
# # METRICS #
# ############
# Specification of metrics to be retreived
# This is a list where each element is:
#  {<artefactTypeList> <metricId> <condition> <value> <format>}
```

```
# Where:
#     - <artefactTypeList>: the list of artefact types for which the metric has
 to be used
#                       each element of the list is (sheetName!)?artefactType
 where sheetName is used
#                       to restrict search to only one sheet. sheetName is
 optional.
#     - <metricId>: the name of the MeasureId to be injected into Squore, as
 defined in your analysis model
#     - <confition>: see COMMON DEFINITIONS above. This is the condition for the
 metric to be generated.
#     - <value> : see COMMON DEFINITIONS above. This is the value for the metric
 (can be built from multi column)
#     - <format> : optional, defaults to NUMBER
#                  Possible format are:
#       * DATE_FR, DATE_EN for date stored as string
#       * DATE for cell formatted as date
#                             * NUMBER_FR, NUMBER_EN for number stored as string
#       * NUMBER for cell formatted as number
#                             * LINES for counting the number of text lines in a
 cell
#     - <formatPattern> : optional
#                  Only used by the LINES format.
#      This is a pattern (can contain perl regexp) used to filter lines to count
set MetricsSpecs {
 {{RELEASE SPRINT} TIMESTAMP {} {A:} DATE_EN}
 {{RELEASE SPRINT} DATE_ACTUAL_RELEASE {} {S:} DATE_EN}
 {{RELEASE SPRINT} DATE_FINISH {} {T:} DATE_EN}
 {{RELEASE SPRINT} DELIVERY_STATUS {} {U:}}
 {{WP} WP_STATUS {} {BO:}}
 {{ChangeNotes!TASK} IS_UNPLAN {} {BL:}}
 {{TASK WP} DATE_LABEL {} {BP:} DATE_EN}
 {{TASK WP} DATE_INTEG_PLAN {} {BD:} DATE_EN}
 {{TASK} TASK_STATUS {} {AE:}}
 {{TASK} TASK_TYPE {} {AB:}}
}

# #############
# # FINDINGS #
# #############
# This is a list where each element is:
#  {<artefactTypeList> <findingId> <condition> <value> <localisation>}
# Where:
#     - <artefactTypeList>: the list of artefact type for which the metric has to
 be used
#                       each element of the list is (sheetName!)?artefactType
 where sheetName is used
#                       to restrict search to only one sheet. sheetName is
 optional.
#     - <findingId>: the name of the FindingId to be injected into Squore, as
 defined in your analysis model
#     - <confition>: see COMMON DEFINITIONS above. This is the condition for the
 finding to be triggered.
#     - <value>: see COMMON DEFINITIONS above. This is the value for the message
 of the finding (can be built from multi column)
#     - <localisation>: this a <value> representing the localisation of the
 finding (free text)
set FindingsSpecs {
 {{WP} {BAD_WP} {BL:.+ AF:.+} {{This WP is not in a correct state } AF:.+} {A:}}
```

```
}

# ########################
# # TEXTUAL INFORMATION #
# ########################
# This is a list where each element is:
#  {<artefactTypeList> <infoId> <condition> <value>}
# Where:
#     - <artefactTypeList> the list of artefact types for which the info has to
 be used
#                       each element of the list is (sheetName!)?artefactType
 where sheetName is used
#                       to restrict search to only one sheet. sheetName is
 optional.
#     - <infoId> : is the name of the Information to be attached to the artefact,
 as defined in your analysis model
#     - <confition> : see COMMON DEFINITIONS above. This is the condition for the
 info to be generated.
#     - <value> : see COMMON DEFINITIONS above. This is the value for the info
 (can be built from multi column)
set InfosSpecs {
 {{TASK} ASSIGN_TO {} {XB:}}
}

# ##########################
# # LABEL TRANSFORMATION #
# ##########################
# This is a list value specification for MeasureId or InfoId:
#    <MeasureId|InfoId> { {<LABEL1> <value1>} ... {<LABELn> <valuen>}}
# Where:
#    - <MeasureId|InfoId> : is either a MeasureId, an InfoId, or * if it is
 available for every measureid/infoid
#    - <LABELx> : is the label to macth (can contain perl regexp)
#    - <valuex> : is the value to replace the label by, it has to match the
 correct format for the metrics (no format for infoid)
#
# Note: only metrics which are labels in the excel file or information which need
 to be rewriten, need to be described here.
set Label2ValueSpec {
 {
  STATUS {
   {OPENED 0}
   {ANALYZED 1}
   {CLOSED 2}
   {.* -1}
  }
 }
 {
  * {
   {FATAL 0}
   {ERROR 1}
   {WARNING 2}
   {{LEVEL:\s*0} 1}
   {{LEVEL:\s*1} 2}
   {{LEVEL:\s*[2-9]+} 3}
  }
 }
}
```

```
Note that a sample Excel file with its associated config.tcl is available in
 $SQUORE_HOME/addons/tools/ExcelMetrics in order to further explain available
 configuration options.
```

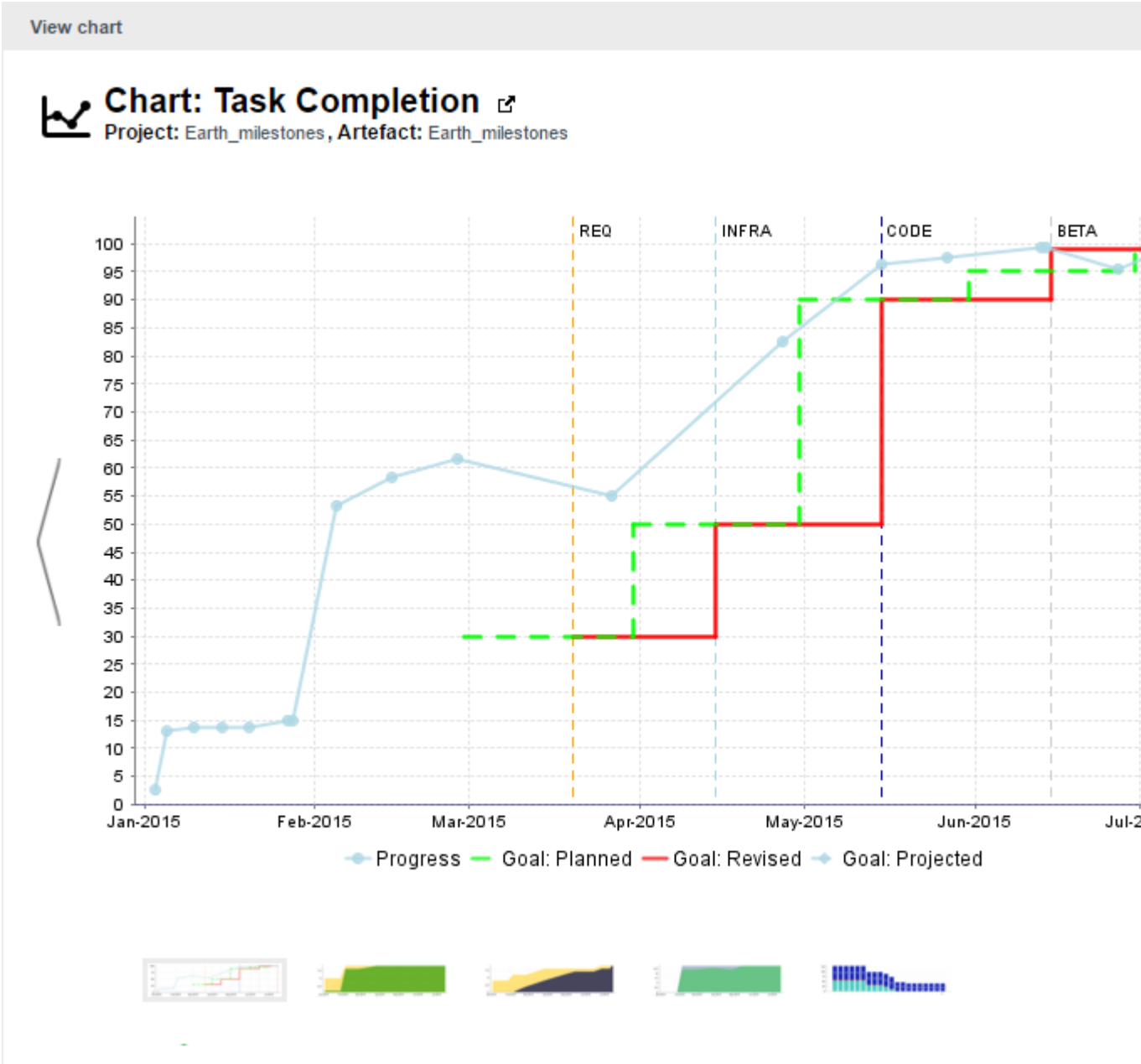
Appendix B. Milestones Tutorial

With the introduction of project milestones, a series of goals for specific metrics at certain dates in the life of your project, Squore offers new ways to measure your objectives and detect deviations from your goals early:

- You are alerted early if your current performance shows that you will not meet your goals and can react before it is too late
- You keep track of your various goals and communicate any change to the rest of your team
- You can reflect on a project's history and learn from it

This example focuses on a project that is slipping, then over-performing and how the team reacts along the course of the development process. Our team is tracking a basic task completion metric over the lifetime of the project, which includes milestones for Requirements Review, Infrastructure Complete, Code Complete, Beta Release and Final Release.

Here is where they stand on the day of the Final Release and look back at how the project went:

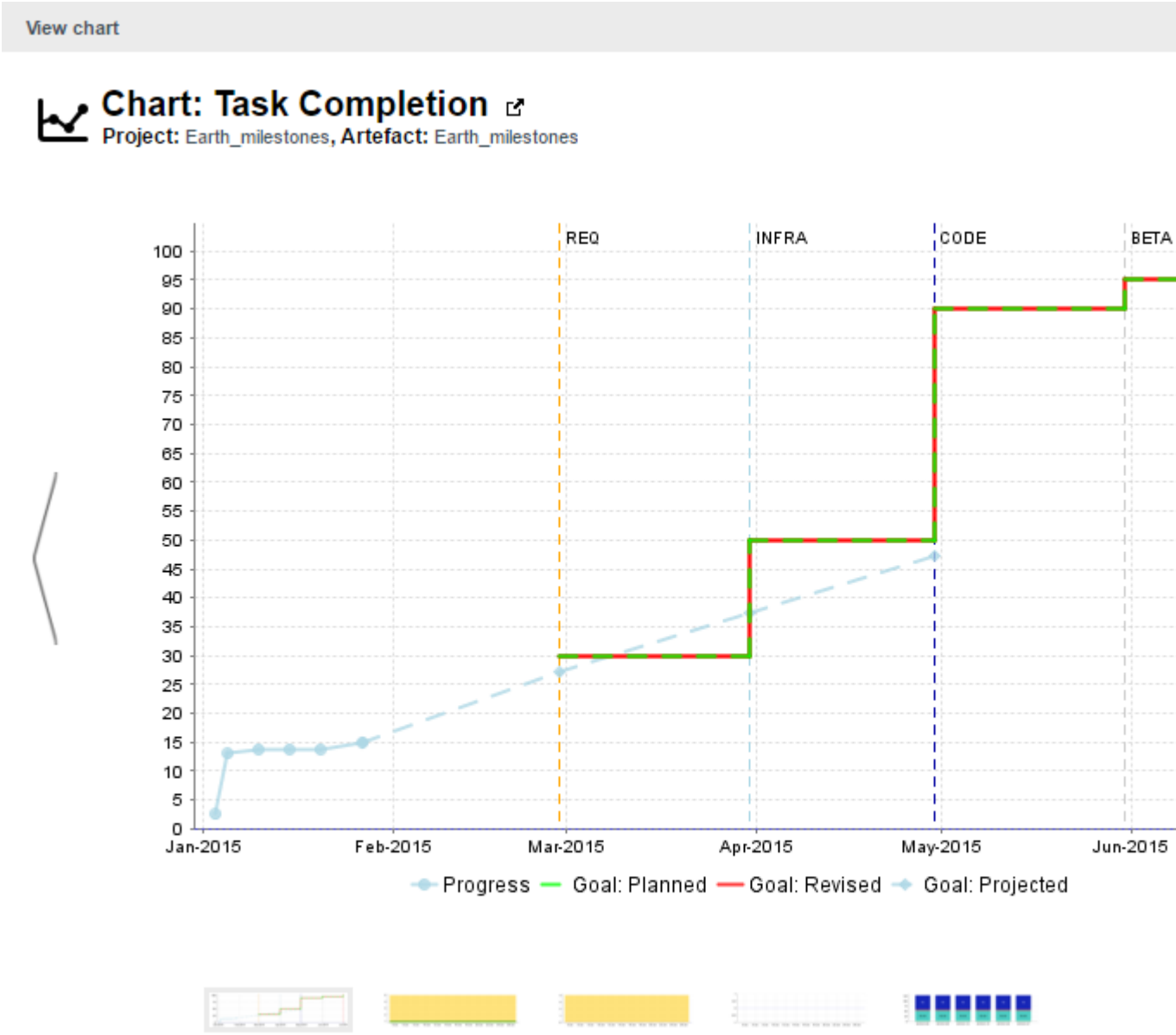


The chart shows the following information:

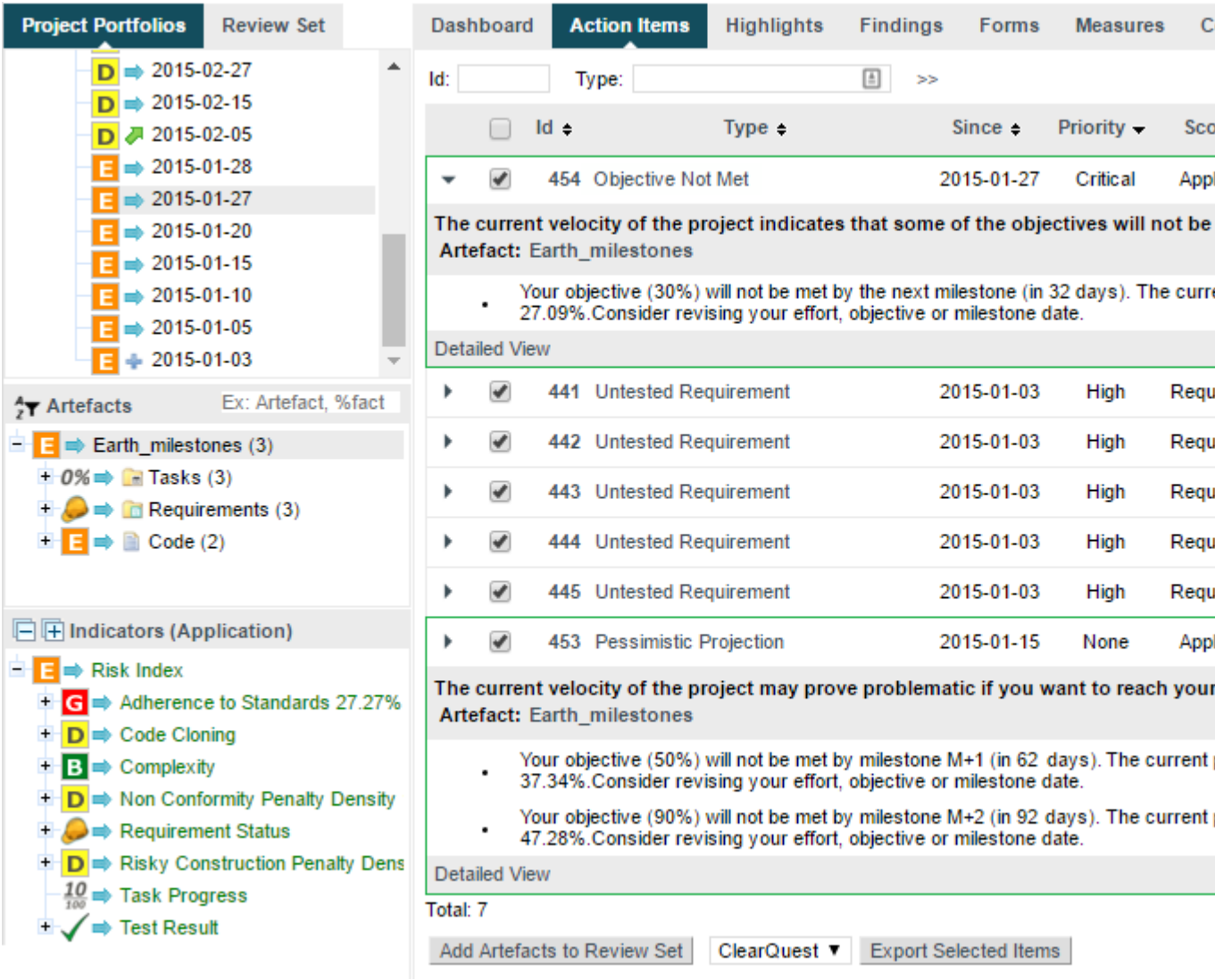
- Vertical dotted lines (markers) on the x-axis for each milestone in the project at the predefined date
- A solid light-blue line showing the task completion metric for each version of the project
- A dotted green line showing the goal for the task completion metric at each milestone
- A solid red line showing the goals actually used for the task completion metric during the lifetime of the project.
- Deviations from the goals around the REQ and BETA milestones

In order to understand why changes were made to the goals, let's go back to the January 27th analysis and look at the Task Completion chart again. Because we are using milestones and have a defined goal for the task completion metric, we can get a projection of what our metric will be by the time we hit the milestone dates.

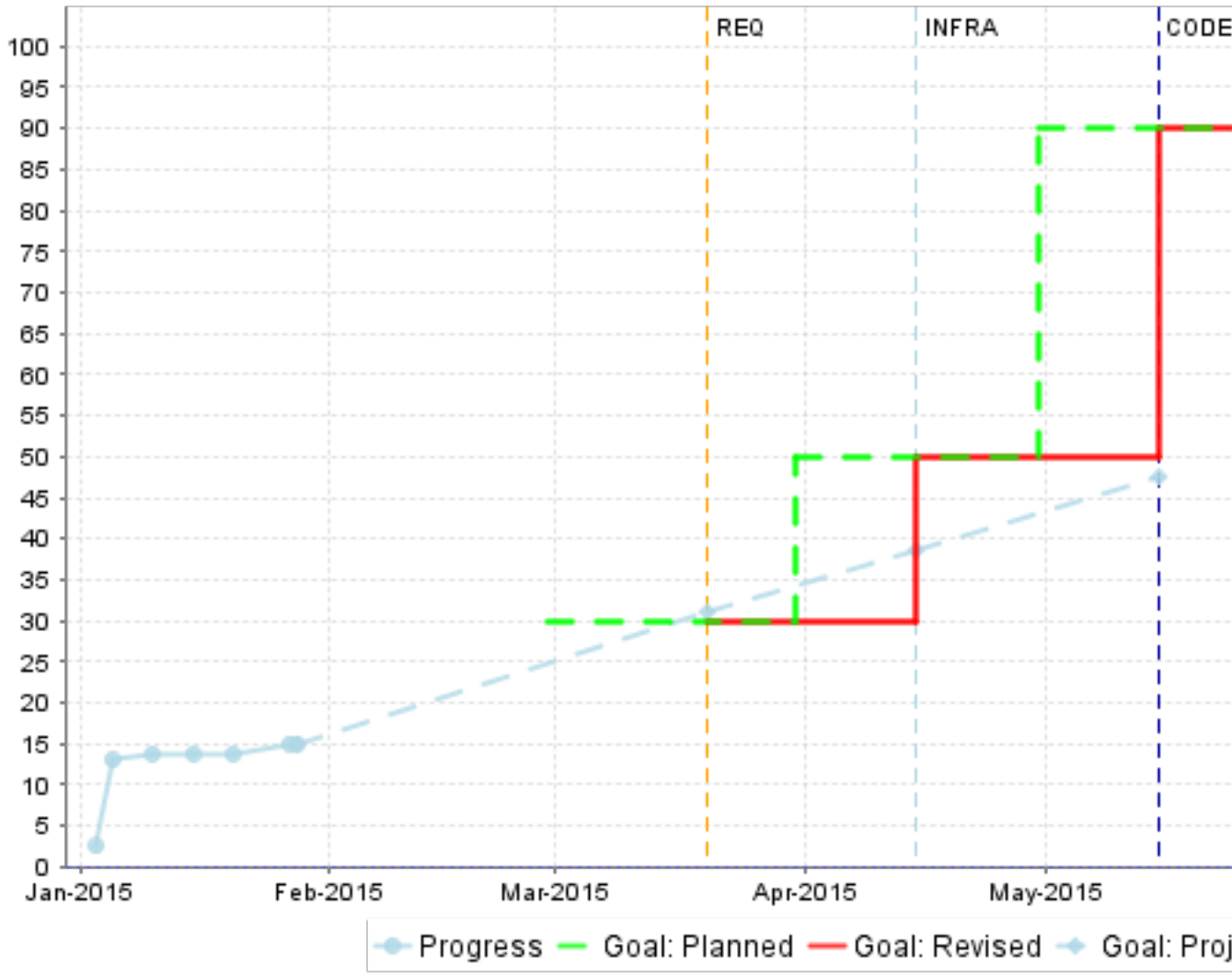
So instead of just showing results from previous analyses, the Progress line continues past January 27th to show what results we can expect based on the performance so far. Our chart is configured to show the projected value for the next 3 milestones, and all 3 projections are below the goal line for the metric.



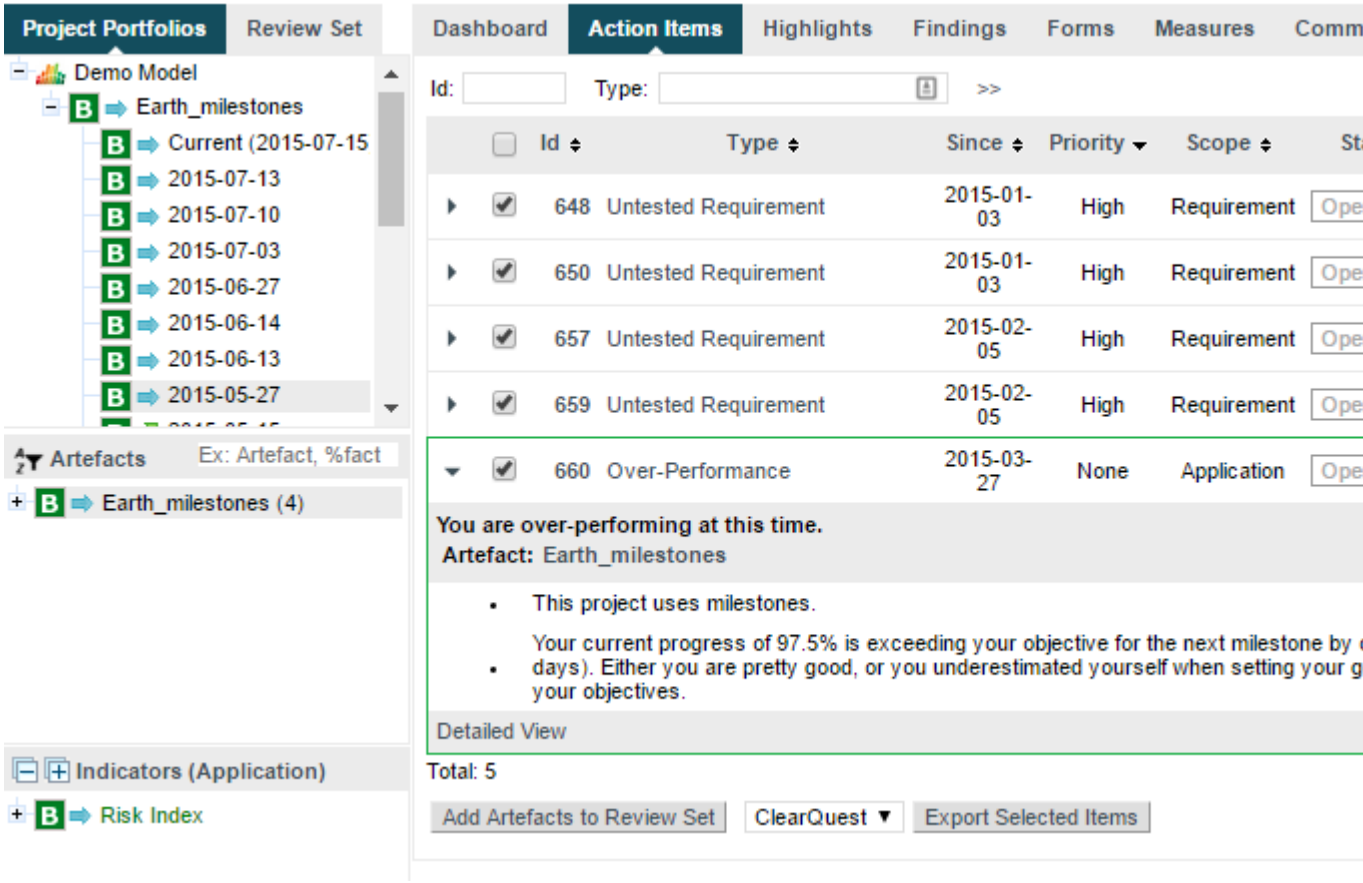
The team knows this: a **Pessimistic Projection** action item was already opened on January 15th to inform them that the current performance could cause problems in milestones 2 and 3. But today, an **Objective Not Met** action item informs them that they will not meet their goal even for the upcoming milestone.



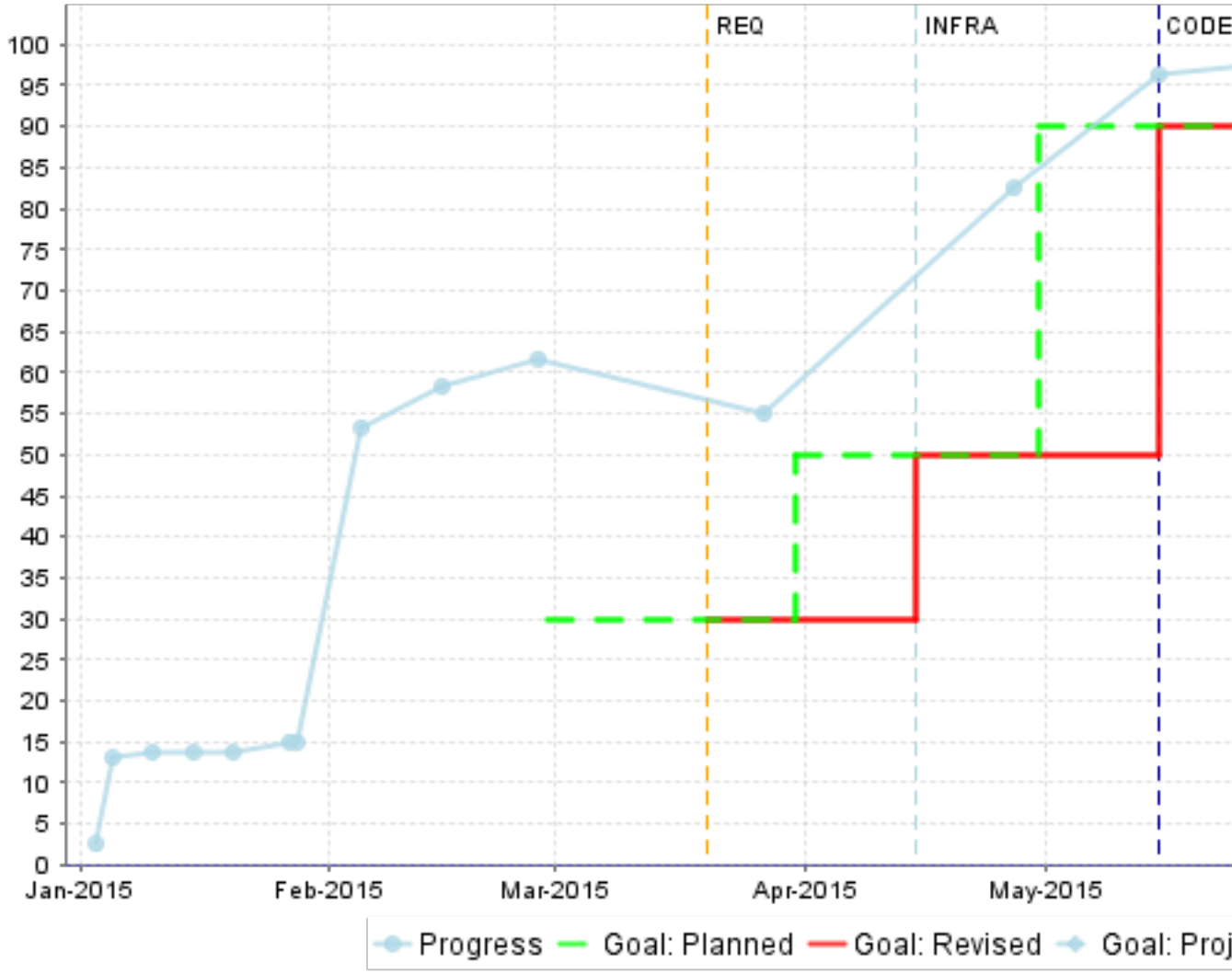
After a team meeting, it is decided that the best course of action is to keep the goal for the Requirements Review milestone, but move its date by two weeks. The analysis run the next morning confirms this on the Task Completion chart, where you see the first deviation between the planned goal (green) and the actual goal (red). The progress objective will be met for the first milestone, but there are still doubts for the next two:



Let's fast forward to the end of May after the Code Complete milestone and before the Beta Release to find our team performing better than expected: progress is already over the goal for the beta, and it makes sense to raise the goal for the beta. In a final review after the release, we can use this information to revise our default goals for other projects of the same type. As before, this information can be highlighted in Squore using an action item similar to the one opened on May 27th:



After revising their goal, the team can share the new standards for the project to their collaborators in the Task Completion chart from June 13th, where the actual goal line (red) moves up compared to the planned goal line (green) for the Beta Release milestone:



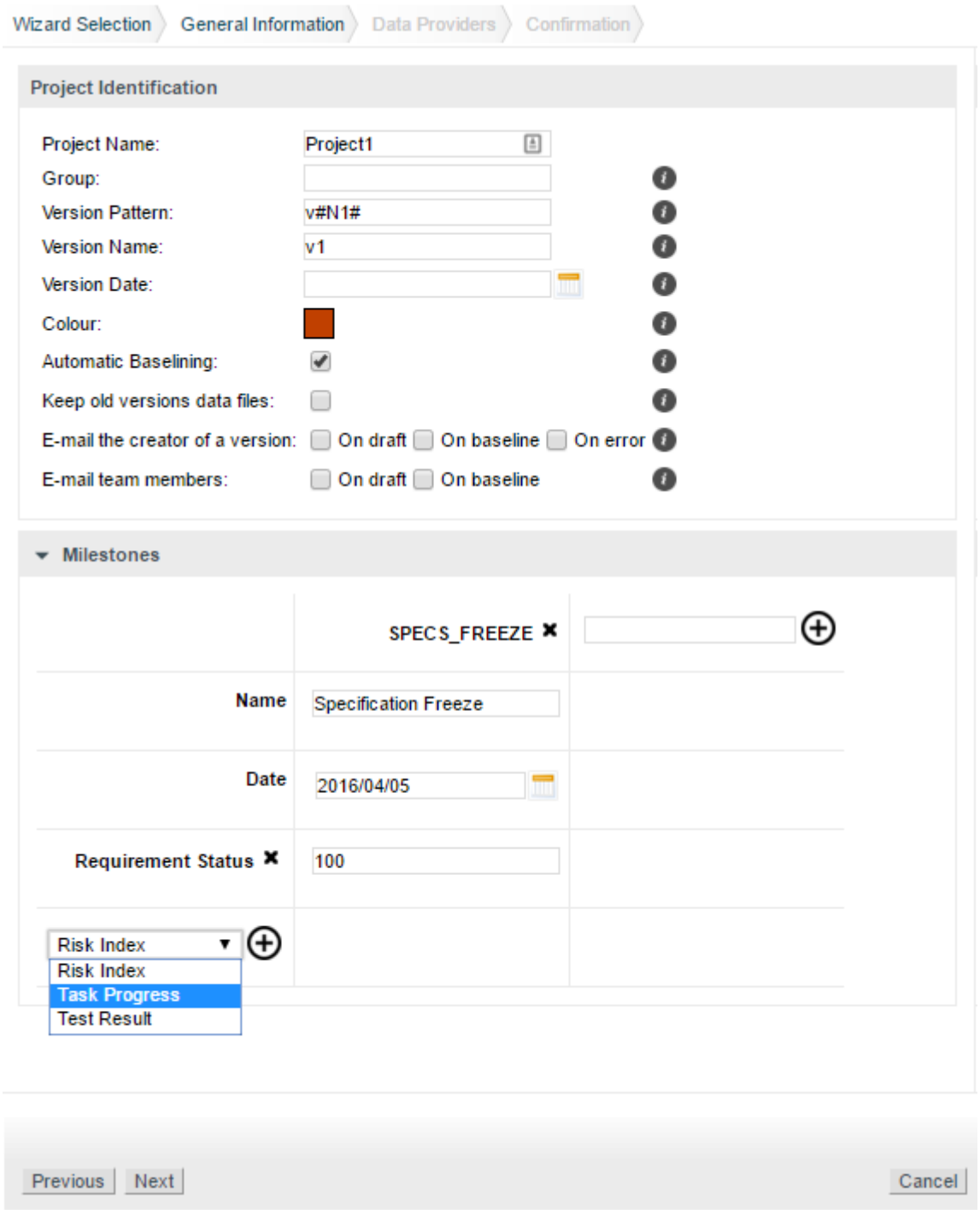
How it works

In order to add support for milestones to your model, configure your wizard to allow users to create milestones and goals:

```
<Bundle xmlns:xi="http://www.w3.org/2001/XInclude">
  <wizard wizardId="DOC" versionPattern="v#N1#" img="../../Shared/Images/icons/
faded.png">
    <tools all="FALSE">
      <tool name="project_data" optional="FALSE" checkedInUI="TRUE" />
      <tool name="Squore" optional="TRUE" checkedInUI="TRUE">
       <param name="scnode" value="TRUE" />
       <param name="scnode_name" value="Code" />
      </tool>
    </tools>
    <milestones canCreateMilestone="TRUE" canCreateGoal="TRUE">
      <goals displayableFamilies="GOALS" />
    </milestones>
  </wizard>
</Bundle>
```

The **`milestones`** element allows users to create milestones in the project creation wizard (`canCreateMilestone="TRUE"`) and also set goals (`canCreateGoal="TRUE"`). The goals can be set for metrics of the GOALS family only in this example (`displayableFamilies="GOALS"`).

The result in the web UI is the following:



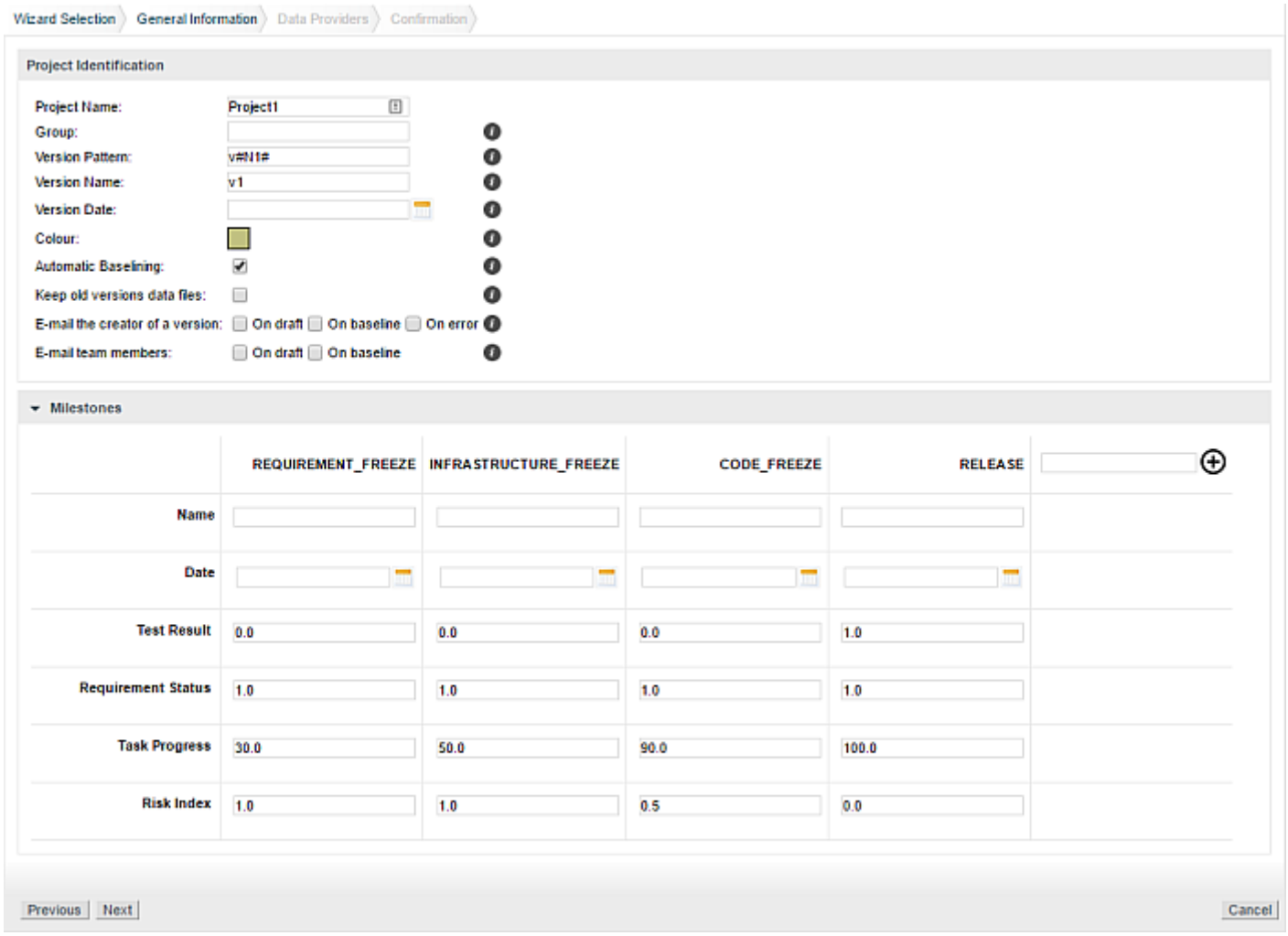
A project wizard allowing users to create milestones freely during an analysis

When creating a new project, a user decides to create a **Specification Freeze** milestone with one objective of **100** for the **Requirement Status** indicator. Other goals can be set, for the other metrics in the project that belong to the **GOALS** family: Risk Index, Task Progress, Test Result.

If you have company-wide milestones and objectives that need to be set for every project created with the wizard, you can specify the goals directly. Milestones can also be marked as mandatory or optional:

```
<Bundle xmlns:xi="http://www.w3.org/2001/XInclude">
  <wizard wizardId="DOC_WITH_MILESTONES" versionPattern="v#N1#" img="../../
Shared/Images/icons/faded.png">
    <tools all="FALSE">
      <tool name="project_data" optional="FALSE" checkedInUI="TRUE" />
      <tool name="Squore" optional="TRUE" checkedInUI="TRUE">
       <param name="scnode" value="TRUE" />
       <param name="scnode_name" value="Code" />
      </tool>
    </tools>
 <milestones canCreateMilestone="TRUE" canCreateGoal="TRUE">
    <goals displayableFamilies="GOALS">
    <goal measureId="RESULT" mandatory="TRUE" highestIsBest="FALSE" />
    <goal measureId="STATUS" mandatory="TRUE" highestIsBest="TRUE" />
    <goal measureId="PROGRESS" mandatory="TRUE" highestIsBest="TRUE" />
    <goal measureId="RISK_INDEX" mandatory="TRUE" highestIsBest="FALSE" />
    </goals>
    <milestone id="REQUIREMENT_FREEZE" mandatory="TRUE">
      <defaultGoal measureId="RESULT" value="0" />
      <defaultGoal measureId="STATUS" value="1" />
      <defaultGoal measureId="PROGRESS" value="30" />
      <defaultGoal measureId="RISK_INDEX" value="1" />
    </milestone>
    <milestone id="INFRASTRUCTURE_FREEZE" mandatory="TRUE">
      <defaultGoal measureId="RESULT" value="0" />
      <defaultGoal measureId="STATUS" value="1" />
      <defaultGoal measureId="PROGRESS" value="50" />
      <defaultGoal measureId="RISK_INDEX" value="1" />
    </milestone>
    <milestone id="CODE_FREEZE" mandatory="TRUE">
      <defaultGoal measureId="RESULT" value="0" />
      <defaultGoal measureId="STATUS" value="1" />
      <defaultGoal measureId="PROGRESS" value="90" />
      <defaultGoal measureId="RISK_INDEX" value="0.5" />
    </milestone>
    <milestone id="BETA_RELEASE" mandatory="FALSE">
      <defaultGoal measureId="RESULT" value="1" />
      <defaultGoal measureId="STATUS" value="1" />
      <defaultGoal measureId="PROGRESS" value="95" />
      <defaultGoal measureId="RISK_INDEX" value="0.3" />
    </milestone>
    <milestone id="RELEASE" mandatory="TRUE">
      <defaultGoal measureId="RESULT" value="1" />
      <defaultGoal measureId="STATUS" value="1" />
      <defaultGoal measureId="PROGRESS" value="100" />
      <defaultGoal measureId="RISK_INDEX" value="0" />
    </milestone>
 </milestones>
  </wizard>
</Bundle>
```

When creating a new project, the predefined goals are filled in in the web interface, and you can still add a **Beta Release** milestone (using the default values specified in the wizard bundle) if needed by using the **+** icon:



A project wizard with preconfigured milestones and goals

If you create projects using the command line interface, you can specify settings for your milestones with the -M parameter:

```
-M "id=BETA_RELEASE,date=2015/05/31,PROGRESS=95"
```

or with a project config file:

```
<SquoreProjectSettings>
  <Wizard>
 <Milestones>
    <Milestone id="BETA_RELEASE" date="2015-05-31">
      <Goal id="PROGRESS" value="95" />
    </Milestone>
 </Milestones>
  </Wizard>
</SquoreProjectSettings>
```

In your analysis model, new functions are available to work with milestones and projections:

- **HAS_MILESTONE([milestoneId or keyword] [, date])** checks if a milestone with the specified milestoneId exists in the project.
  The function returns 0 if no milestone is found, 1 if a milestone is found.
- **DATE_MILESTONE([milestoneId or keyword] [, date])** returns the date associated to a milestone.
- **GOAL(measureId [, milestoneId or keyword] [, date])** returns the goal for a metric at a milestone.

Tip

You can use keywords instead of using a milestone ID. You can retrieve information about the next, previous, first or last milestones in the project by using:

- **NEXT**
- **NEXT+STEP** where STEP is a number indicating how many milestones to jump ahead
- **PREVIOUS**
- **PREVIOUS-STEP** where STEP is a number indicating how many milestones to jump backward
- **FIRST**
- **LAST**

Consut the Configuration Guide for more details.

On your charts, you are now able to:

- Display the goals defined for each milestone in your project
- Display the changes made to the goals defined for each milestone
- Display the date changes for your milestones
- Show markers for milestone dates and goals

You can also compute metrics with functions like **LEAST_SQUARE_FIT()**, which lets you calculate projections. This is how the Task Completion chart used in this example was created. You can find its full definition below:

```
<chart type="TE" id="TASK_PROJECTION" byTime="TRUE" width="700" height="400"
 displayOnlyIf="MILESTONES_ARE_ENABLED">

 <dataset renderer="STEP" >
  <goal dataBounds="[0;100]" color="GREEN" stroke="DOTTED" shape="CIRCLE"
alpha="200" label="Planned" versionDate="FIRST_BUILD_DATE">PROGRESS</goal>
  <goal dataBounds="[0;100]" color="RED" stroke="SOLID" shape="DIAMOND"
alpha="200" label="Revised">PROGRESS</goal>
 </dataset>

 <dataset renderer="LINE">
  <measure stroke="SOLID" color="#ADD8E6" alpha="200">PROGRESS</measure>
 </dataset>
  <dataset renderer="LINE">
  <goal dataBounds="[0;100]" color="#ADD8E6" stroke="DOTTED" shape="DIAMOND"
alpha="200" label="Projected">
   <forecast>
    <version value="PROGRESS" timeValue="CUR_BUILD_DATE" />
    <version value="PROGRESS_NEXT" timeValue="NEXT_MILESTONE" />
    <version value="PROGRESS_NEXT_1" timeValue="NEXT_1_MILESTONE" />
```

```
    <version value="PROGRESS_NEXT_2" timeValue="NEXT_2_MILESTONE" />
   </forecast>
  </goal>
  </dataset>
 <markers>
  <marker fromMilestones="true" alpha="150" isVertical="TRUE" stroke="DOTTED" />
 </markers>
</chart>
```

The action items monitoring the project's progress also make use of the new **GOAL()** function and were defined as follows:

```
<?xml version="1.0" encoding="utf-8" standalone="yes"?>
<Bundle>
 <DecisionCriteria>
  (...)
  <DecisionCriterion dcId="PROGRESS_WARNING" categories="SCALE_PRIORITY.CRITICAL"
 targetArtefactTypes="APPLICATION">
   <Triggers>
    <Trigger>
     <Test expr="MILESTONES_ARE_ENABLED" bounds="[1;1]" />
     <Test expr="IF(PROGRESS_NEXT=-1, 0, PROGRESS_NEXT < GOAL(PROGRESS, NEXT))"
 bounds="[1;1]"
      p2="#{MEASURE.DAYS_TO_NEXT}" p0="#{MEASURE.PROGRESS_GOAL_NEXT}"
 p1="#{MEASURE.PROGRESS_NEXT}" descrId="PROGRESS_WARNING_NEXT_ACTION" />
    </Trigger>
   </Triggers>
  </DecisionCriterion>
  (...)
  <DecisionCriterion dcId="OVERPERFORMANCE" categories="SCALE_PRIORITY.NONE"
 targetArtefactTypes="APPLICATION">
   <Triggers>
    <Trigger>
     <Test expr="MILESTONES_ARE_ENABLED" bounds="[1;1]"
 descrId="MILESTONES_ARE_ENABLED" />
     <Test expr="IF(PROGRESS_NEXT=-1, 0, IF(PROGRESS / GOAL(PROGRESS, NEXT) >
 1.1, 0, 1))" bounds="[1;1]"
      p2="#{MEASURE.PROGRESS}" p1="#{MEASURE.DAYS_TO_NEXT}"
 p0="#{MEASURE.PROGRESS_GOAL_NEXT}" descrId="OVERPERFORMANCE" />
    </Trigger>
   </Triggers>
  </DecisionCriterion>
 </DecisionCriteria>
</Bundle>
```

Check out the Getting Started Guide and the Configuration Guide to learn more about milestones, and if you would like to try out the demo described in this article on your own installation or review the entire model, download the configuration folder from our wiki [http://openwiki.squoring.com/openwiki/index.php/Milestones] and launch the demo from **Tools > Feature Spotlight: Milestones**.

Index

S

T

V

W