

Rational Strategy and Industry Trends

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Director Systems Engineering



Software is the driving force behind today's innovations



Aerospace and Defense

Today's F35 has 10 million lines of code on board, twice the amount on the F-22, another stealth fighter.



Energy and Utilities

Smart meters for water utilities will lead to \$29.9 million in sales by 2017 compared with \$10.3 million in 2011.



Automotive

Electronics drives 80 percent of the automotive industry's functional innovation—software is the key to most of it.



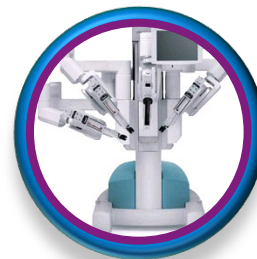
Telecom

Between 2012 - 2016, mobile data traffic will multiply tenfold, with video content acting as the biggest driver.



Electronics

By 2014, 230 million Smart TVs will be installed with 57 million homes watching web-based streams over broadband.



Medical Devices

The da Vinci S surgical robotic system:

- 1.4 million lines of code
- Computing power of 7 laptops
- 10,000 individual parts

At the same time the world is experiencing unprecedented change

- Globalization
- Bandwidth explosion
- Integrated technologies
- Consumerization of products
- Cloud, mobile, social business



This new reality uncovers unique challenges and opportunities *for software engineers*



“I need to know what I need to develop — nothing more, nothing less”

1 of 2

Challenged with **scope creep and changing requirements**



“I need to show that I am compliant with the standards required by my industry”

2x

Need for **standards compliance** doubled since 2009



“I need to know when changes are made to the hardware to avoid unpleasant ‘surprises’ later”

45%

Use **hardware/software dependency management**

This new reality uncovers unique challenges and opportunities *for systems engineers*

BEST-IN-CLASS



“I need to better understand my design alternatives earlier in the development process”

88%

Improve ability to **predict system behavior**



“I need a level of traceability that allows me to verify what was specified was delivered”

39%

Link **requirements** to specific **test cases**



“I need to manage change across mechanical, electrical, and software engineering”

1 of 4

Involve **multiple engineering disciplines**

in design reviews

Aberdeen Group: “System Design: Get it Right the First Time”, August, 2011

New and enhanced solutions for **systems and software engineers**



IBM

Design, deliver, and manage smarter products from planning to development through product support



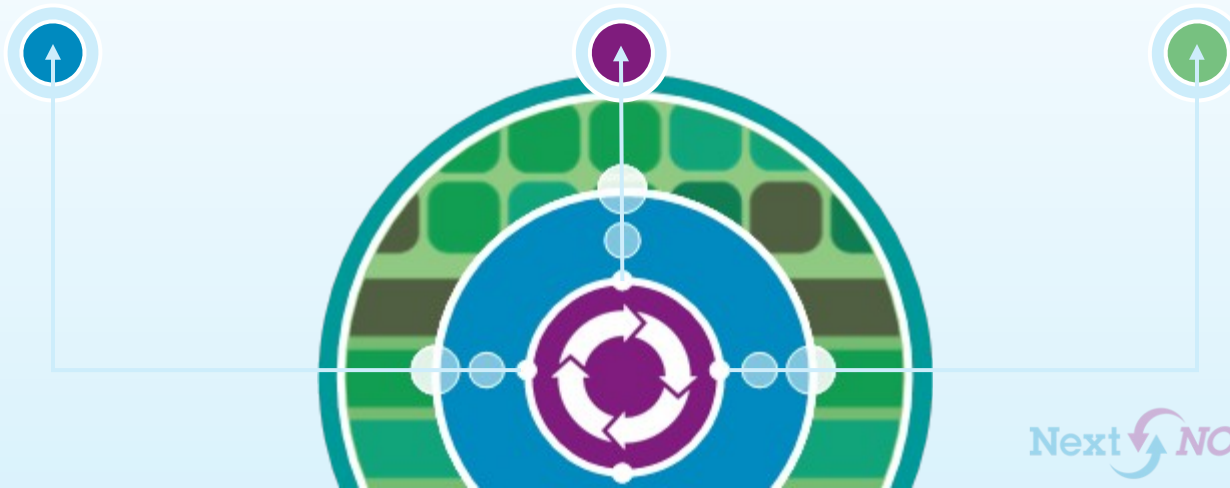
Lifecycle Solutions

Accelerate development with industry specific complex software and systems development solution



Ecosystem

Access a growing and extensive business partner ecosystem



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The information mentioned regarding potential future products is not a commitment, promise, or legal obligation to deliver any material, code or functionality. Information about potential future products may not be incorporated into any contract. The development, release, and timing of any future features or functionality described for our products remains at our sole discretion.

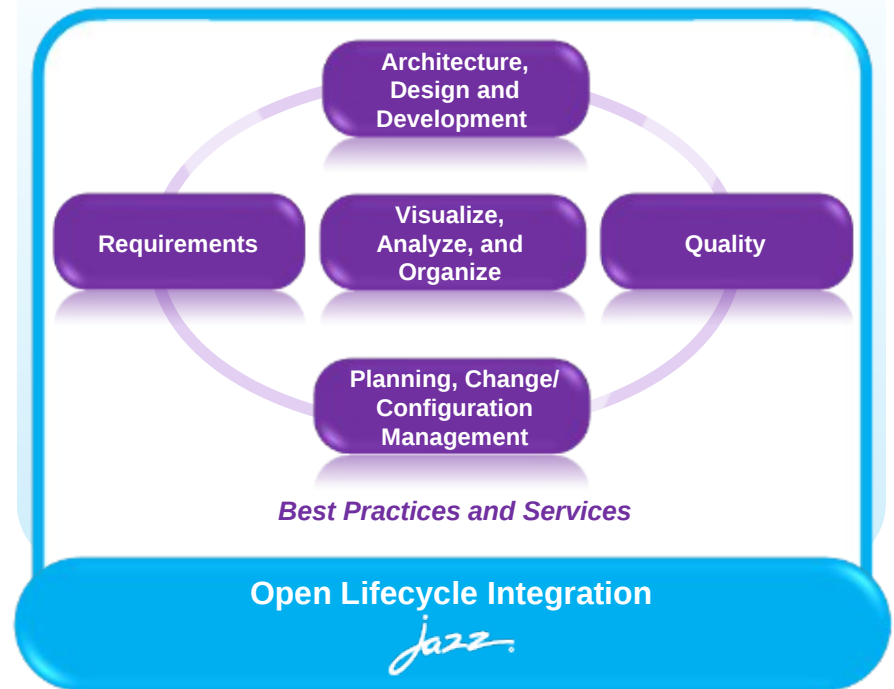
Performance is based on measurements and projections using standard IBM benchmarks in a controlled environment. The actual throughput or performance that any user will experience will vary depending upon many factors, including considerations such as the amount of multiprogramming in the user's job stream, the I/O configuration, the storage configuration, and the workload processed. Therefore, no assurance can be given that an individual user will achieve results similar to those stated here.

Rational solution for systems and software engineering

Progress since Innovate 2011

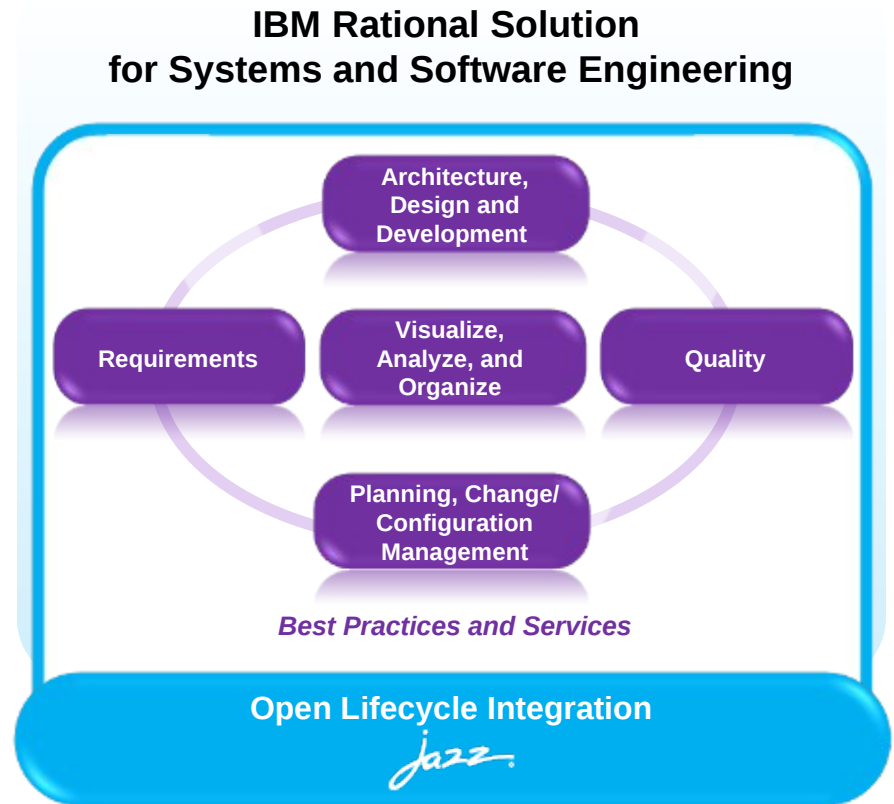
- **Collaborate** across disciplines
 - 2 new products (1 in Beta)
 - 5 new SSE lifecycle integrations
- **Optimize** your practices for industry standard compliance
 - 2 new industry accelerators
 - 10 new process areas + 2 extensions
- **Integrated** and open platform
 - 15+ new third-party integrations

IBM Rational Solution for Systems and Software Engineering



New guidelines, practices and tool mentors for cross-lifecycle traceability and reporting and extended metrics

- **Achieve greater value from lifecycle traceability** with guidance on new ways to view and query linked data.
- **Improve cross lifecycle reporting** with new tool mentors and templates for document generation.
- **Respond faster on emerging issues** with new lifecycle metrics.
- **Apply requirements driven quality management** with greater efficiency using new tool mentors.



Reduce cost of compliance and ensure safety

Improve collaboration, automate processes, and accelerate development

What's New?

- IBM Rational Solution for Medical Devices
 - FDA Quality System Regulation (21 CFR Part 820) and IEC 62304 best practices, templates and tooling.
- IBM Rational Solution for Electronic Design
 - New practice and process assets to support high-level electronics design and EDA design workflow.

What's Enhanced?

- IBM Rational Solution for Aerospace and Defense
 - DO-178C best practices, templates and tooling.
 - Extended support for Defense Architecture Frameworks.
- IBM Rational Solution for Automotive Engineering
 - AUTOSAR and ISO26262 best practices, templates and tooling.



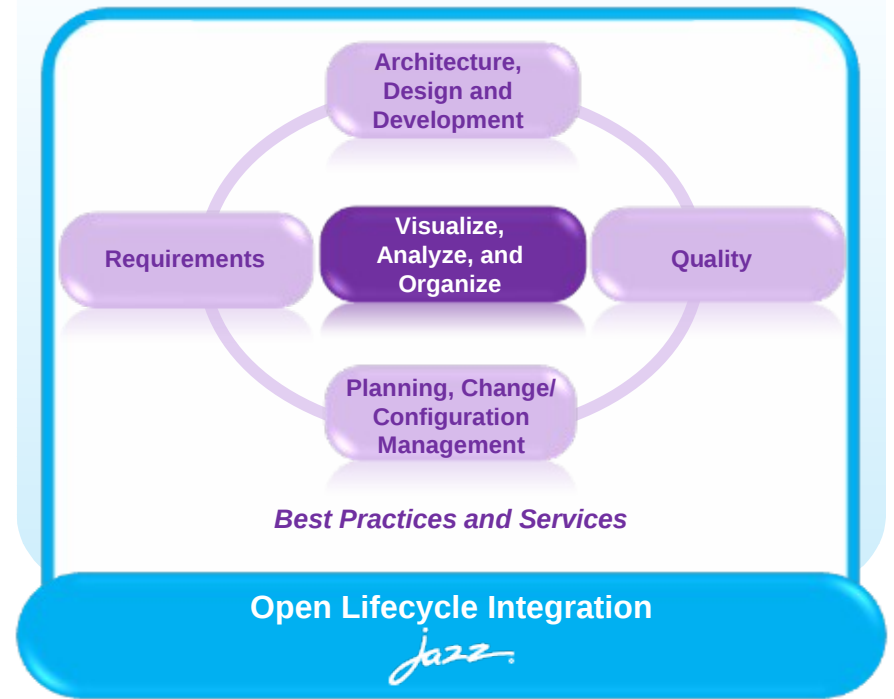
Reduce overhead by managing complexity in product development

Rational Engineering Lifecycle Manager 1.0

Visualize, analyze and organize engineering artifacts from across multiple tools to help organizations:

- Manage growing complexity
- Extract key threads of interest from a web of related engineering artifacts
- Make timely and correct business and engineering decisions
- Improve collaboration across engineering disciplines

IBM Rational Solution for Systems and Software Engineering



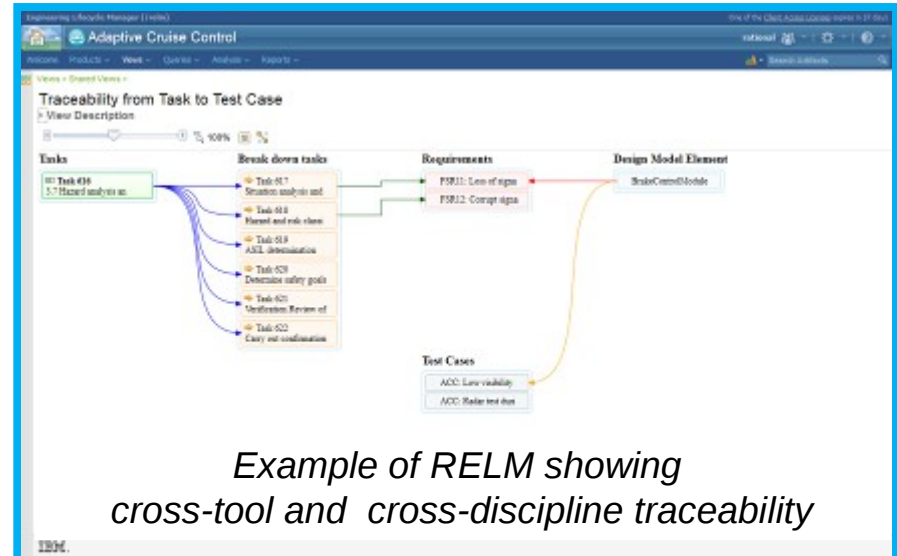
What's unique about RELM?

- Cross lifecycle views
 - Tools often provide A-B or B-C traceability views, but RELM shows A-B-C

- Flexible views
 - Views can be tailored for specific task, role, process or standard

- Data remains at source
 - No need to move data into common repository

- Adaptable to plug in other data sources
 - Uses internet standards



Index of Linked Lifecycle Data



*“The beta version of Rational Engineering Lifecycle Manager showed us that it has potential to be a **very valuable tool** and approach to **solving challenges in the engineering of complex products.**”* - Simon Bradley, Vice President,

Head of Global Innovation Network, Systems & Products Architecture, EADS

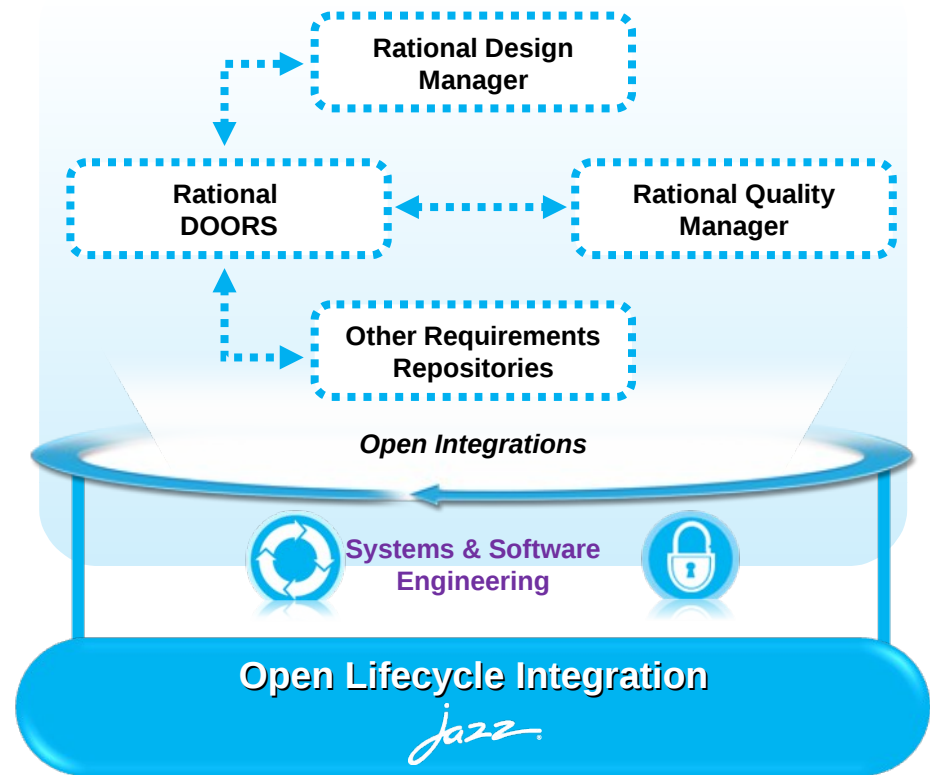
RELM v1.0 works out of the box with:

- IBM Rational DOORS
- IBM Rational Rhapsody with Design Manager
- IBM Rational Team Concert
- IBM Rational Quality Manager

Requirements Management

IBM Rational DOORS v9.4

- Open integrations more flexible and scalable
 - Quality and test
 - Architecture, design and development
 - Other requirements management repositories
- Even more secure with new server-side authentication
- Usability enhancements



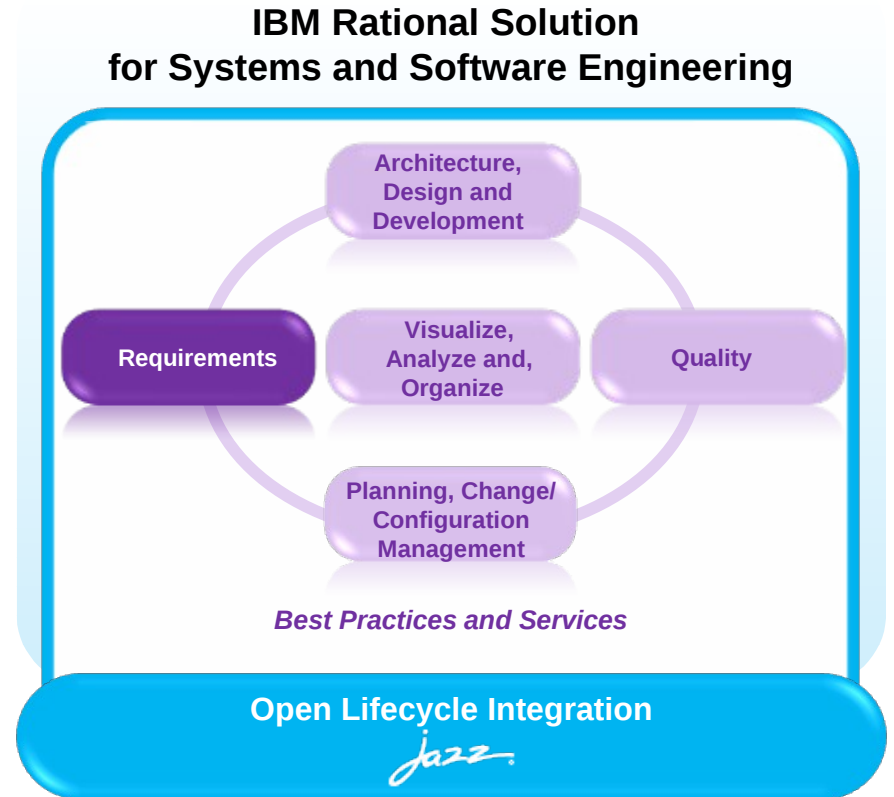
"Our ability to maximize the breadth of the IBM software let us provide NASA with demand-based statistics while maintaining control of the costs."

Joseph Dress, Requirements Management,
Constellation Software Engineering Corporation

Requirements Management

IBM Rational DOORS Next Generation v4.0.1 RC2 (Planned GA 27 Nov 2012)

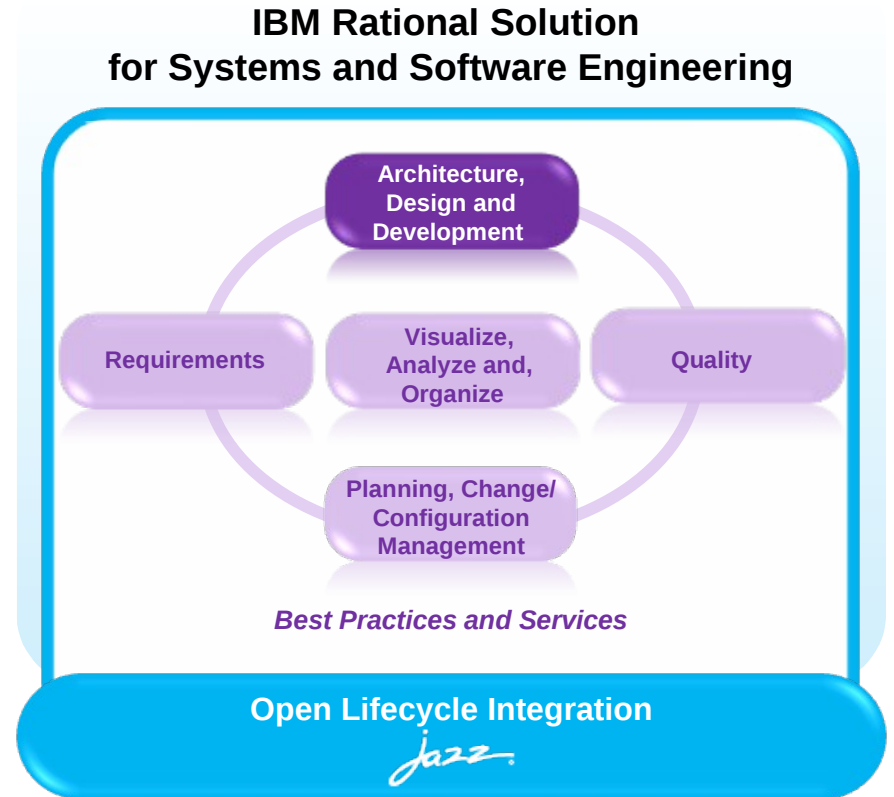
- Requirements collaboration, planning, reuse and lifecycle traceability
- Requirements management capabilities on the integrated collaborative lifecycle management platform
- Interoperability with DOORS 9.5
- Developed through open, public project on Jazz.net
- Complementary to, not replacing DOORS 9.x series



Architecture, Design & Development

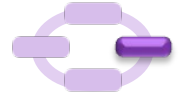
IBM Rational Rhapsody v8.0 with Design Manager v4.0

- **Simplify design collaboration** through Jazz-based model management
- **Unify requirements and design** with single-source of truth utilizing OSLC
- **Streamline safety critical design** using certification assistance
- **Automate standards compliance** with latest SysML, AUTOSAR and UPDM
- **Enhanced User Experience** with usability and productivity improvements

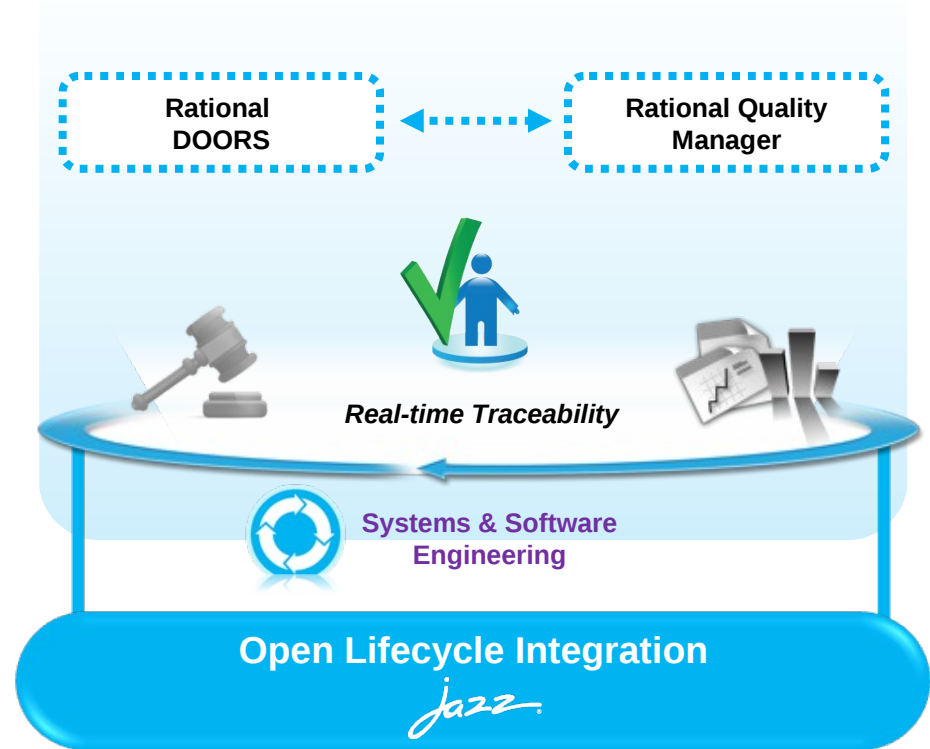


Quality and Test

IBM Rational Quality Manager v4.0



- Requirements-driven testing
 - Rational Requirements Management and Quality Management using OSLC
 - Live traceability views
 - Trace test steps to requirements
- More control over compliance and process enforcement
- Dashboards and reporting



“We have greater control to improve processes, greater test coverage and traceability, plus, vastly improved navigation and user friendliness.”

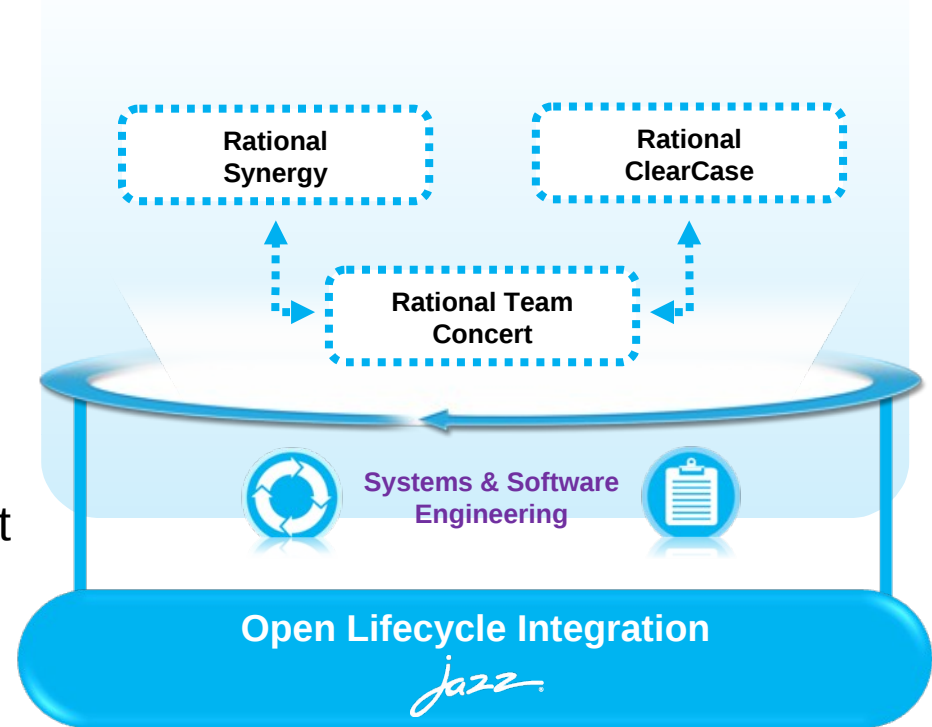
– Beta test participant

Planning, Change and Configuration Management

IBM Rational Team Concert v4.0

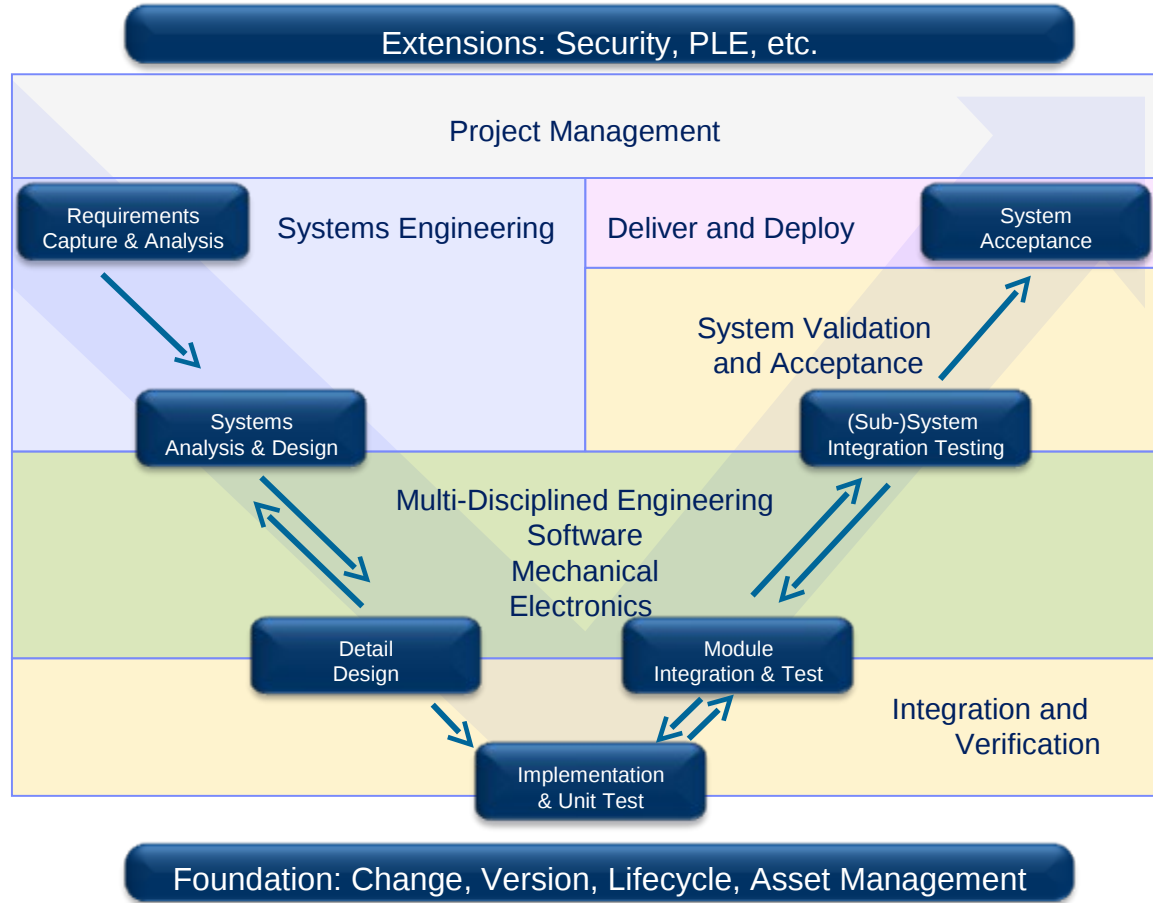


- More control over permissions and process
- Track delivery of source code changes to variants/branches of a product
- Manage cross-cutting plans and tasks across multiple projects
- Integrate Rational Synergy and Rational ClearCase for source code management with Rational Team Concert planning and change management
- Additional tool integrations via MS SCCI interface



IBM Smarter Product Development Ecosystem

Partnering for Success

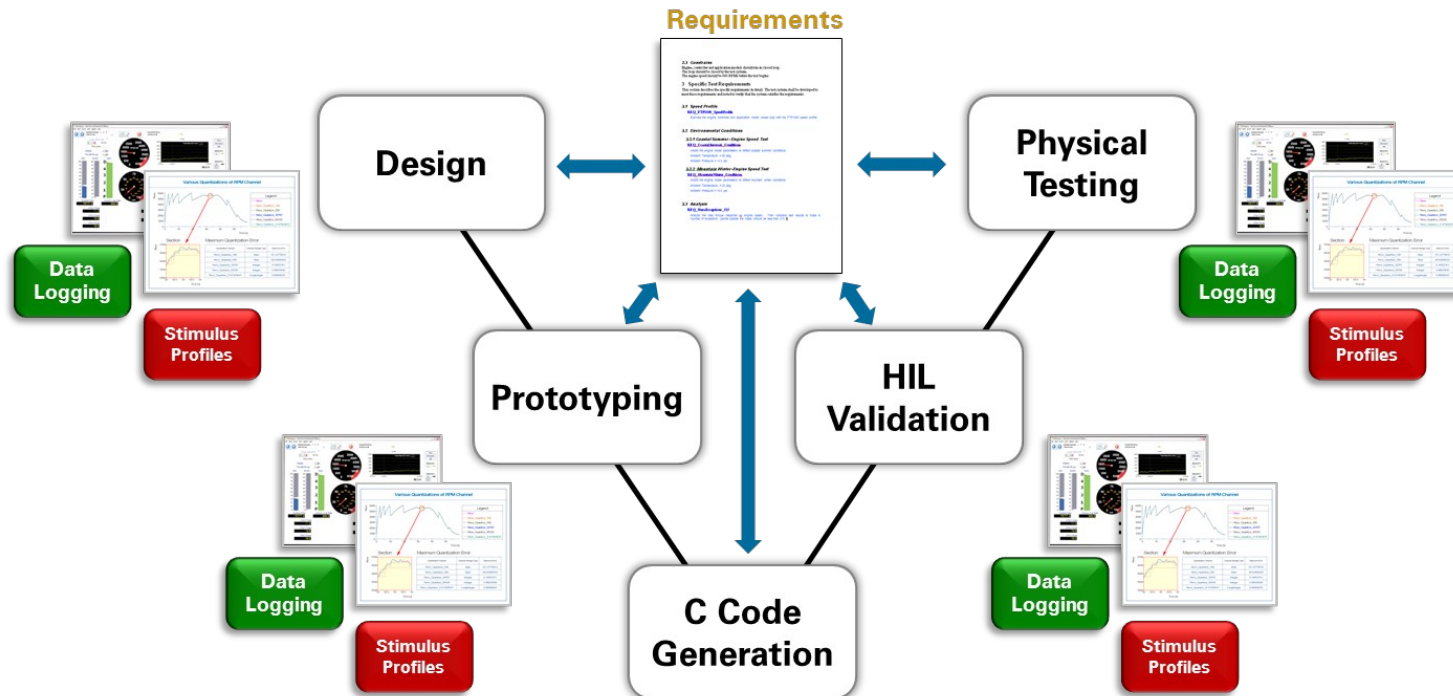


IBM and National Instruments

IBM and National Instruments collaborate to improve software **Quality** and **Test**

Breaking the Quality Management Silos with Enhanced Collaboration and Traceability

- Bi-directional traceability across the entire development lifecycle
- Collaboration across ALL teams throughout the ENTIRE process
- Test component re-use throughout the entire project and between projects



Invensys Rail Dimetronic

Speeds innovation with a unified platform for multi-stage development processes

The need:

- Modernize development processes
- Ensure systems integration with other railways while meeting railway standards

The solution:

- Incorporated system intelligence into its development process
- Deployed an application development platform to:
 - Model system reliability
 - Highlight areas requiring improvement

The benefits:

- ✓ Reduced time-to-market for signaling systems products by 40 percent
- ✓ Facilitated 100 percent compliance rate with ERTMS standards for code traceability and safety
- ✓ Reduced cost and risks of development and documentation



“Innovation and process flexibility are important in allowing us to differentiate our offerings. We’re now able to ensure that our design can be rapidly adapted, not only to customer needs, but to changing ERTMS requirements, at a reasonable cost.”

Francisco Lozano
ERTMS Program Manager



Solution components:

- IBM® Rational® Rhapsody
- IBM Rational DOORS
- IBM Rational Synergy
- IBM Rational Change
- IBM Rational Publishing Engine
- IBM Software Services



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