

# Echolot

## Qualitätssicherung mit Sonar

Thomas Haug

[thomas.haug@mathema.de](mailto:thomas.haug@mathema.de)

[www.mathema.de](http://www.mathema.de)

- Motivation
- Sonar Überblick
- Demo
- Fazit

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“Sometimes the developers manage to maintain this purity of design through the initial development and into the first release. More often something goes wrong. The software starts to rot like a piece of bad meat”

(Robert C. Martin)



- Architektur-, Design- und Implementierungsvorgaben
- Reviews

- Architektur-, Design- und Implementierungsvorgaben
  - Reviews
  - Statische und dynamische Analyse



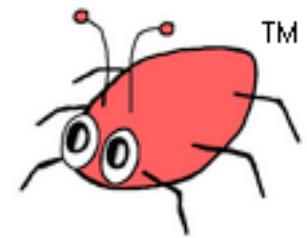
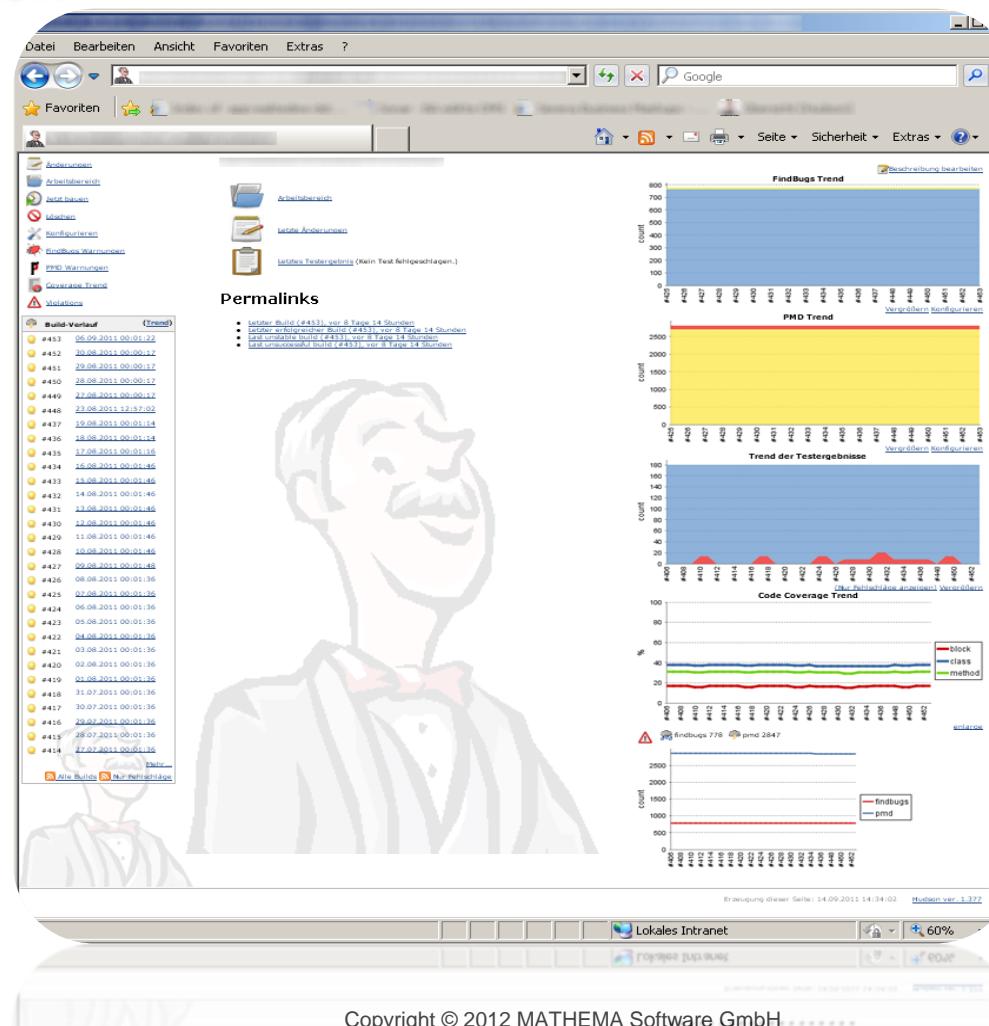
PartCover  
OpenCover



Microsoft® FxCop, Version 10.0 (10.0.30319.1)  
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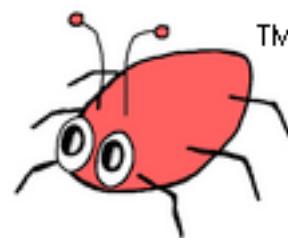
## ■ Typische Anwendung: Einsatz einer Vielzahl von Werkzeugen



**JUnit**



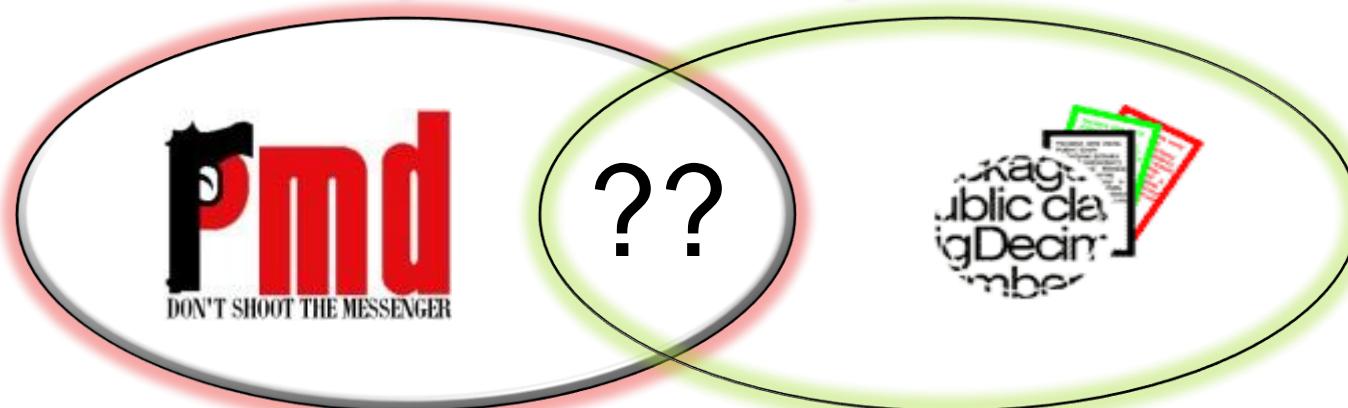
- Herausforderungen:
  - Know-how und Konfiguration unterschiedlicher Werkzeuge



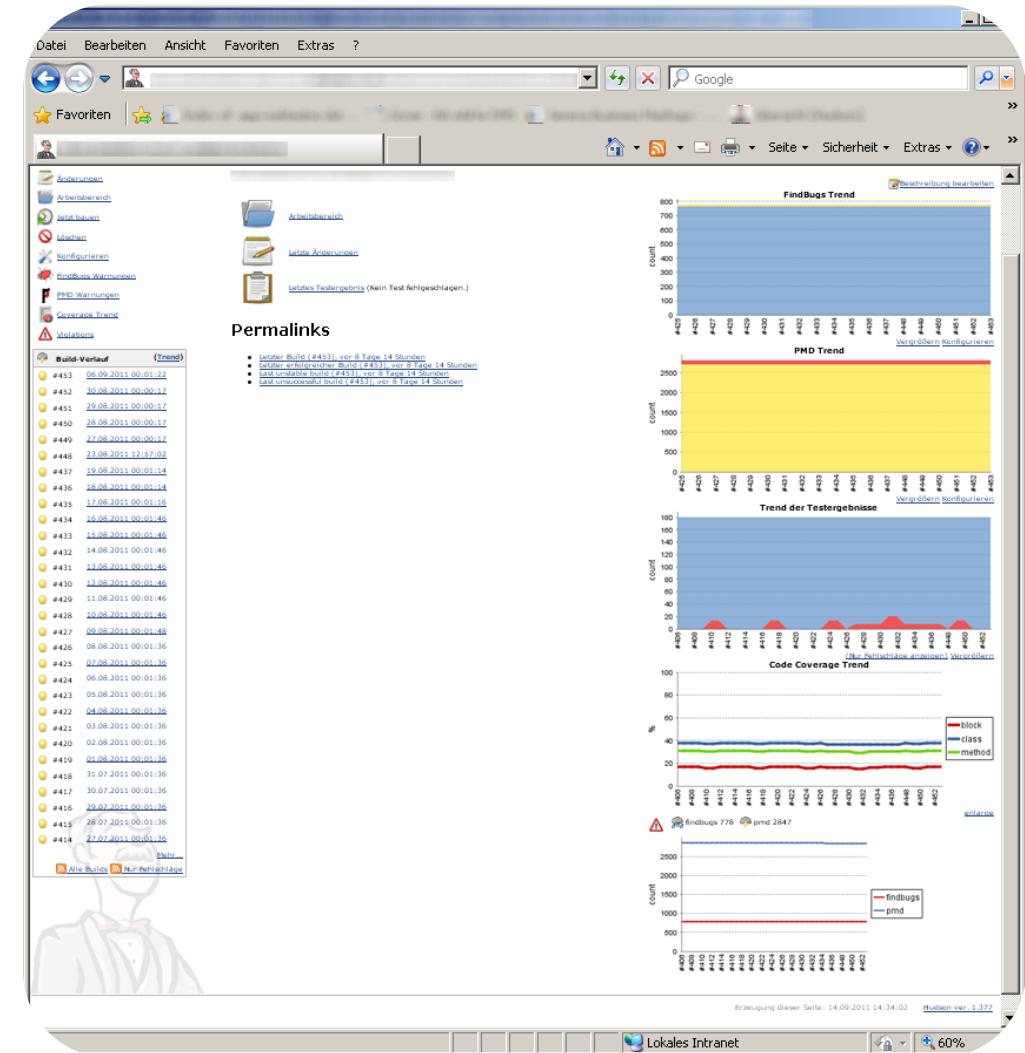
JUnit

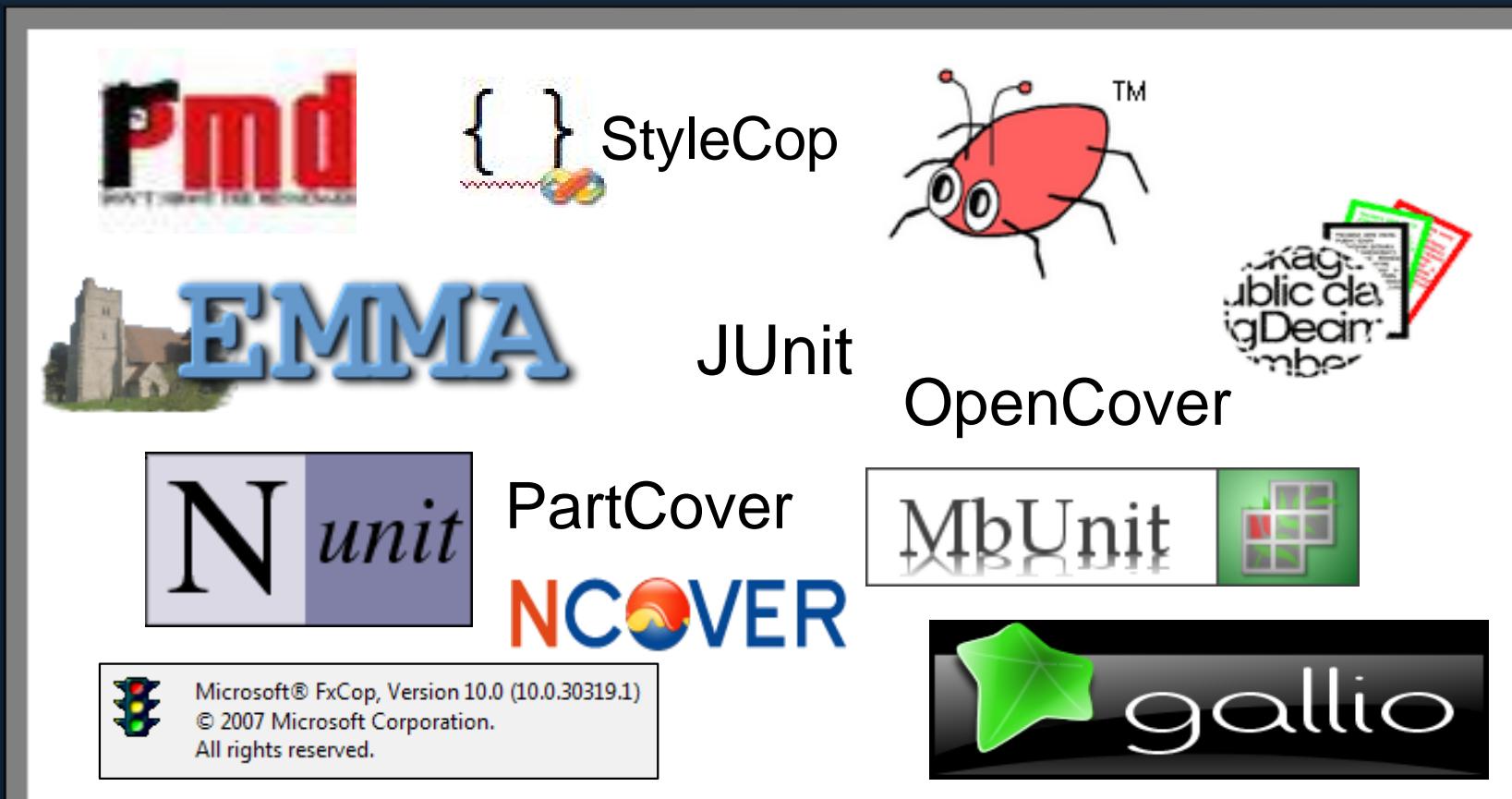


- Überschneidungen der Werkzeuge



- Herausforderungen:
- Einbetten in  
(Continuous Integration)  
Build
- Trendanalyse





The image is a collage of logos and icons for various Java development tools:

- PMD: A logo featuring the letters "PMD" in red and black, with the tagline "WEIGHT THE SOFTWARE" below it.
- StyleCop: A logo with curly braces {} and a small colorful icon.
- EMMA: A logo featuring a stylized illustration of a church or cathedral.
- JUnit: A logo featuring a cartoon red beetle with antennae.
- OpenCover: A logo featuring three overlapping cards with text like "kag", "ublic cla", "gDecim", and "mber".
- Nunit: A logo with the letters "N" and "unit" in white and purple.
- PartCover: A logo with the text "PartCover" next to a blue and red "NCOVER" logo.
- MbUnit: A logo with the text "MbUnit" and a green square icon with a grid pattern.
- FxCop: A logo featuring a traffic light icon and the text "Microsoft® FxCop, Version 10.0 (10.0.30319.1)  
© 2007 Microsoft Corporation.  
All rights reserved."
- gallio: A logo featuring a green star icon and the word "gallio" in white.

XRadar Statics Analysis - Mozilla Firefox

Datei Bearbeiten Ansicht Chronik Lesezeichen Extras Hilfe

Meistbesuchte Seiten Erste Schritte Aktuelle Nachrichten MATHEMA Mail Listen Wrapper HTML for Cl... https://195.110.18.10 Zimbra http://forum.springfr... Wrapper HTML for Cl... XML Transaction Servic... Revision 2: /

XRadar Statics Analysis Metric Descriptions

**Subsystems**

Total System  
!! There are Packages with A module  
B module  
C and D module  
E module  
F module  
G module

**Packages**

org.xradar.test.a  
org.xradar.test.b  
org.xradar.test.c  
org.xradar.test.d  
org.xradar.test.e  
org.xradar.test.f  
Not Analyzed: java.io  
Not Analyzed: java.lang  
Not Analyzed: org.xradar  
Not Analyzed: sun.in...

**Classes**

All  
A1  
B1  
C1  
D1  
E1  
F1

<http://xradar.sourceforge.net>

Statics Report - System: 3, Version: 365, Date: 2002.01.01

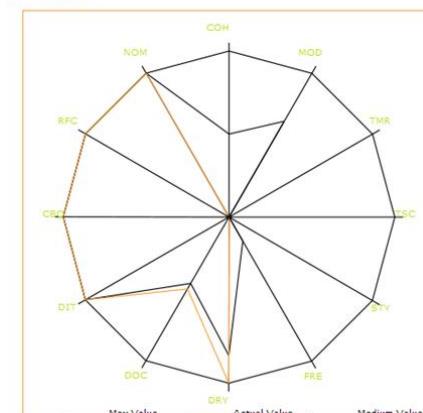
Designed for use with , Checkstyle, CKJM, FindBugs, JavaNCSS, JDepend, PMD, PMD-CPD, Java2HTML and Ant.

[scorecard] [analysis] [explanations]  
[\[overview\]](#) [\[architecture\]](#) [\[design\]](#) [\[code\]](#) [\[test\]](#) [\[source control\]](#) [\[system specific\]](#)

**[Statics] Subsystems**

**Subsystem : A module**

The a module is a top module.



**Total Quality**  
 $[TQ = 0.25 * ARCH + 0.25 * DES + 0.25 * CODE + 0.25 * TS]$  0.37

**Unit Test Suite**  
 $[TS = 0.5 * TSC - 0.5 * TMR]$  0

**Statement Test Coverage**  
 $[TSC = \text{source-statements-covered} / \text{ncss}]$  0

**Method Test Reference**  
 $[TMR = \text{methods-referenced} / \text{npm}]$  0

**Architecture**  
 $[ARCH = 0.4 * MOD - 0.6 * COH]$  0

**Modularization**  
 $[MOD = 1 - (\text{count_packages(not(illegal-dependencies=0))} / \text{total_packages})]$  0

**Cohesion**  
 $[COH = 1 - (\text{count_packages(cycles=true)}) / \text{total_packages}]$  0

**Design**  
 $[DES = 0.20 * NOM + 0.30 * RFC + 0.30 * CBO + 0.20 * DIT]$  1

**Number of Methods**  
 $[NOM = \text{count_classes}(\text{vmc}<20) / \text{total-classes}]$  1

**Response for Class**  
 $[RFC = \text{count_classes}(rfc>50) / \text{total-classes}]$  1

**Coupling Between Objects**  
 $[CBO = \text{count_classes}(cho>5) / \text{total-classes}]$  1

**Depth of Inheritance Tree**  
 $[DIT = \text{count_classes}(dit<5) / \text{total-classes}]$  1

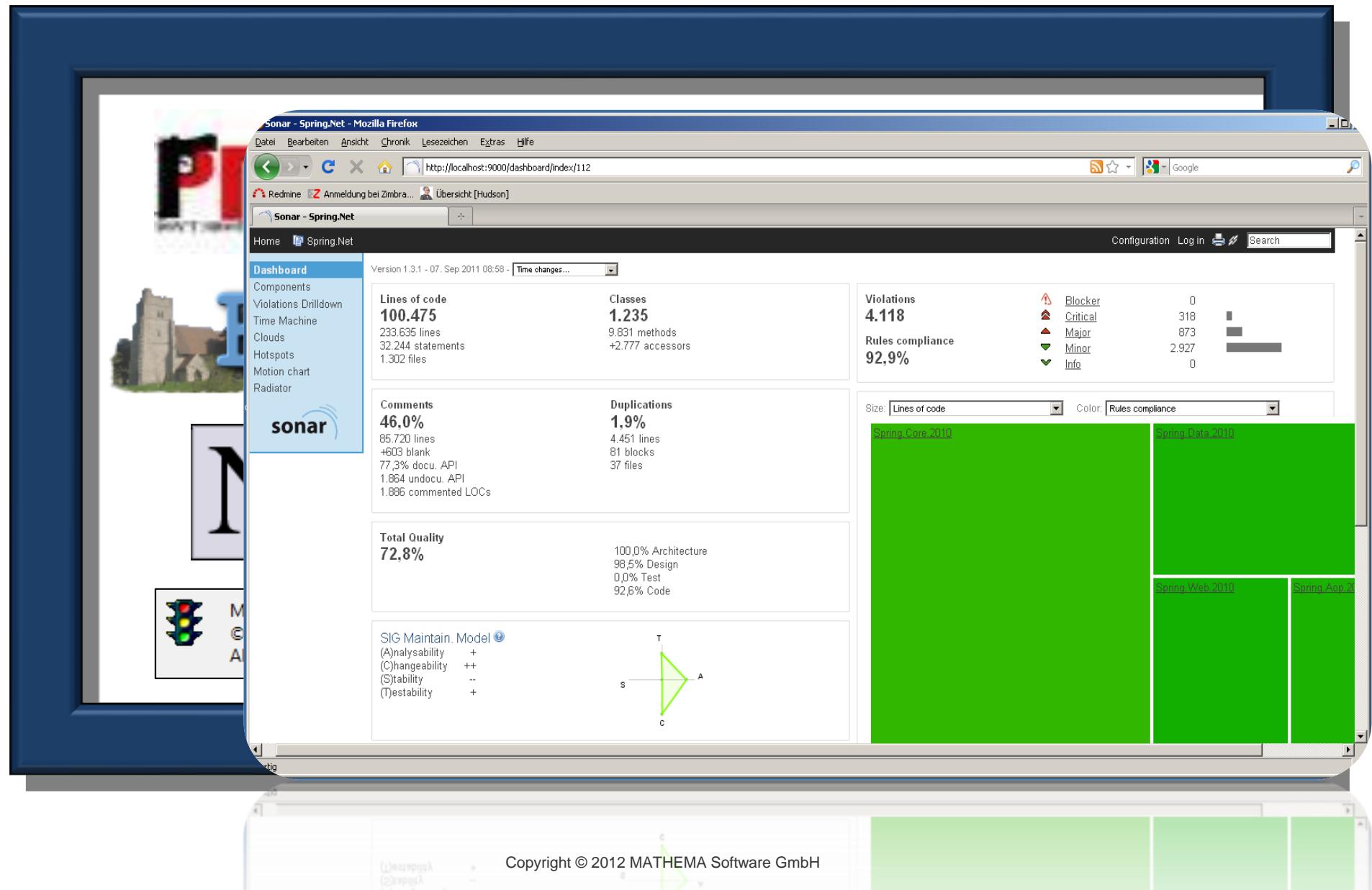
**Code Quality**  
 $[CODE = 0.15 * DOC + 0.4 * DRY + 0.3 * FRE + 0.15 * STY]$  0.48

**Documentation**  
 $[DOC = \text{javadocs} / (\text{functions} + \text{analyzed-classes})]$  0.5

**DRYness**  
 $[DRY = 1 - (\text{classes-with-duplications} / \text{analyzed-classes})]$  1

**Code Coverage**

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Sonar - Spring.Net - Mozilla Firefox

Datei Bearbeiten Ansicht Chronik Lesezeichen Extras Hilfe

Redmine Anmeldung bei Zimbra... Übersicht [Hudson]

Sonar - Spring.Net

Home Spring.Net

Configuration Log in Search

Version 1.3.1 - 07. Sep 2011 08:58 - Time changes...

**Lines of code**  
**100.475**  
233.635 lines  
32.244 statements  
1.302 files

**Classes**  
**1.235**  
9.831 methods  
+2.777 accessors

**Violations**  
**4.118**

Severity	Count	Percentage
Blocker	0	0%
Critical	318	~7.6%
Major	873	~21.1%
Minor	2.927	~71.3%
Info	0	0%

**Rules compliance**  
**92,9%**

**Comments**  
**46,0%**  
85.720 lines  
+603 blank  
77,3% docu. API  
1.864 undocu. API  
1.866 commented LOCs

**Duplications**  
**1,9%**  
4.451 lines  
81 blocks  
37 files

**Total Quality**  
**72,8%**  
100,0% Architecture  
98,5% Design  
0,0% Test  
92,6% Code

**SIG Maintain. Model** ⓘ  
(A)nalsability +  
(C)hangeability ++  
(S)tability --  
(T)estability +

A radar chart with axes S, C, A, T.

Size: Lines of code Color: Rules compliance

Spring Core 2010 Spring Data 2010

Spring Web 2010 Spring App 2010

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- Motivation
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- [www.sonarsource.org](http://www.sonarsource.org)
- Beheimatet bei Codehaus
- Aktuelle Version 3.1.1 (Juni 2012)
- LGPL Lizenz-Modell, kommerzieller Support möglich



- Über 100 000 Downloads



- Knapp 20 Releases innerhalb von 2 Jahren
- Über 1000 Subscribers auf Sonar Mailing-Listen
- Erweiterbar über Plugin Mechanismus
  - Es existieren mehr als 30 Plugins

## ■ Unterstützte Sprachen

- Java (Build-in)
- C
- C#
- Flex
- Natural
- PHP
- PL/SQL
- Cobol
- Visual Basic 6
- XML

 sonar

- Multi-Projekt fähig
  - Alle Projekte können über das Dashboard erreicht werden
- „Drill-down“ Analyse
  - Abtauchen in die Tiefen des Designs und der Implementierung über Dashboards möglich
- Prüfen von Kodierrichtlinien
  - Über 600 Regeln vorgefertigt (Java)
  - Java : PMD, CheckStyle, FindBugs,...
  - C# : FxCop, StyleCop, Gendarme



sonar

## ■ Standard Metriken

- Sonar misst Metriken wie McCabe, LOC, ...



sonar

## ■ Dynamische Analyse

- Messen von Code-Coverage
  - via Cobertura, Emma, JaCoCo für Java
  - via NCover, PartCover, OpenCover für C#

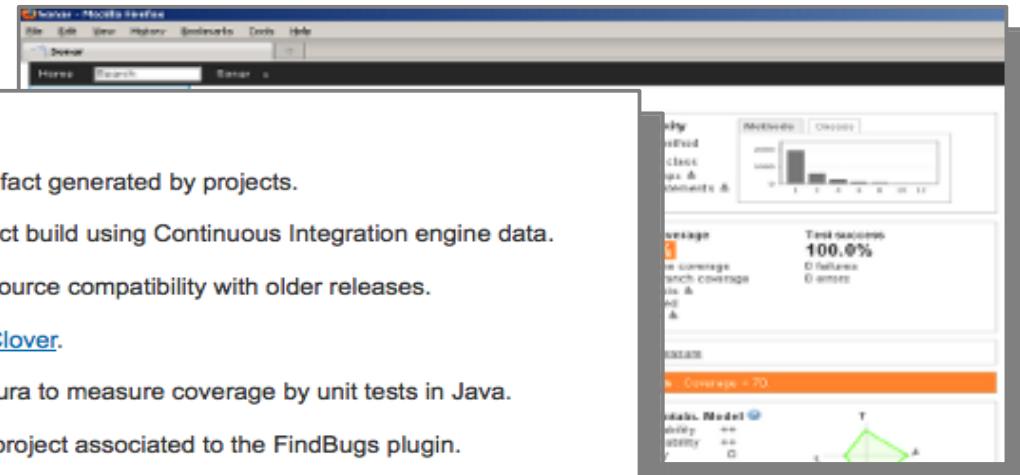
## ■ Build-Integration

- Maven
- Ant, Ad hoc (sonar runner)

## ■ Plugins Metriken

### Additional Metrics

- [\*\*Artifact Size\*\*](#) - Reports on the size of the artifact generated by projects.
- [\*\*Build Stability\*\*](#) - Reports on stability of project build using Continuous Integration engine data.
- [\*\*Clirr\*\*](#) - Checks Java libraries for binary and source compatibility with older releases.
- [\*\*Clover\*\*](#) - Get code coverage with [Atlassian Clover](#).
- [\*\*Emma\*\*](#) - An alternative to Clover and Cobertura to measure coverage by unit tests in Java.
- [\*\*fb-contrib\*\*](#) - Additional rules from fb-contrib project associated to the FindBugs plugin.
- [\*\*GreenPepper\*\*](#) - Collects and reports tests results of executable specifications provided by GreenPepper.
- [\*\*JaCoCo\*\*](#) - An alternative to Clover and Cobertura to measure coverage by unit tests in Java.
- [\*\*JIRA Issues\*\*](#) - Retrieves and reports the number of project issues from JIRA.
- [\*\*JMeter\*\*](#) - Retrieve JMeter test results in SONAR.
- [\*\*Mantis\*\*](#) - Retrieves and reports the number of project issues from Mantis.
- [\*\*Rules Meter\*\*](#) - Gives information on the level of activation of projects quality profiles.
- [\*\*Security Rules\*\*](#) - Enables to zoom on security rules violations to keep them under control.
- [\*\*Sonargraph\*\*](#) - Provides architecture governance features accompanied by metrics about cyclic dependencies and other structural aspects using Sonargraph.
- [\*\*SonarJ\*\*](#) - Provides architecture governance features accompanied by metrics about cyclic dependencies and other structural aspects using SonarJ.
- [\*\*Taglist\*\*](#) - Generates a report on various tags found in the code, like @todo or //FIXME tags.
- [\*\*Trac\*\*](#) - Retrieves and reports the number of project issues from a Trac instance.
- [\*\*Useless Code\*\*](#) - Reports on the number of lines that can be reduced in an application.
- [\*\*Violation Density\*\*](#) - Compute a new metric named violation density. This is kind of "opposite" for rule compliance metric.



# ■ Plugins Integration

## Integration

[AnthillPro](#) - Enables to configure and launch Sonar analysis from AntHillPro

[Bamboo](#) - Enables to configure and launch Sonar analysis from [Bamboo](#), the Atlassian CI engine.

[Branding](#) - Allows to add your own logo to the Sonar UI.

[Build Breaker](#) - Makes the build fail if pre-defined alert thresholds are hit.

[Crowd](#) - Enables delegation of Sonar authentication to [Atlassian Crowd](#).

[Cutoff](#) - Exclude files from analysis based on a cutoff date threshold, to analyze the work done on an existing code base and measure the quality of new code/changes only.

[Google Calendar](#) - Posts an event, when project analysed by Sonar.

[Hudson / Jenkins](#) - Enables to configure and launch Sonar analysis from [Hudson](#) or [Jenkins](#) CI engines.

[LDAP](#) - Enables the delegation of Sonar authentication to LDAP and Microsoft Active Directory.

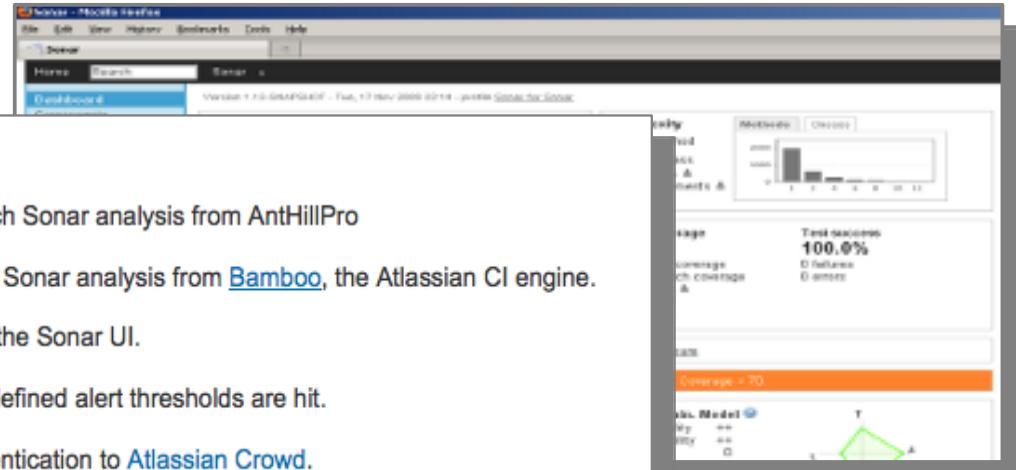
[PAM](#) - Enables the delegation of Sonar authentication to underlying PAM subsystem.

[Piwik](#) - Submits usage of a Sonar instance to a [Piwik](#) server.

[SCM Activity](#) - Collects and reports information on commits using SCM data.

[Switch off violations](#) - Exclude some violations in a fine-grained way.

[Twitter](#) - Creates tweet, when project analysed by Sonar.



## ■ Plugins Darstellung

### Visualization / Reporting

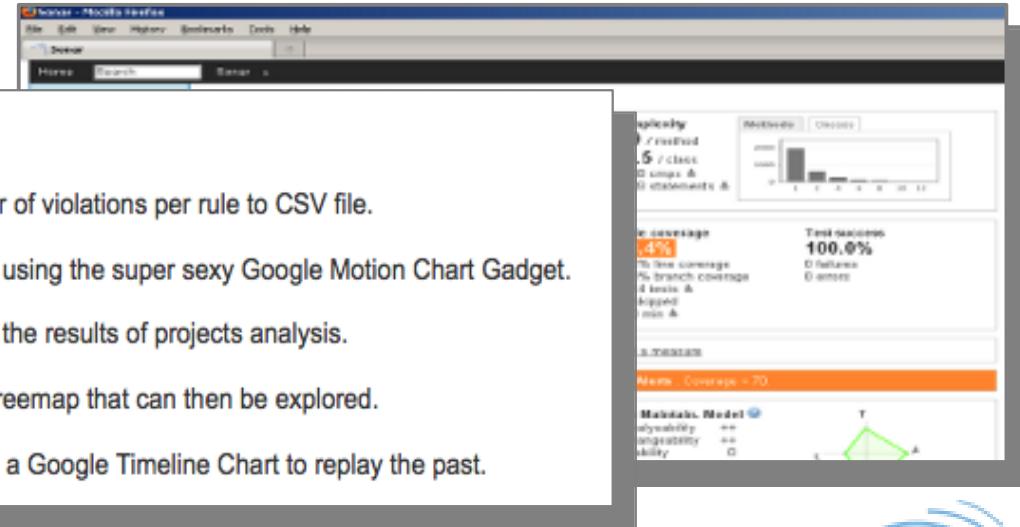
[CSV Export](#) - Export measures and number of violations per rule to CSV file.

[Motion chart](#) - Displays projects measures using the super sexy Google Motion Chart Gadget.

[PDF Report](#) - Generates a PDF report with the results of projects analysis.

[Radiator](#) - Displays measures using a big treemap that can then be explored.

[Timeline](#) - Displays measures history using a Google Timeline Chart to replay the past.



## ■ Plugins Steuerung

### Governance

[Quality Index](#) - Calculates a global Quality Index based on coding rules, Style, Complexity and Coverage by unit tests.

[SIG Maintainability Model](#) - An implementation of the SIG MM to evaluate the maintainability of an application.

[SQALE - Quality Model](#) (Commercial) - An implementation of the SQALE Methodology, which supports the evaluation of a software application's source code in the most objective, accurate, reproducible and automated way possible.

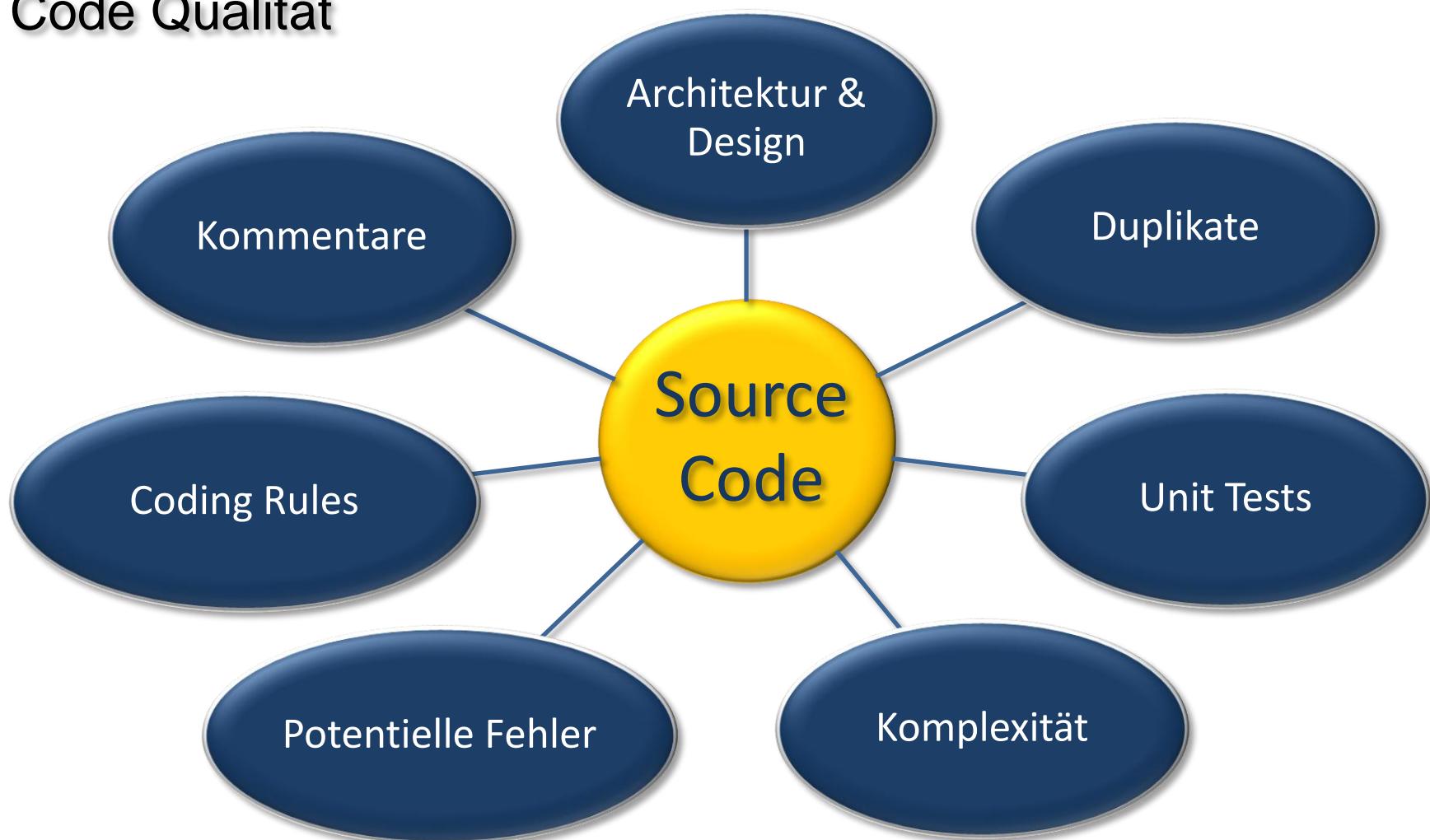
[Technical debt](#) - Calculates the technical debt on every component of projects with a breakdown by duplications, documentation, coverage, complexity...

[Total Quality](#) - Provides an overall measure of the quality of projects linking code quality, design, architecture, and unit testing.

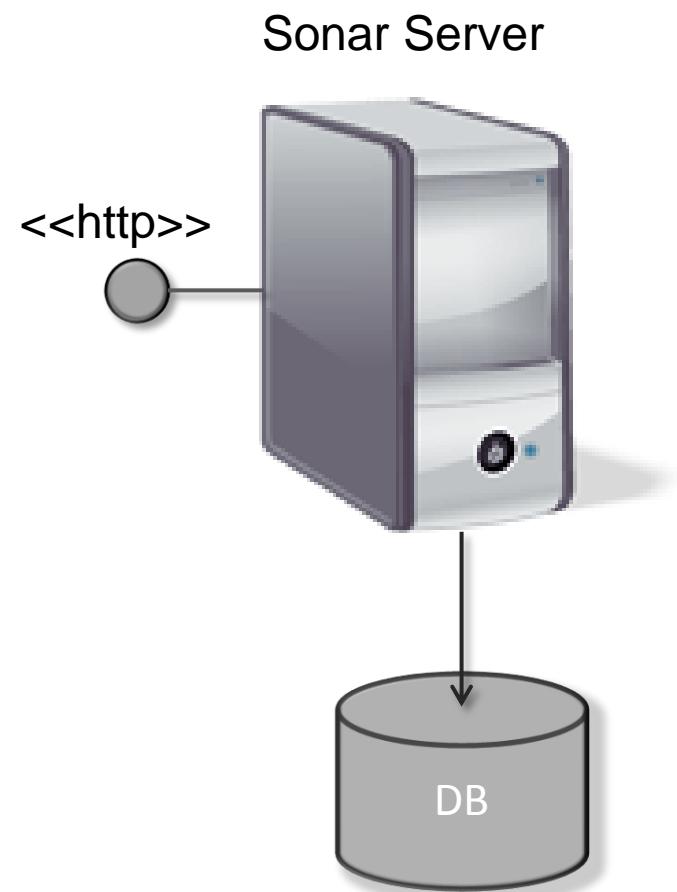
[Views - Portfolio Management](#) (Commercial) - Enables aggregation of projects. Projects can be grouped into applications, applications into teams, teams into departments...



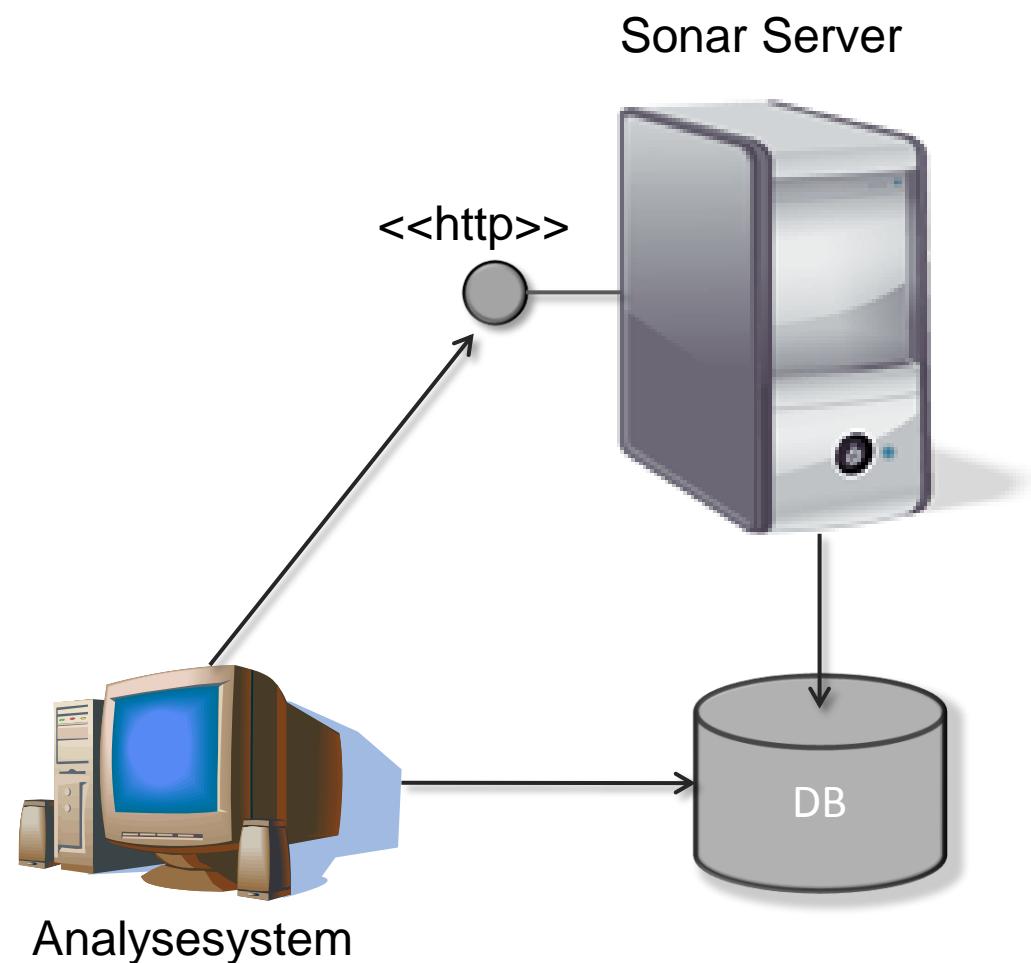
- Sonar bietet eine Sicht auf sieben Achsen/Dimensionen der Code Qualität



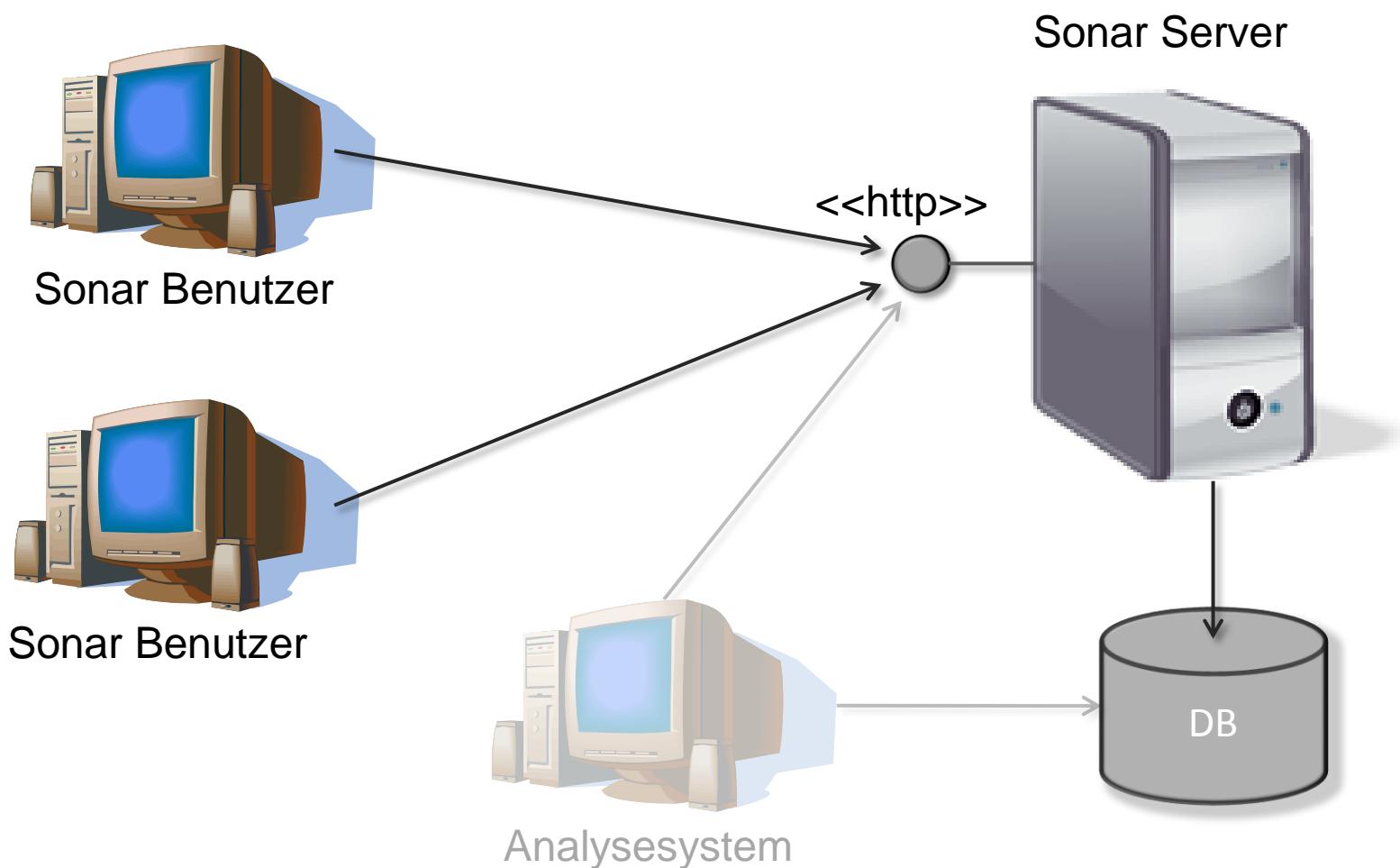
## ■ Sonar Setup



## ■ Sonar Setup

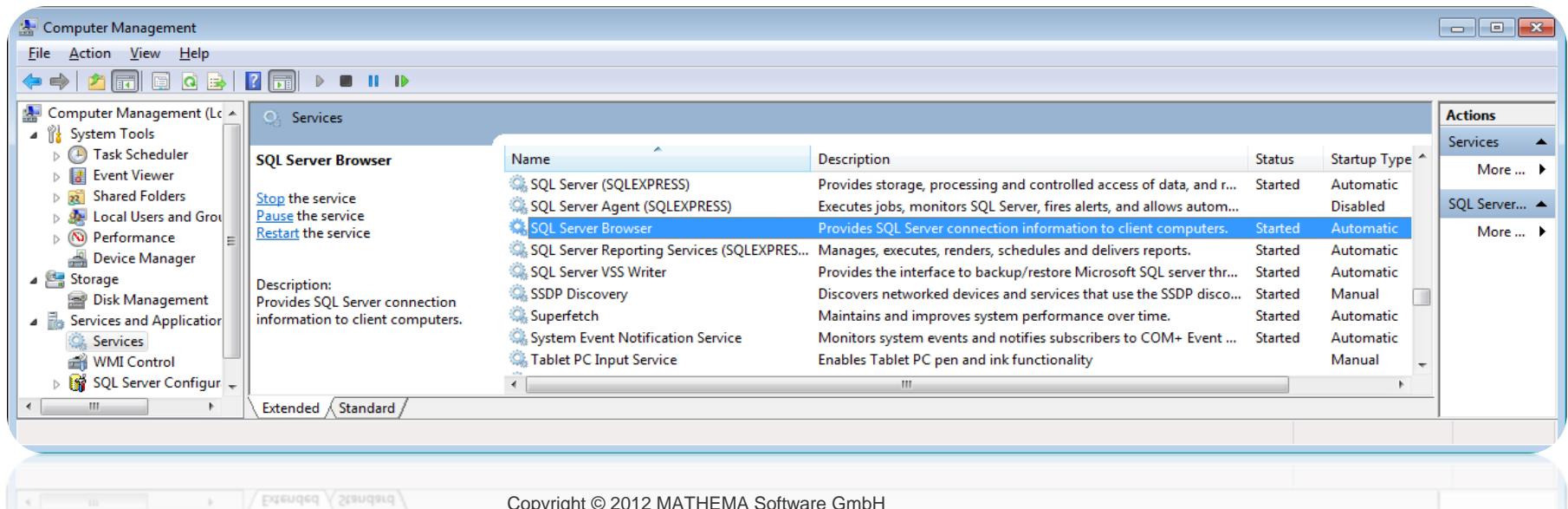


## ■ Sonar Setup



## ■ Vorbereitung SQL Server (Express)

- Benutzer anlegen (z.B sonar/sonar mit SQL Server Authentifizierung)
- Datenbank in SQL Server anlegen
- SQL Server Browser aktivieren
  - Wird für jDTS JDBC Treiber benötigt



- Vorbereitung Sonar Konfigurieren
  - JAVA\_HOME
  - Sonar.config anpassen (Datenbank Konfiguration)
  - ... starten



Los geht's

- Motivation
- Sonar Überblick
- Demo
- Fazit

## ■ Fazit

- Sonar lässt sich sehr schnell aufsetzen
- Konfiguration der „Violation rules“ einfach
- Definition der Sichten (Dashboards) erleichtert Adressaten gerechte Informationen
- Sicherheitskonzept mit Benutzern und Gruppen
- Sowohl Java als auch C#

Viel Spaß mit **sonar** 

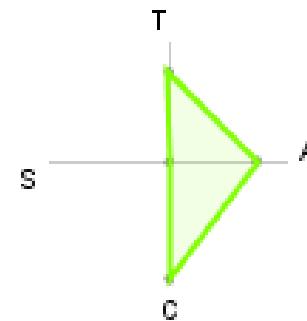
The text "Viel Spaß mit sonar" is displayed in a bold, black sans-serif font. The word "sonar" is followed by a blue icon depicting three curved lines radiating from a central point, resembling sonar waves or sound waves.

[thomas.haug@mathema.de](mailto:thomas.haug@mathema.de)

## ■ Backup

- Definiert von Software Improvement Group
- Einfaches Wartbarkeitsmodell
- basiert auf 4 Dimension
  - Analysierbarkeit
  - Änderbarkeit
  - Stabilität
  - Testbarkeit

SIG Maintain. Model 	
(A)nalyseability	+
(C)hangeability	++
(S)tability	--
(T)estability	+



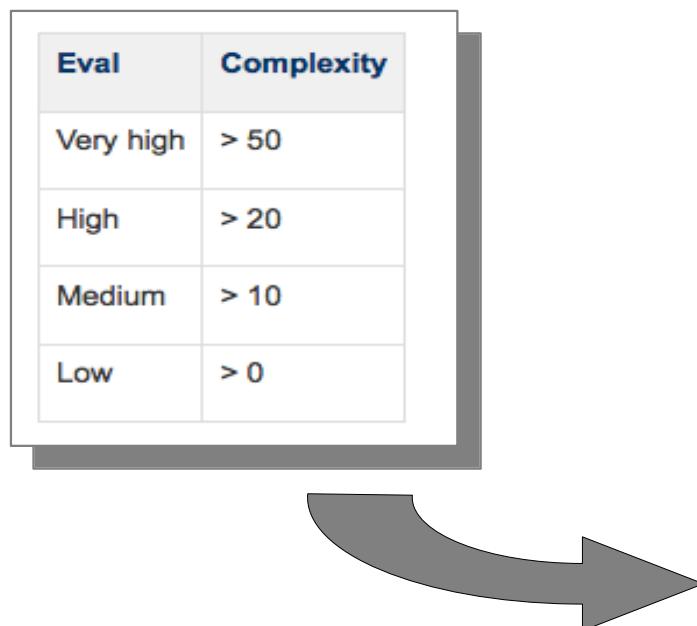
- (Projekt/System) Volumen
  - Größe des gemessenen System
  
- Duplikate
  - Anzahl duplizierte Zeilen im System

Rank	LOC
--	> 1310000
-	> 655000
0	> 246000
+	> 66000
++	> 0

Rank	Duplication
--	> 20%
-	> 10%
0	> 5%
+	> 3%
++	> 0%

## ■ (Projekt/System) Komplexität

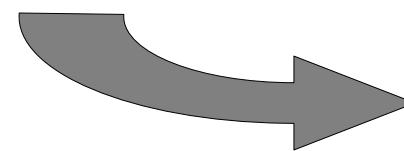
- Nutzt die McCabe zyklomatische Komplexität
- Prozentualer Anteil der LOC, die zu Methoden gehören, die in einem Komplexitäts-Bereich liegen



Rank	Medium	High	Very High
++	< 25%	< 0%	< 0%
+	< 30%	< 5%	< 0%
0	< 40%	< 10%	< 0%
-	< 50%	< 15%	< 5%

- Unit (= Methoden) Größe
  - Prozentualer Anteil von LOC, die zu Methoden eines gewissen Größenbereichs (LOCs) gehören

Eval	LOCs
Very high	> 100
High	> 50
Medium	> 10
Low	> 0



Rank	Medium	High	Very High
++	< 25%	< 0%	< 0%
+	< 30%	< 5%	< 0%
0	< 40%	< 10%	< 0%
-	< 50%	< 15%	< 5%

- Unit-Tests
  - Code Coverage (Zeilenabdeckung)

Rank	Coverage
++	> 95%
+	> 80%
0	> 60%
-	> 20%
--	> 0%

## ■ Sonar Erweitern

	Volume	Complexity	Duplications	Unit size	Unit tests
analysability	✓		✓	✓	✓
changeability		✓	✓		
stability					✓
testability		✓		✓	✓

