

# Rational Software Analyzer: Beyond Source Code

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IBM Rational Software Development Conference 2008

WHERE TEAMS ARE **R-HEROES**



## Agenda

***Reducing costs while  
improving software quality***

Static Analysis Overview

Technology Review: Rational  
Software Analyzer

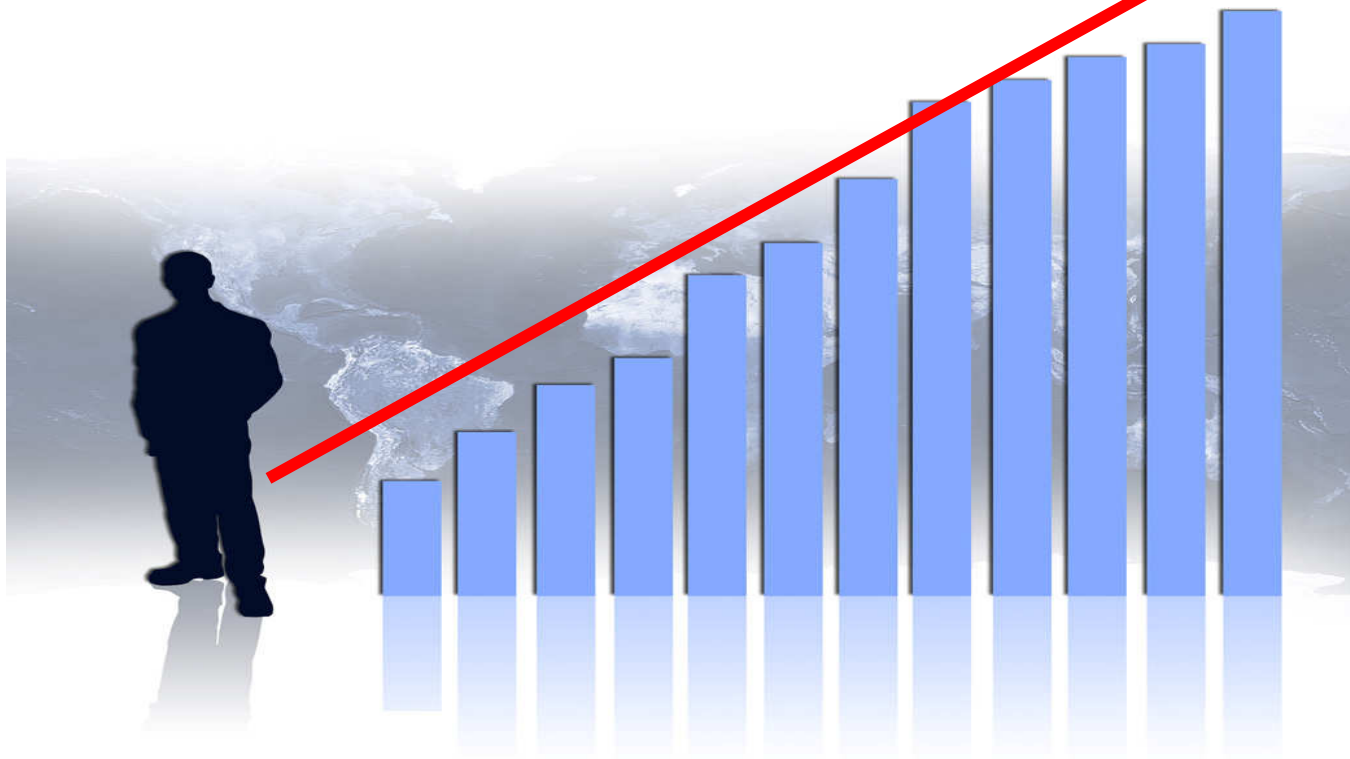
Software Analyzer “Rules  
Framework”



# The Rising Costs of Operations

Operational **costs continue to grow at 10%** year-over-year...  
twice the rate of the IT budget

The cost of failed projects and rework compounds the problem



# What is the cost of a defect?

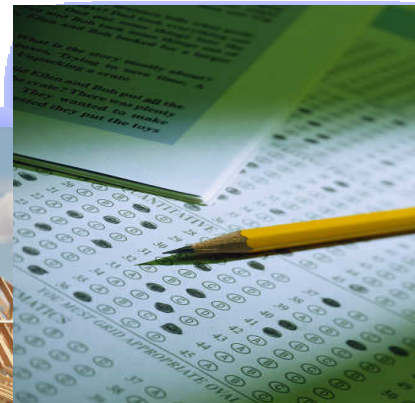
**80% of development costs are spent identifying and correcting defects!**



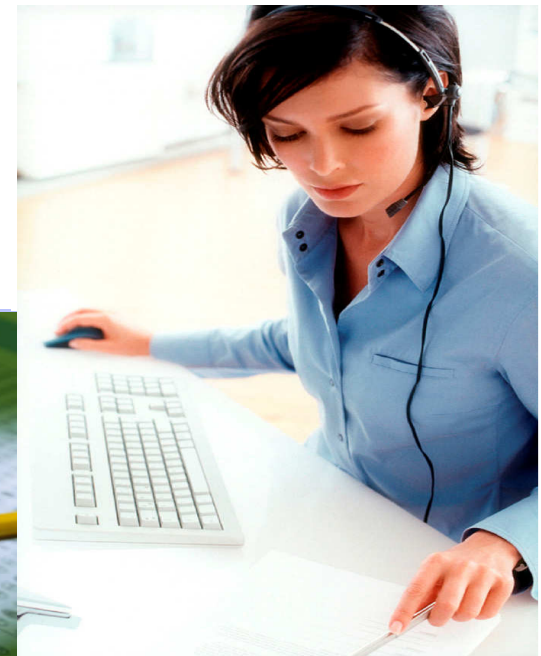
During the coding phase  
\$25/defect



During the build phase  
\$100/defect



During the QA/Testing phase  
\$450/defect



Once released as a product  
\$16,000/defect



The increasing costs of fixing a defect....



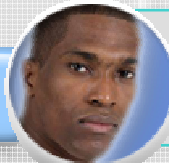
# The old way of software defect identification... ...do these sound familiar?

**Development Manager**



*I am going to let testing and QA find the defects, they have all the tools and time they need*

**Quality Manager**



*We have a great customer support organization, they always notify us of how customers are breaking our products*

**CIO**



*We just mandated code review policies down to our development organization, I am sure they are adhering to them*

**Program Manager**



*I just purchased a static analysis solution and sent it to my development team, I am sure they are using it*

**Lead Developer**



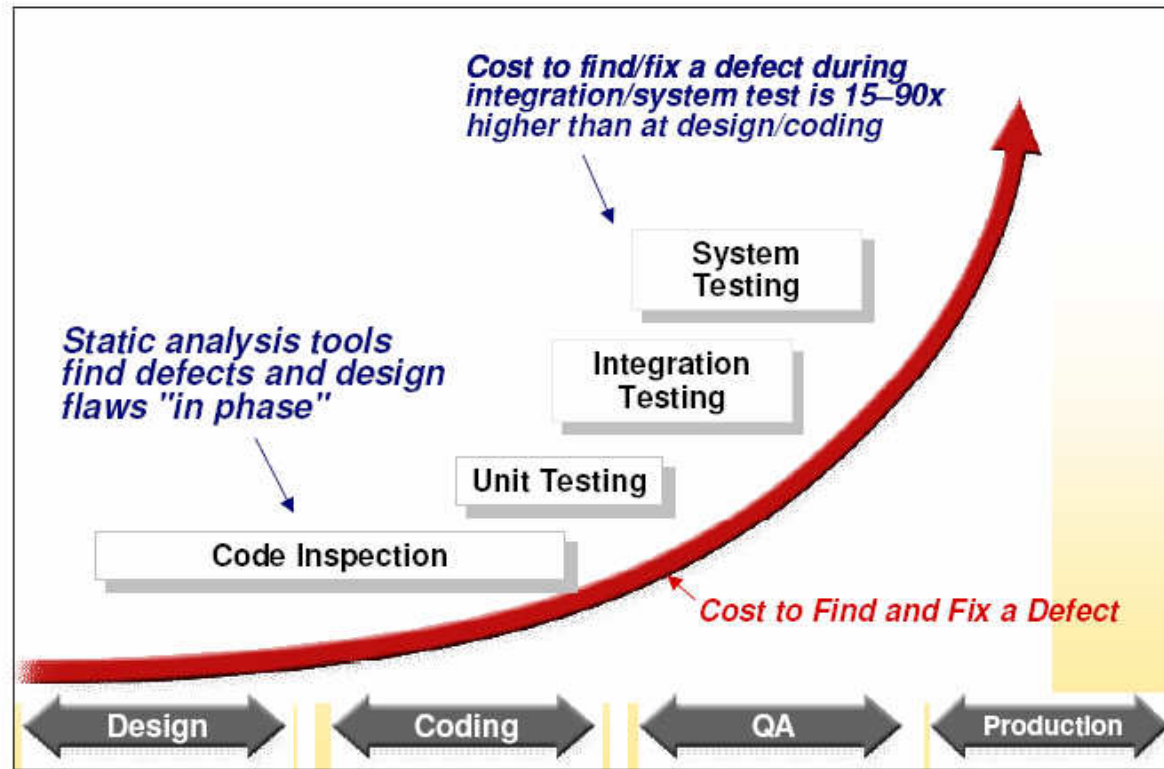
*I have all these open source tools, I will spend a couple of days next week running all of them on my code...if I get the time*

**Developer**



*I know what I am doing, I don't make mistakes when I am writing code*

# What if you could reduce costs AND improve quality? *Identify defects earlier in the lifecycle using Static Analysis*



Source: IDC, 2005

***The costs associated with bug fixes increase as a product matures through the software development lifecycle***

## Agenda

Reducing costs while improving software quality

### ***Static Analysis Overview***

Technology Review: Rational Software Analyzer

Software Analyzer “Rules Framework”



# Software Engineering Metrics





## What is Static Analysis?

*A method of software code debugging that is done by examining the code without executing the program*



### **What are the benefits?**

Improves code quality by identifying defects

Reduces costs by locating defects earlier in the software development lifecycle – during the coding phase

Provides an understanding of the code structure

Ensures adherence to corporate and industry coding guidelines

Discovers problems relating to dependencies in code

Examines complexity of code

# What are the potential results from Static Analysis?

## *Reducing development costs*

Basic static analysis can find/prevent between 5-15% of all code problems

Deeper analysis can push this to as high as 15-20%

For an average sized project this can conservatively save \$10K's

Find bugs early when cost is lowest



# Improving code quality using Static Analysis

There are many types of static analysis...

## Code review

Generally concerned with coding style  
Identifies rudimentary bugs

## Structural analysis

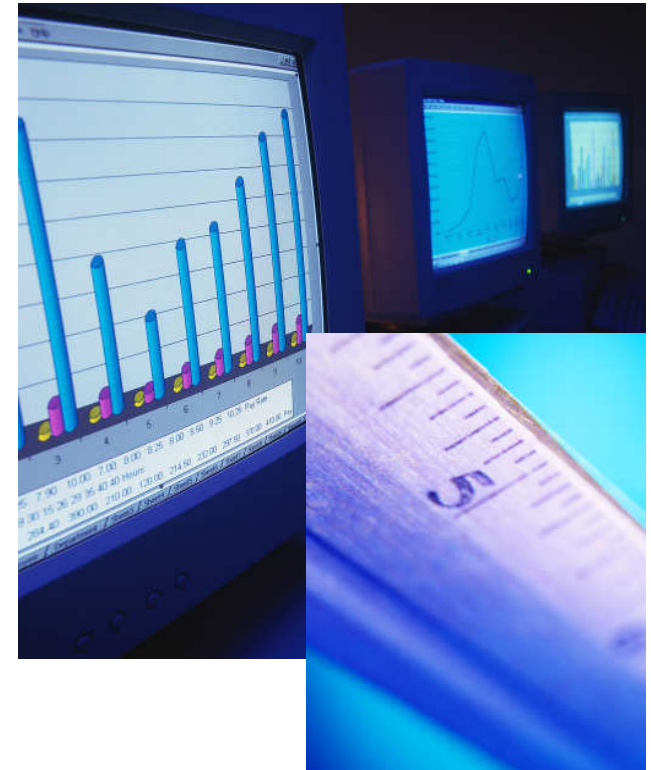
Identifies inter-class dependencies  
Locates cyclical dependencies, hubs, etc.

## Software metrics

Measures the complexity of software  
Uses standard metrics (line counting, McCabe, Halstead)

## Data Flow Analysis

Symbolic Execution of code  
Aids in locating resource and memory leaks



## Agenda

Reducing costs while improving  
software quality

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***Technology Review: Rational  
Software Analyzer***

Software Analyzer “Rules  
Framework”



# IBM Rational Software Analyzer

*Increase software quality and lower development costs*

An extensible static analysis solution enabling the identification of code-level issues early in the software development lifecycle

Helping to...

*Improve customer satisfaction*

*Relieve the burden on testing resources*

*Reduce the number of bugs released into production*

*Decrease time spent on identifying and fixing software defects*

*Ensure coding standards and adherence to company best practices*





# Rational Software Analyzer Capabilities

## Code Review support built in

600+ rules for Java™

~160 rules for C/C++

## Data Flow Analysis

~40 data flow analysis rules

Mostly for detecting stream and memory misuse

## Structural Analysis

10 pattern rules

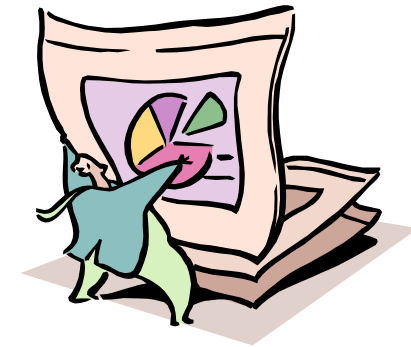
14 anti-pattern rules

Supports Java today

## Software Metrics

41 common software metrics for Java

McCabbe, Halstead, Maintainability, Dependency



# More Rational Software Analyzer Capabilities

## Custom Rules

- Many templates to create custom rules
- Full API to write your own rules using Java code

## Data Export

- Several built-in XML exporters
- Full API and data access to create your own

## Reporting

- Some already built in
- BIRT-based composer to create custom reports

## Two Products

- Developer Edition
- Enterprise Edition



# IBM Rational Software Analyzer

*Improve project visibility*

Easy to read analysis results

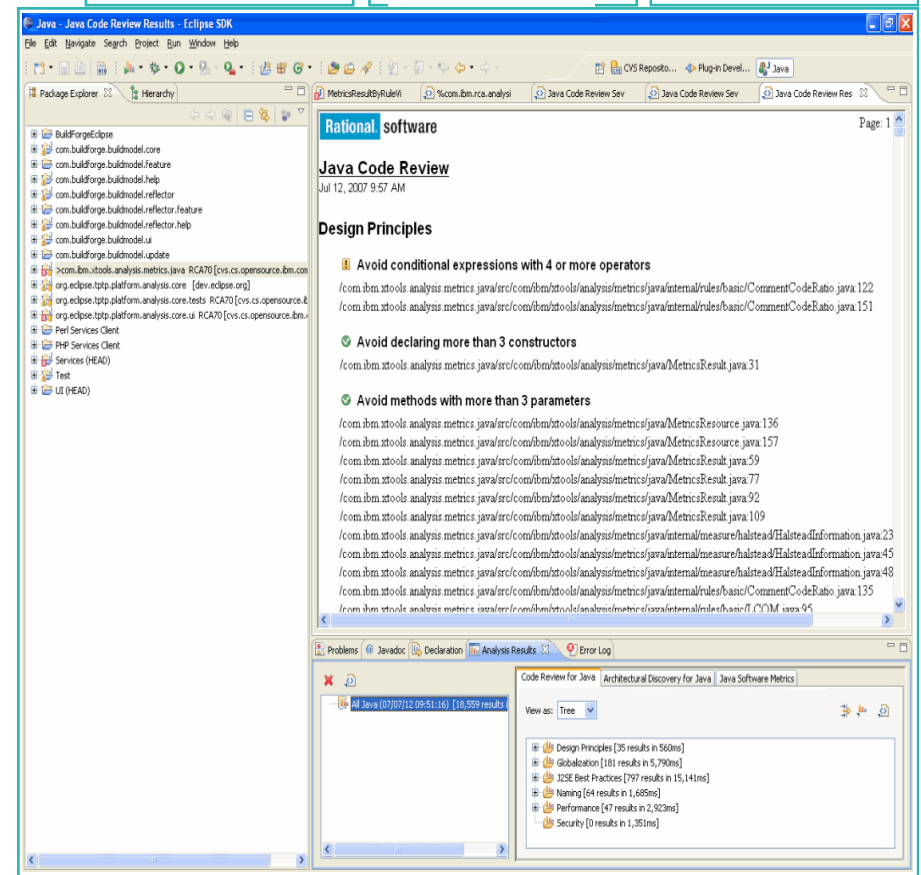
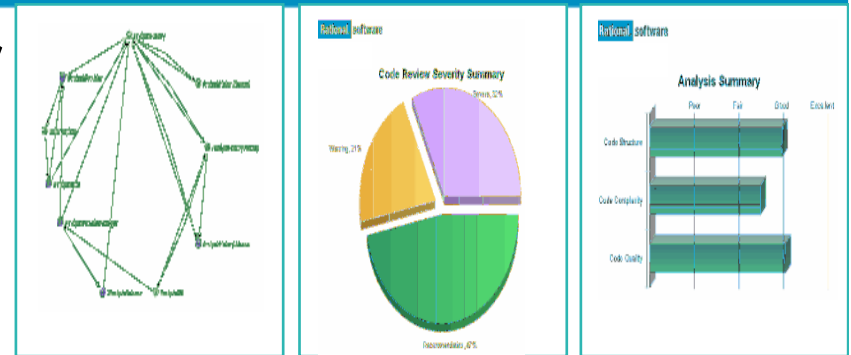
Rich set of reports and metrics

Out-of-the-box and custom reports

Exportable in XML, HTML or PDF formats

Flexible reporting framework

Centralized reporting for high-level view of software quality and compliance related issues



# Rational Software Analyzer

*Delivering benefits to each member of your organization*



CIO

## Executive

Driven by the CFO, Legal Council and CEO

- Achieving sustainable compliance to meet corporate IT objectives
- Reduce the number of defects, improving overall quality, customer satisfaction
- Allows Executives to make quality “ship” assessments



Project Manager

## Management

Driven by the CIO

- Drastically reduce development time and costs
- Mitigate product quality issues
- An automated approach that is more pro-active versus re-active



Build Engineer

## Build Engineer

Driven by Development Manager, Architect and CTO

- Ability to schedule, automate code scans, for each and every software build
- All contributed code is reviewed, regardless of source
- Provides visibility into code quality and code review polices

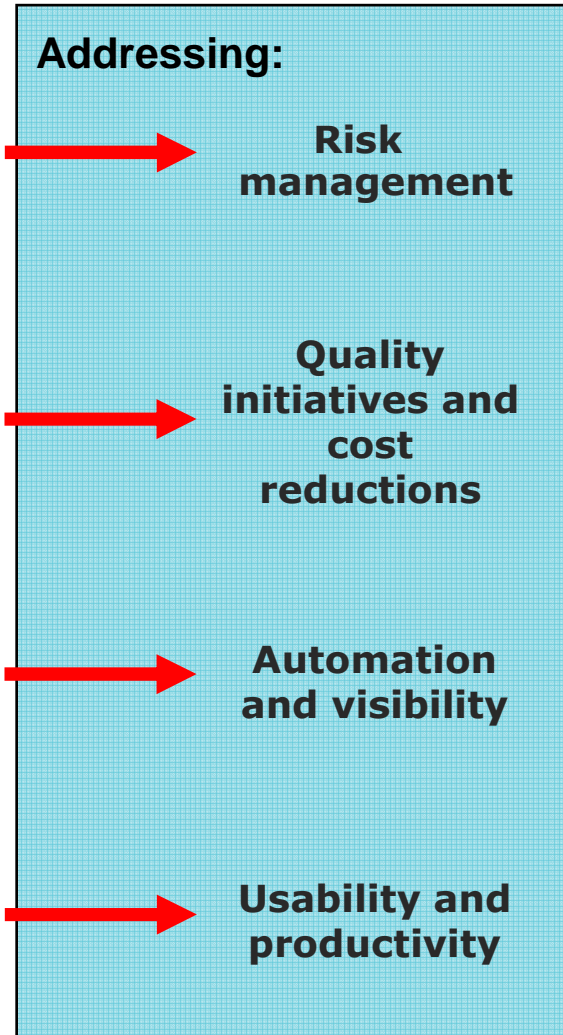


Developer

## Developer

Driven by the Development Manager, Architect and CTO

- One scan, one view, and one analysis of code for a single session
- Identify code issues earlier; increasing productivity
- Improve and adopt best practices



## Agenda

Reducing costs while improving software quality

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Technology Review: Rational Software Analyzer

***Software Analyzer “Rules Framework” Beyond Source Code***





# IBM Rational Software Analyzer

## *Extensible framework*

Provides the ability to plug-into other analysis tools

Unify your tools: one scan, one view, one analysis, one decision

Execute multiple scan rules and tools from a common framework

Central management of legacy and third-party technologies

Ties into existing software build processes for automated and centralized code reviews

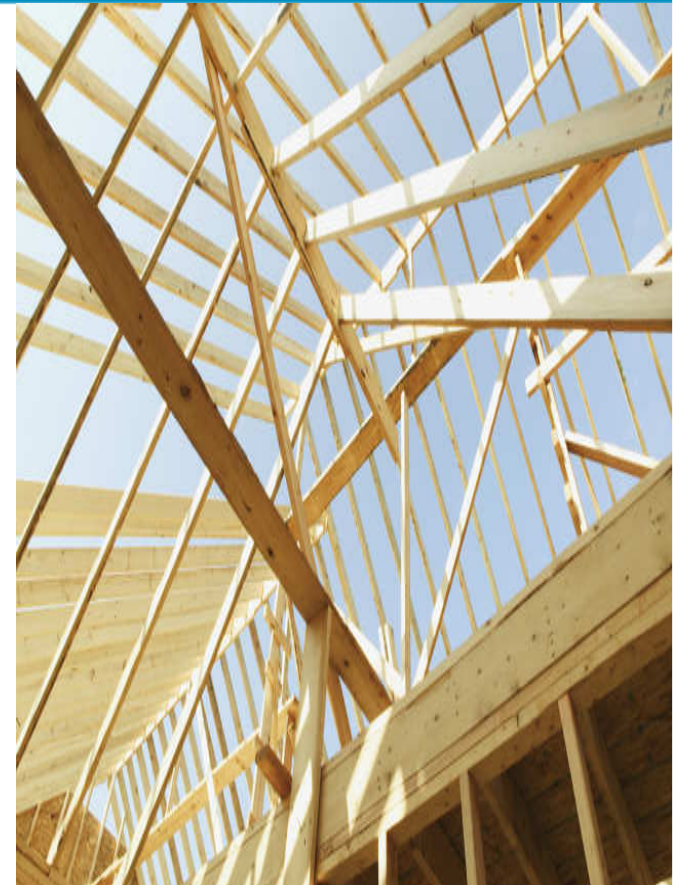
Enables a unified and consistent work-flow

Provides selectable and customizable rules and reports

Out-of-the-box or customizable reports

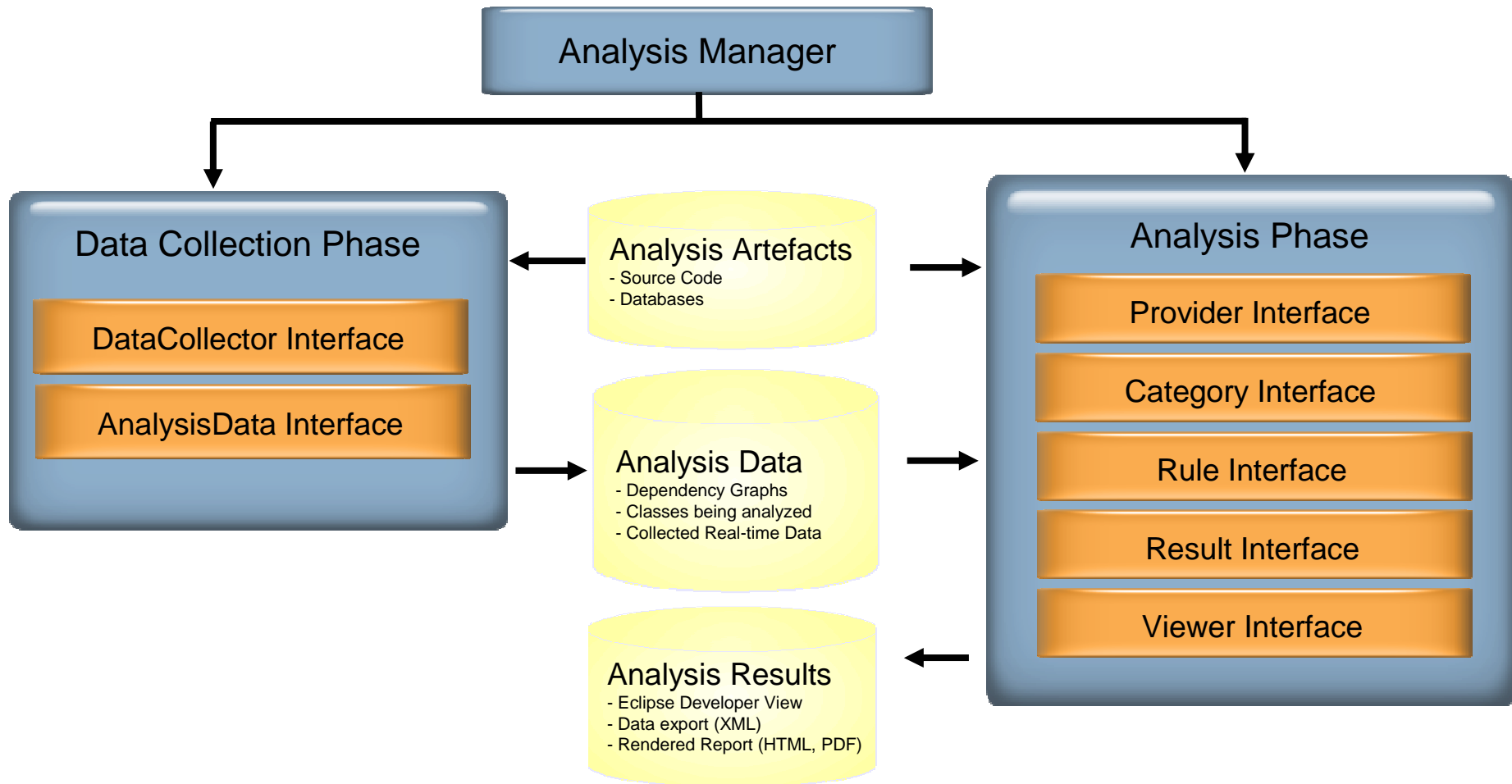
Rules can be customized, imported or created from scratch

Enables inclusion of rules for security, compliance and intellectual property vulnerabilities increasing team responsiveness to business priorities

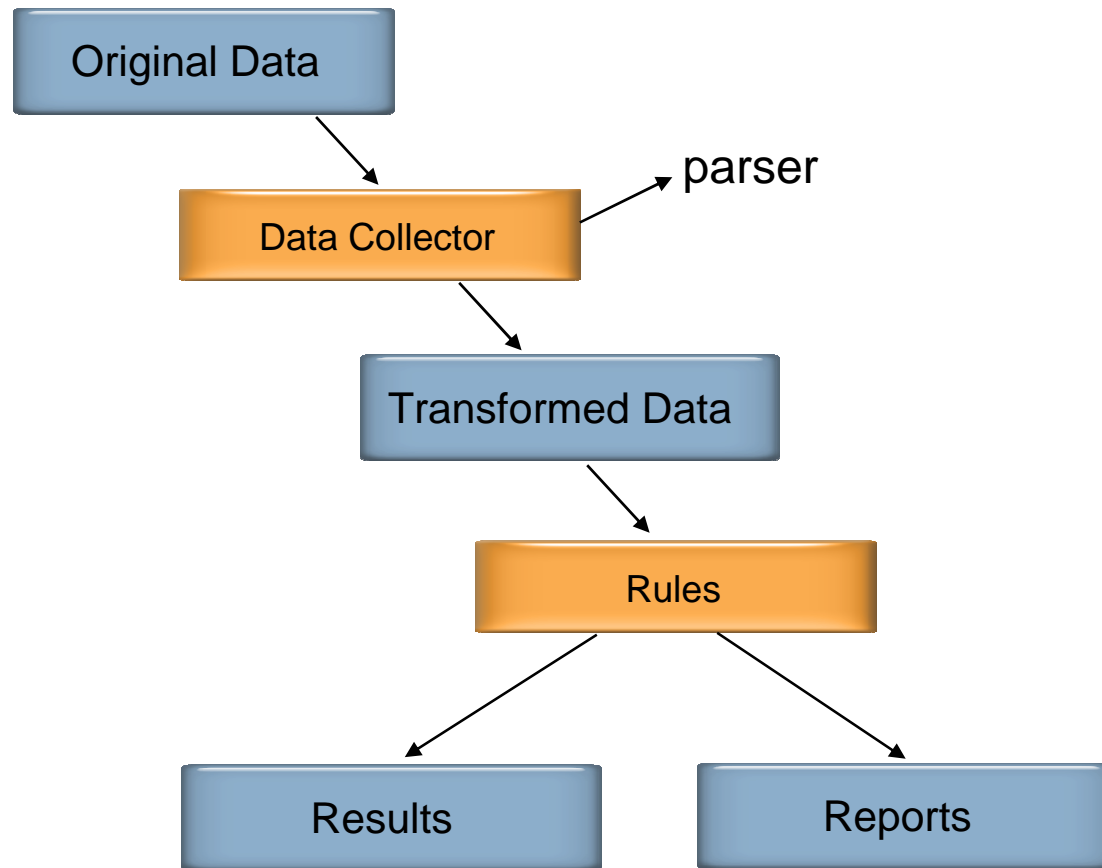


***Extensible foundation for increasing productivity and simplifying static analysis***

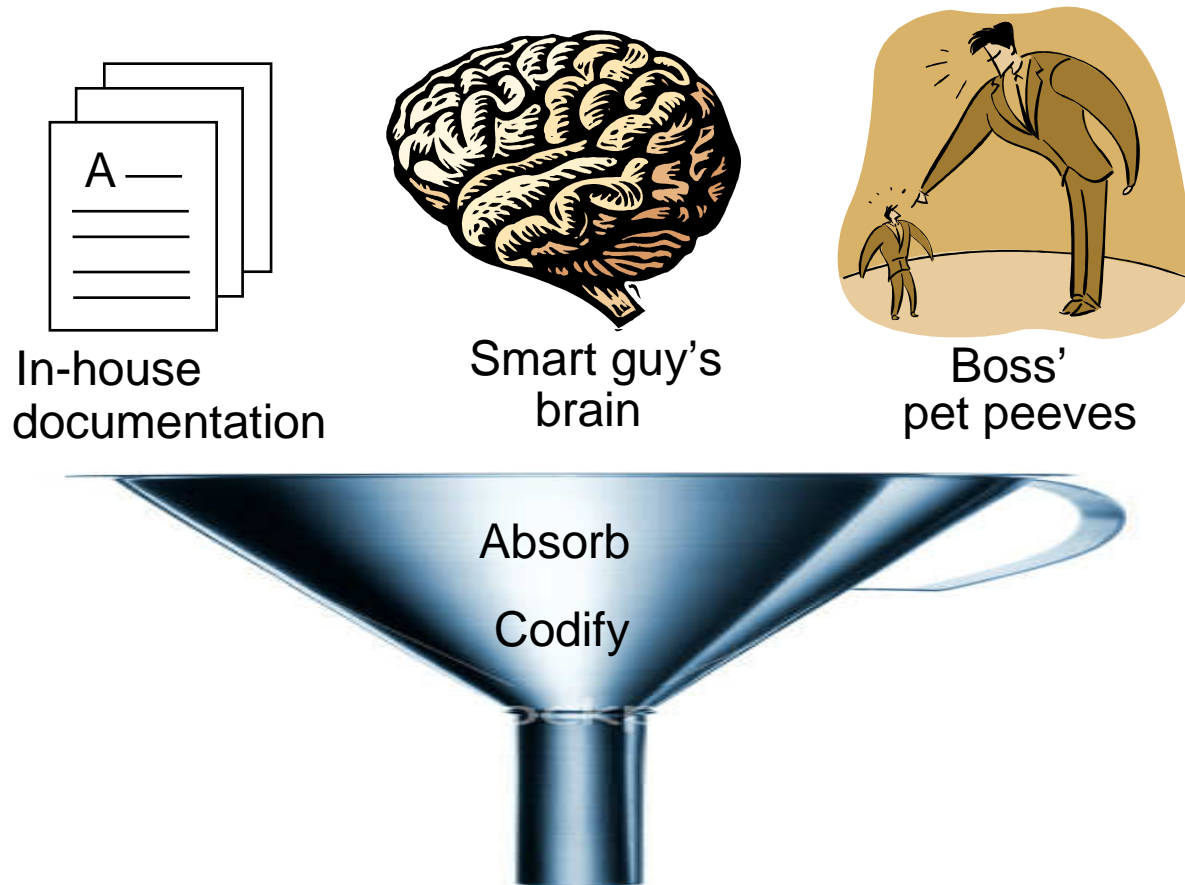
# Overview of Rational Software Analyzer Framework



# Rules Framework Perspective



# Tougher job: Capturing domain specific and language knowledge

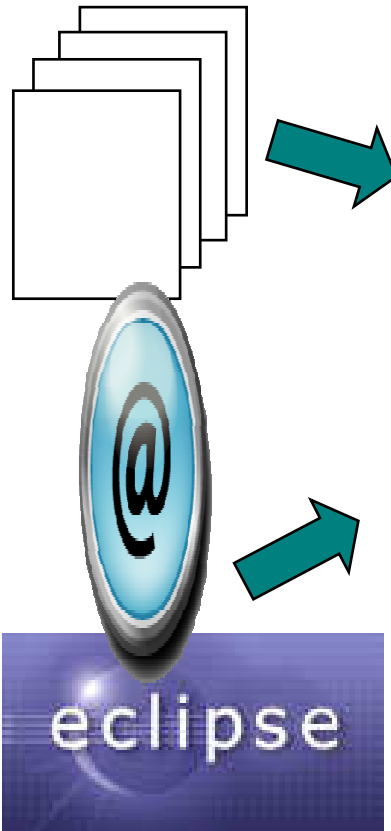


Rational Software Analyzer: Beyond Source Code

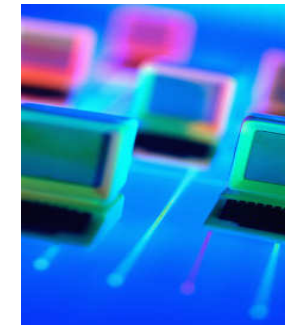
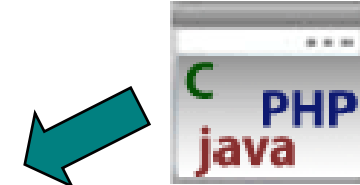
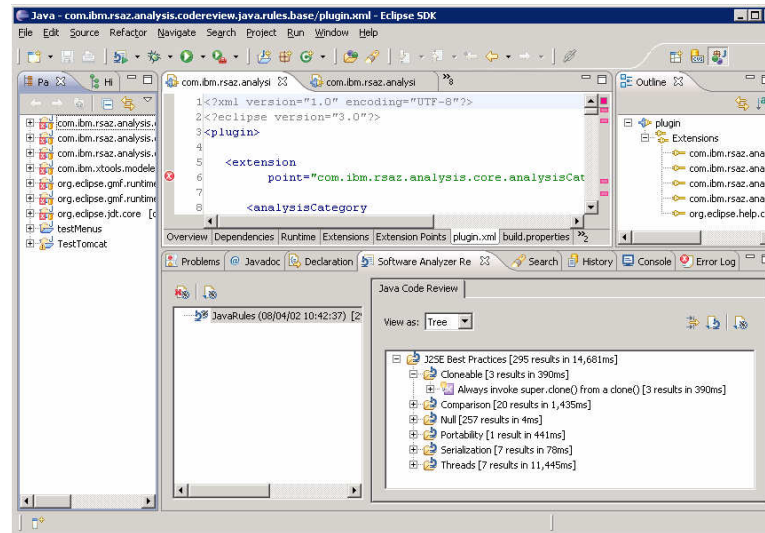
# One Scan-One View-One Analysis-One Decision

Source Code

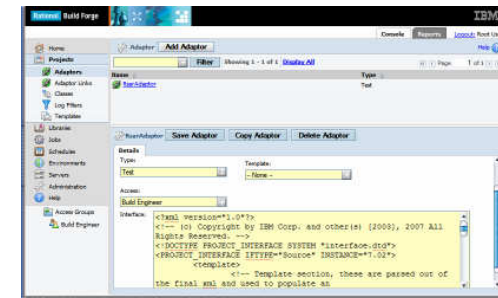
Web documents



PDE/EMF/GEF/Eclipse projects



Build/Install



Existing product



# IBM Rational Software Analyzer

*Extensible framework: Customizable to meet your specific needs*

Multiple Application Programming Interface (API) extension points provide the ability to:

- Create your own language parsers for custom code analysis

- Create groups of rules to address specific business needs

- Create custom rules and analysis views to enforce company best practices and policies

- Create your own custom reports and views to see results in your preferred format

- Create new data collection points to collect the data you want



# IBM Rational Software Analyzer Enterprise Edition

## *Automating and centralizing code scans*

Using Rational Software Analyzer Enterprise Edition...

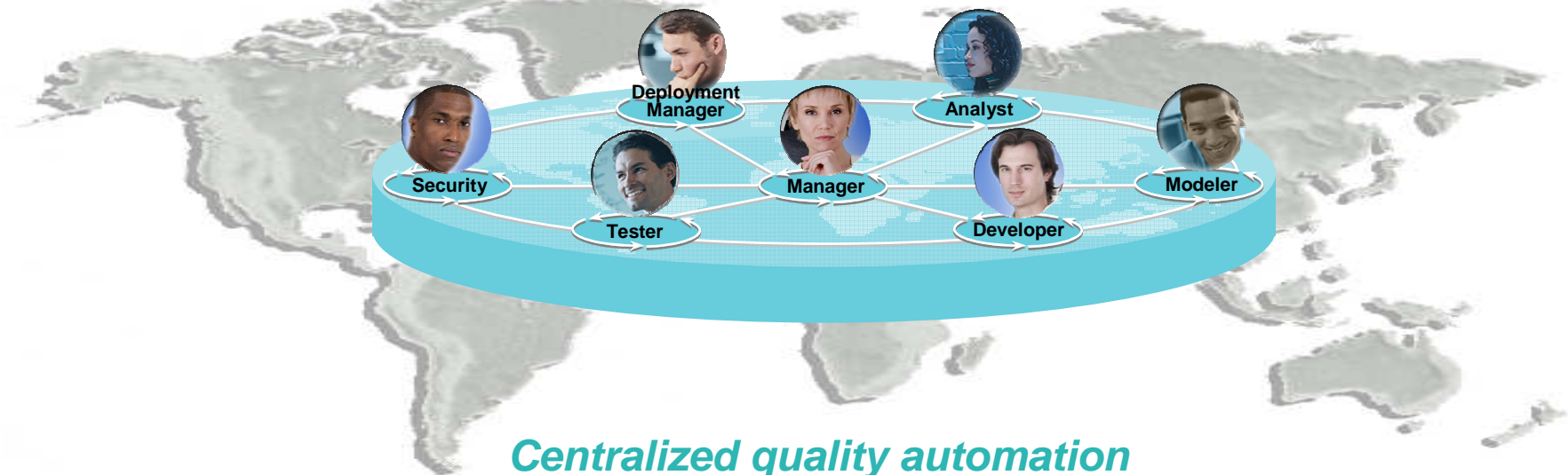
Automates and centralizes code reviews

Incorporates code quality analysis into existing software build processes

Plugs into any build system

Ships with an IBM Rational Build Forge adaptor

Additional layer of static analysis quality check



# Rational Software Analyzer and Rational Build Forge

*Together to centralize and automate*

**Centralizes and automates code quality and software delivery processes**

Automates code reviews and incorporates **static analysis into existing software build processes**

**Faster time to market and increased competitive edge** through automation and centralization of quality analysis

**Identifies software defects** earlier in the software development lifecycle – during the coding and build phases which **saves time and money**

**Common static analysis framework** to create customizable and consistent work-flow

Provides **repeatable and consistent processes** for more **improved efficiency**

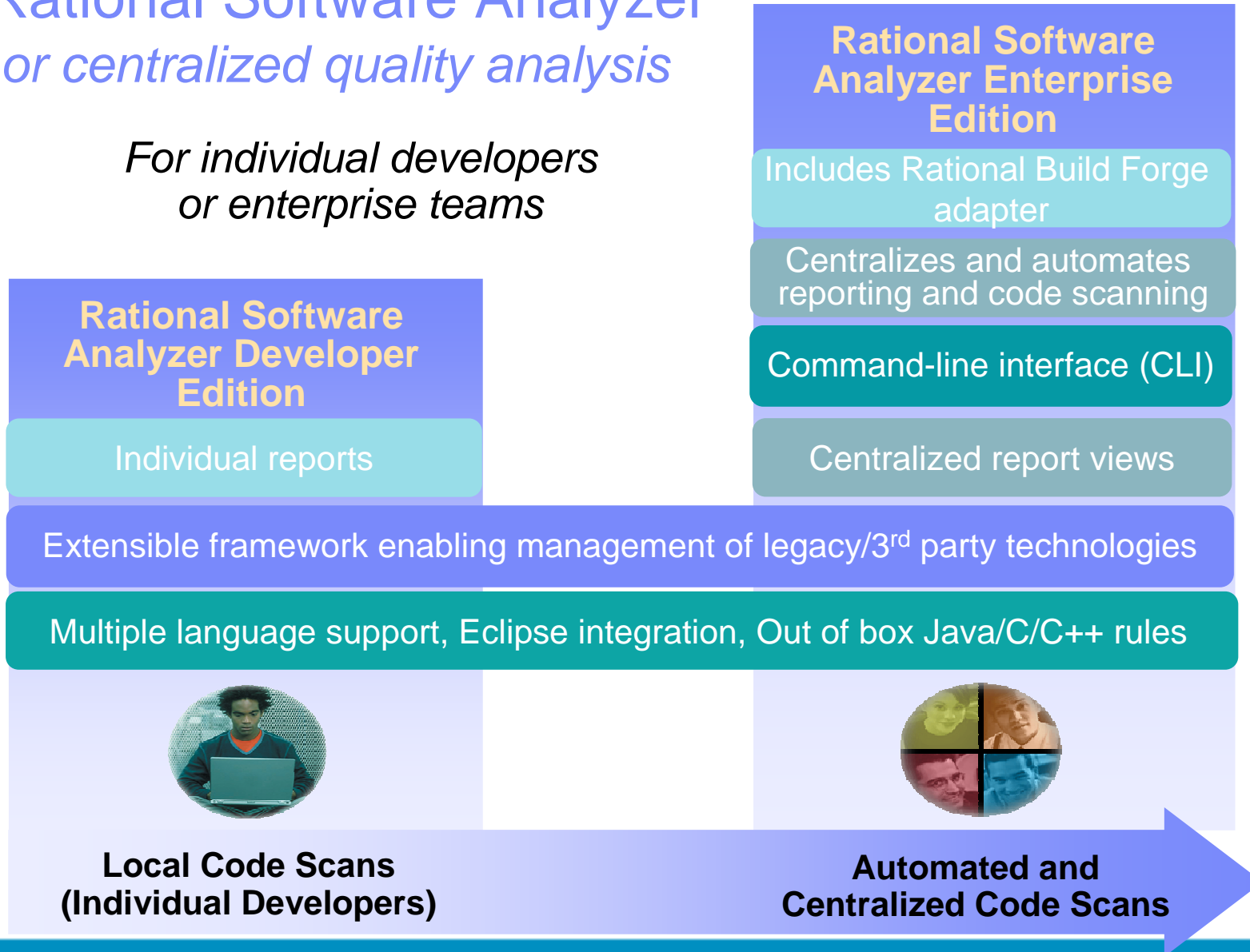
Effectively manages **governance and compliance IT objectives** through a customizable reporting framework

**Your Results:** Higher productivity, improved quality, faster delivery, reduced costs

# IBM Rational Software Analyzer

*Local or centralized quality analysis*

*For individual developers  
or enterprise teams*



# Rational Software Analyzer Futures Overview

## More focus on the enterprise

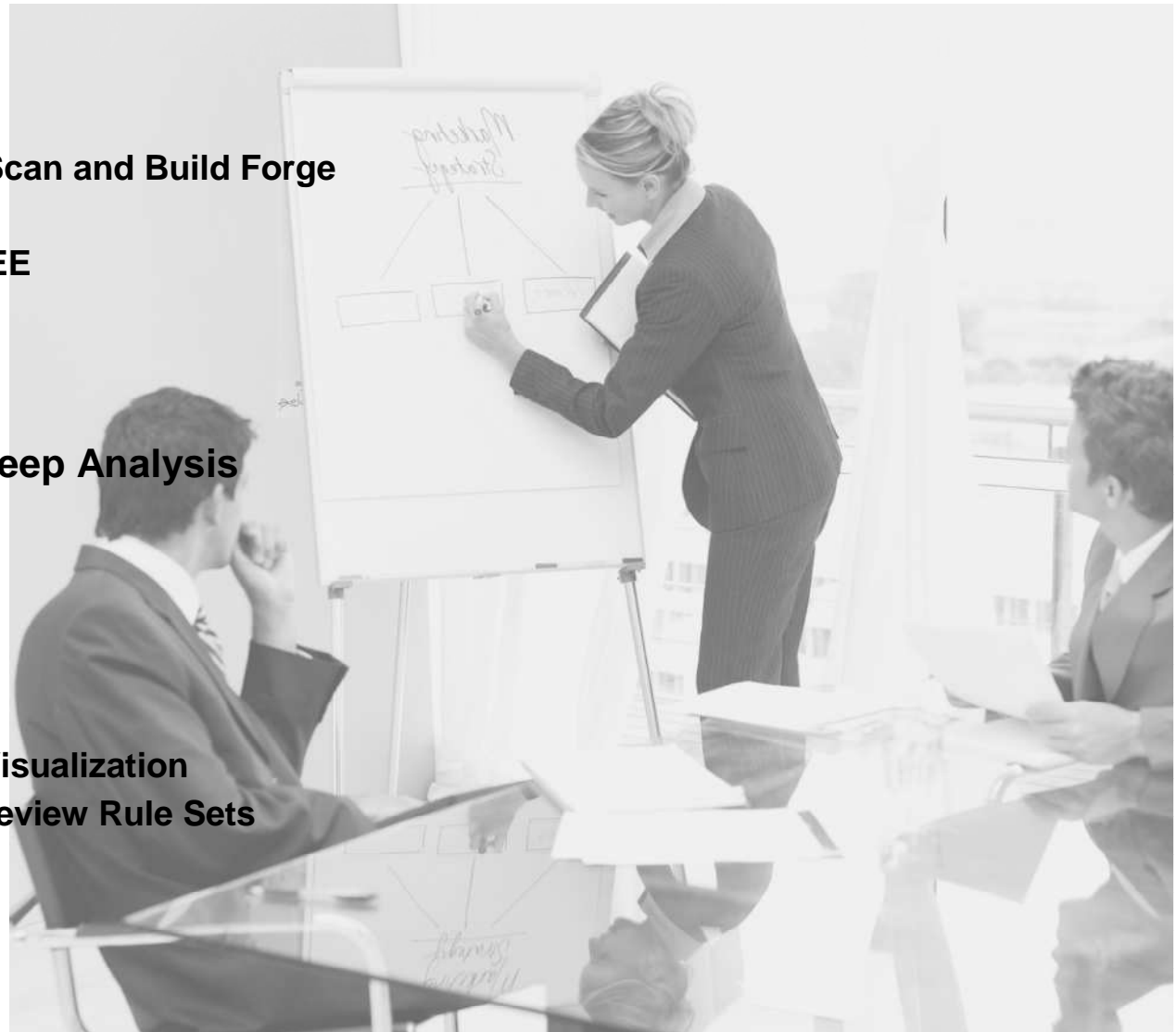
- Integration into RTC/Jazz
- Deeper integration with AppScan and Build Forge
- UI enhancements
- Integration between DE and EE
- Persistence layer
- Basic Trend Analysis
- User Authentication

## Expansion of C++ support – Deep Analysis

- Software Metrics
- Data Flow
- Architecture Discovery
- Misra and STL rules

## Additional Capabilities

- Call Graph and Component Visualization
- FixAll capabilities on Code Review Rule Sets
- Additional OS support
- Incremental Analysis
- Extended Java support





## Summary: IBM Rational Software Analyzer

*Increase software quality and lower development costs*

An extensible static analysis solution that enables code reviews and bug identification during the coding phase of the software development lifecycle

- ✓ Identify code-level issues at coding time, saving both time and money
- ✓ Improve overall code quality and predictability by identifying and resolving potential coding errors
- ✓ Extensible framework runs commonly used 3rd-party static analysis tools for a single view of code analysis
- ✓ Enhance project visibility and more effectively manage governance and compliance through customizable and out-of-the-box reporting
- ✓ Automate code quality analysis as part of the build process for a centralized software code scan solution

# For More Information...

Contact your IBM representative  
<http://www.ibm.com/contact/us>  
Call 1 800 728 1212

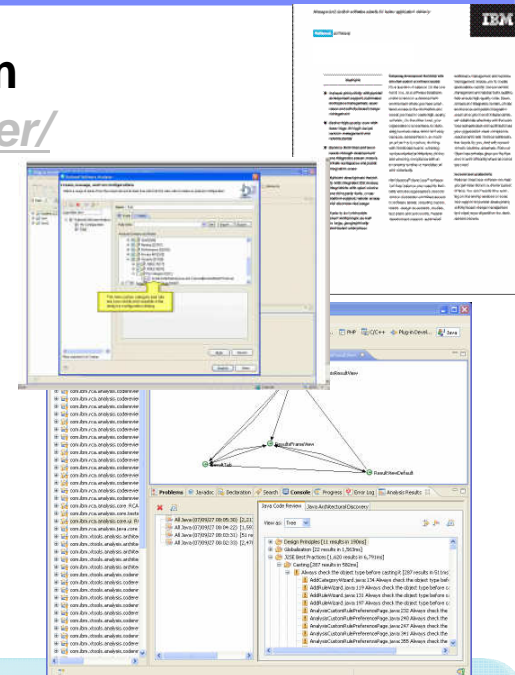
Read more about Rational Software Analyzer on [ibm.com](http://www.ibm.com)

<http://www-306.ibm.com/software/awdtools/swanalyzer/>

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## Technical Resources on IBM developerWorks

<http://www.ibm.com/developerworks/rational/products/rsar/>

Technical library of whitepapers, utilities, betas

Downloadable trial and demos

Discussion forums



# QUESTIONS



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