

IBM Rational Solutions for Systems and Software Engineering using Jazz

Reduce the Time, Cost and Risk of Developing Profitable Products and Systems

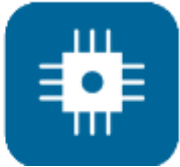
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Systems Foundation Product Manager



Organizations developing smarter products aspire to be innovative

Product innovation enables companies to leapfrog their competition, grow demand, and increase value



INSTRUMENTED

They have the ability to measure, sense and see the exact condition of everything



INTERCONNECTED

They enable people, systems and other products to communicate and interact with each other in entirely new ways



INTELLIGENT

They can respond to changes quickly and accurately, and get better results by predicting and optimizing for future events



Hint: **think software**

Smart products transcend “one-size-fits-all” products enabling customers to get exactly what they want – tailored to their unique needs



The nemesis of product innovation is complexity



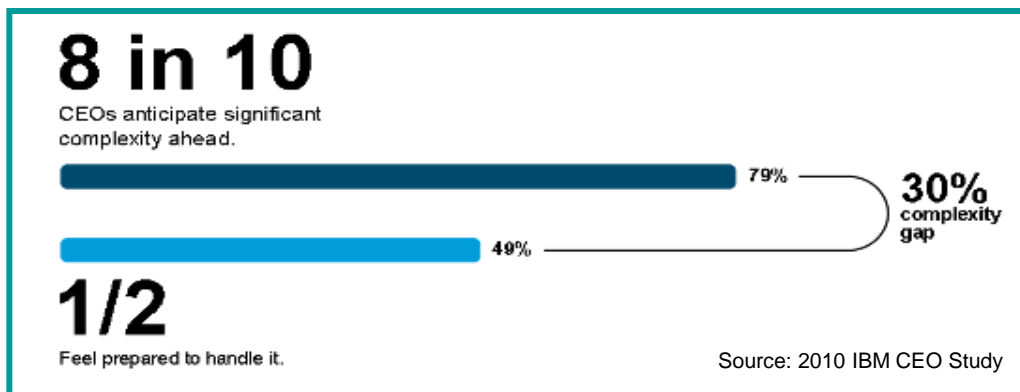
New Surgical Robotic System

- Powered by 1.4 million lines of code
- 3-6 weeks mitral valve procedure recoveries compared to 3-6 months
- Less invasive, breastbone stays intact



Trends in Automotive Engineering

- F-35 jet fighter ~10M lines of code (2x the F-22)
- Average 2010 Ford auto ~ 10M lines of code
- Average luxury auto ~ 100M lines of code

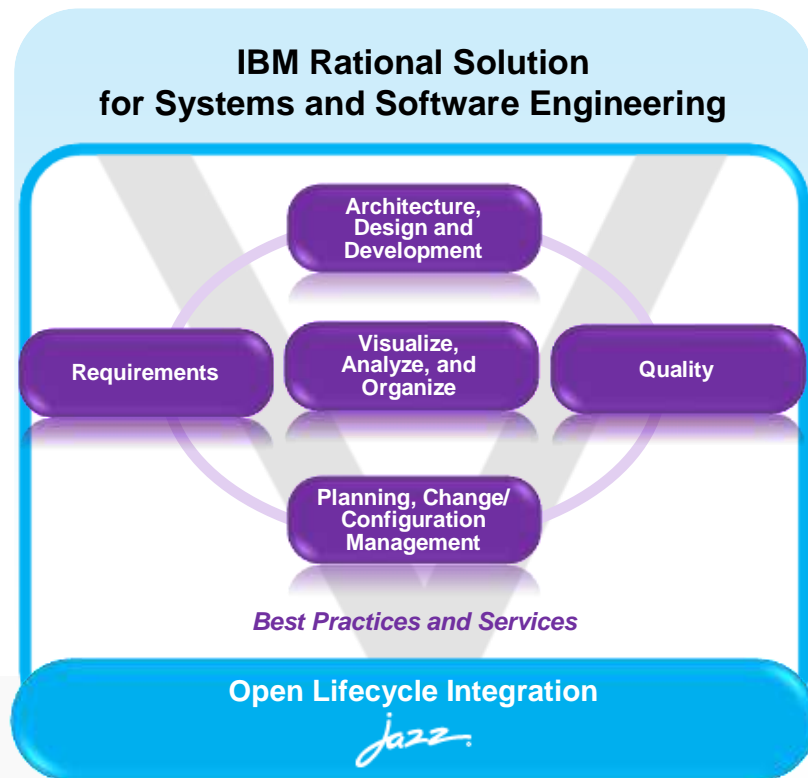


Introduction of SW brings complexity yet few are prepared to handle it

IBM Rational Solution for Systems and Software Engineering

Specify, design, implement and validate complex products and the software that powers them with an integrated systems lifecycle management solution

- Manage requirements across lifecycle and disciplines
- Translate requirements into a system design
- Build in quality from concept to launch
- Collaborate and communicate throughout development
- Recapture intellectual property
- Control the system with optimized software
- Visualize, analyze and organize cross-domain engineering data



THE FOUNDATION

- IBM Rational Solution for Systems and Software Engineering
 - IBM Rational Engineering Lifecycle Manager
 - IBM Rational DOORS
 - IBM Rational Quality Manager
 - IBM Rational Team Concert
 - IBM Rational Rhapsody with Design Manager

“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

IACIT

*Excellence with a unified platform
for multi-stage development processes*

The need:

- Ground Based Argumentation System(GABS)
- Improve Accuracy, Integrity, Continuity and availability of Information to Navigation Satellites.
- Support critical operation of flight, approach, landing, takeoff, surface taxiing & manage 10k regulatory requirements.

The solution:

- A satellite and ground navigation system giving pilots, automated aircraft systems and traffic controllers accurate information to make flight decisions in any weather conditions.
- Developers can better meet regulatory requirements through a development environment that integrates modeling earlier in development to improve quality and safety



Solution components:

- IBM® Rational® Rhapsody
 - IBM Rational DOORS
- IBM Rational Quality Manager
- IBM Rational Team Concert

The benefits:

- ✓ Reduced time-to-market by 40 percent
- ✓ Increased the reuse of development assets by 50 percent
- ✓ Faster, accurate, effective collaboration & Communication amongst development teams
- ✓ Reduced cost and risks of development and documentation

Smart products need to be safe

- As products become smarter, and more embedded in our daily lives, safety becomes more important
- IBM Rational industry solutions help produce safety-critical systems and software
- Aerospace and Defense
 - DO-178C best practices, templates and tooling
 - Extended support for Defense Architecture Frameworks
- Automotive
 - AUTOSAR and ISO-26262 best practices, templates and tooling
- Medical Devices
 - FDA 21 CFR Part 11 and IEC 62304 best practices, templates and tooling



Extending the solution for safety critical development in aerospace

As unmanned vehicles expand into commercial areas (e.g., oil exploration, border patrol, etc.), will safety and compliance regulations significantly raise costs?

- Unmanned vehicles are becoming ubiquitous
 - Model-based systems engineering helps optimize architectures to reduce cost

Key Value Points

- Best practices to support DO-178B/C standard and additional DO-178C supplement documents.
- Out of the box tool templates for DOORS to ensure requirements are properly managed and traced
- Rational Team Concert process and work item templates for DO-178C to allow designers, QA groups to properly manage the project



- Out of the box DO-178B/C checklists to ensure engineers are doing the right work necessary for audit

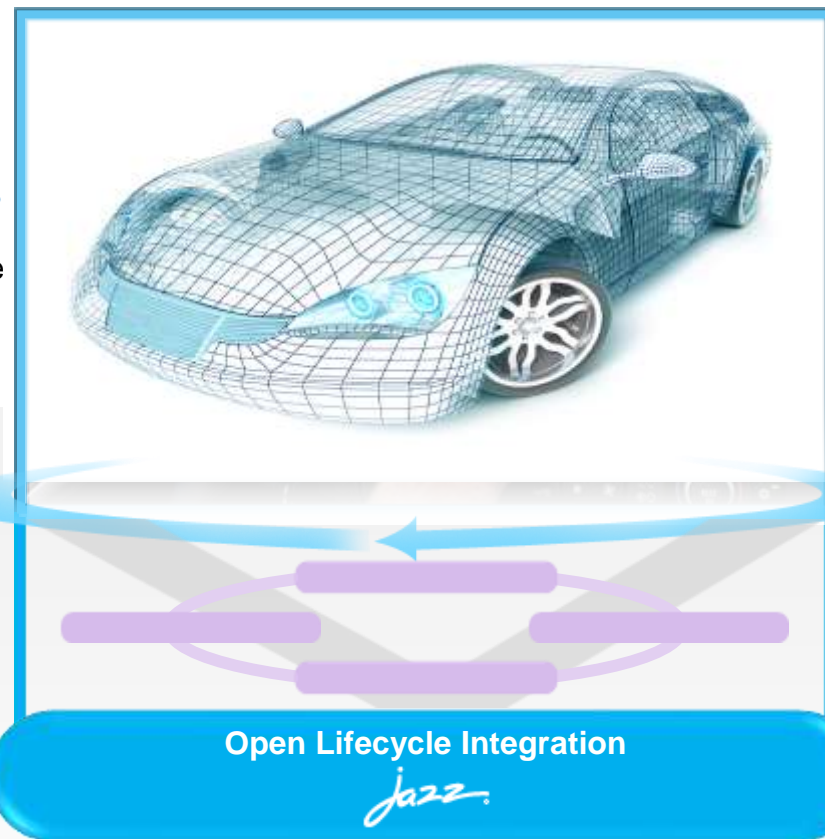
Extending the solution for functional safety in automotive engineering

As manufacturers move forward with semi-autonomous passenger cars, how can we make sure these systems work safely every time we use our cars?

- IBM Rational solution for Automotive Engineering helps lower the cost of compliance by helping projects work efficiently when using standards such as ISO-26262

Key Value Points

- Best practices to support the current released version of ISO-26262
- ISO-26262 practice content covering testing/validation and real-time dynamic analysis support with IBM Business Partner INCHRON
- Rational Team Concert process and work item templates for ISO-26262 to allow designers, QA groups to properly manage the project
- Out of the box tool templates and views to ease customer adoption of ISO-26262
- Process customization guide to help end users adopt our industry practices within their environment.



- Qualification Kits for ISO-26262 and IEC 61508 including “TUV fit for purpose certificate” to meet ISO-26262 tool qualification criteria
- Comparable support for AUTOSAR architectural standards

Extending the solution for medical device development

Will a robot ever perform surgery autonomously?

- Advanced medical robots
 - Very complex products
 - Strictly regulated
 - Fiercely competitive market
 - Need to reduce time to market and cost

Key Value Points

- Process compliance support
 - FDA 21 CFR Part 11
 - Specific process support (e.g. IEC 62304)
- Product compliance guidance for development traceability
- Tool-related assets for clients to provide evidence of regulatory compliance
- Agile adoption support for incremental migration to agile work practices



“Improved collaboration accelerates our development time.” - Diagnostic Grifols

This project represents a major achievement for us. It offers unique innovations that further improve patient safety, physician workload and cost effectiveness of patient care.” - Product manager at a medical device manufacturer

Accelerator Success Story

Jaguar Land Rover



Background

- JLR acquired by Tata Motors, leading to growing market share in executive car sector
- Several new vehicle programs planned over the next 2-3 years
 - expand the product line
 - replace existing vehicles
 - implement new technology to meet/exceed tough new environmental legislation
- Creating an increasing number of engineering requirements
 - mechanical
 - electrical
 - electronic engineering



Existing Rational products

- Small DOORS user (Research, Hybrid, Chassis Electronics)
 - Grew usage across teams and into new areas of the business (200+ users)

JLR Goals and requirements

- Replace propriety development tools with standard, supported solution
- Improve robustness “concept throughout delivery”
- Increase business efficiency & save warranty costs

Results

- Recognized business benefits :
 - Engineering efficiency savings
 - Reduction in development and warranty costs
 - Single information source across the engineering domain
 - Improved communication across the business and the supply chain

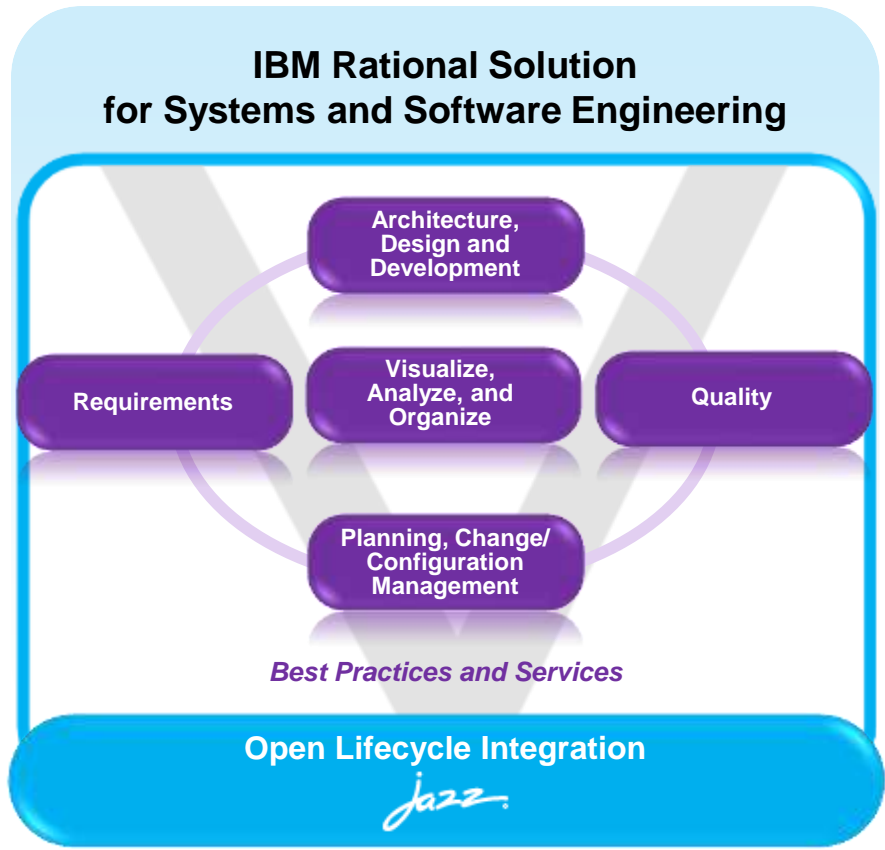
Summary

Lead innovation

Manage complexity

Systems Engineering

Embedded Software Engineering



Specify, design, implement and validate complex products and the software that powers them with an integrated set of tools, practices, and services.

Our solution is based on proven products and practices that we can tailor for their specific needs, as well as to help implement them through an industry-recognized services organization.

QUESTIONS

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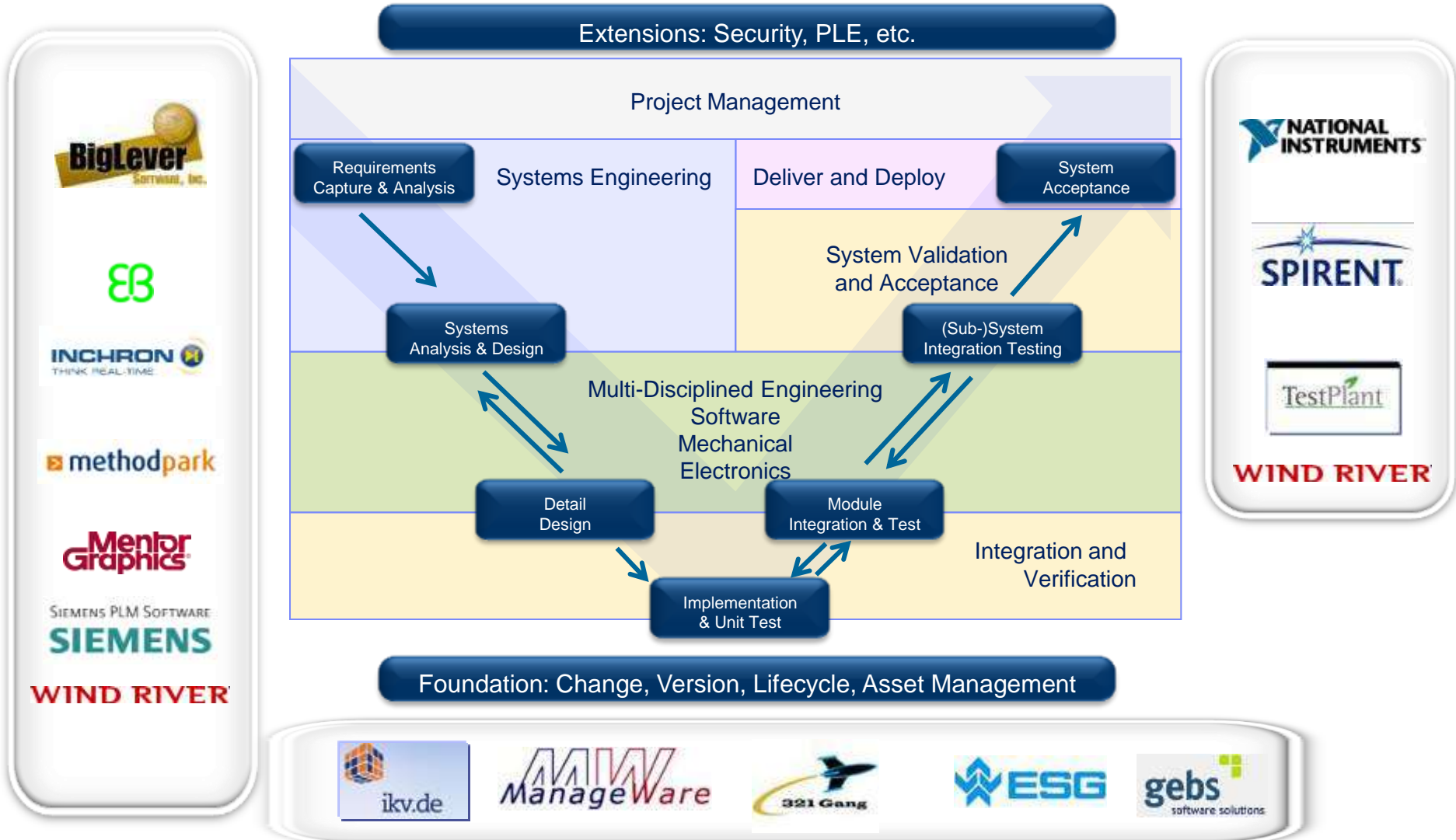
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- BACKUP

Leverage the expanding ecosystem across the lifecycle

Partnering for Success



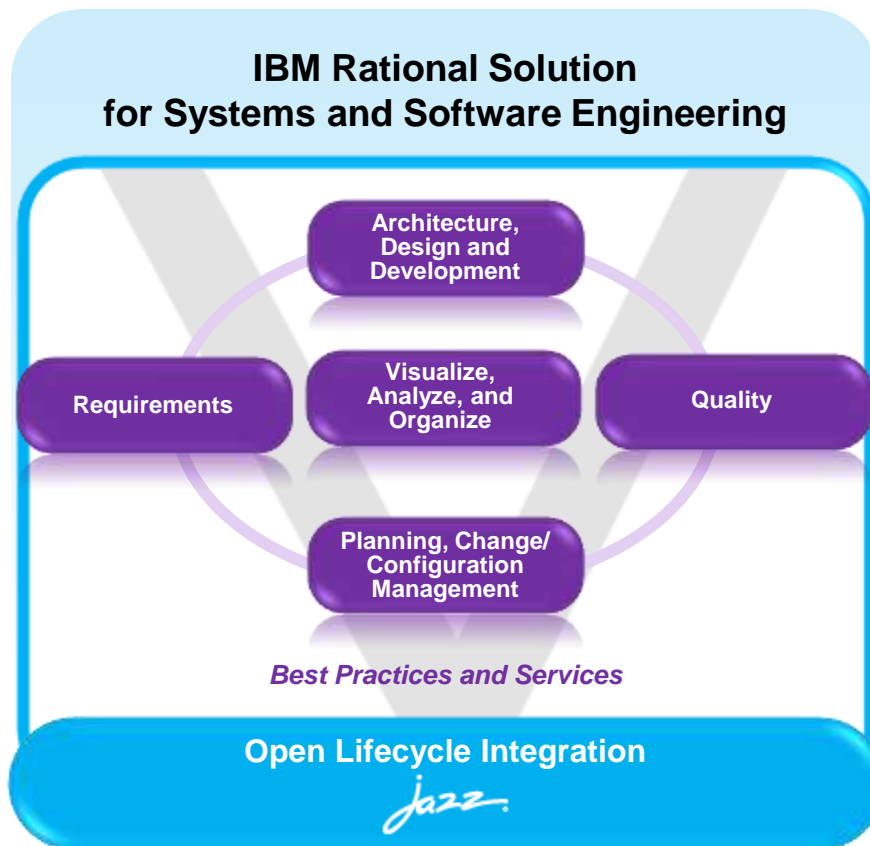
Turn product development into your competitive advantage

*Lead
innovation*

*Manage
complexity*

Systems Engineering

**Embedded Software
Engineering**

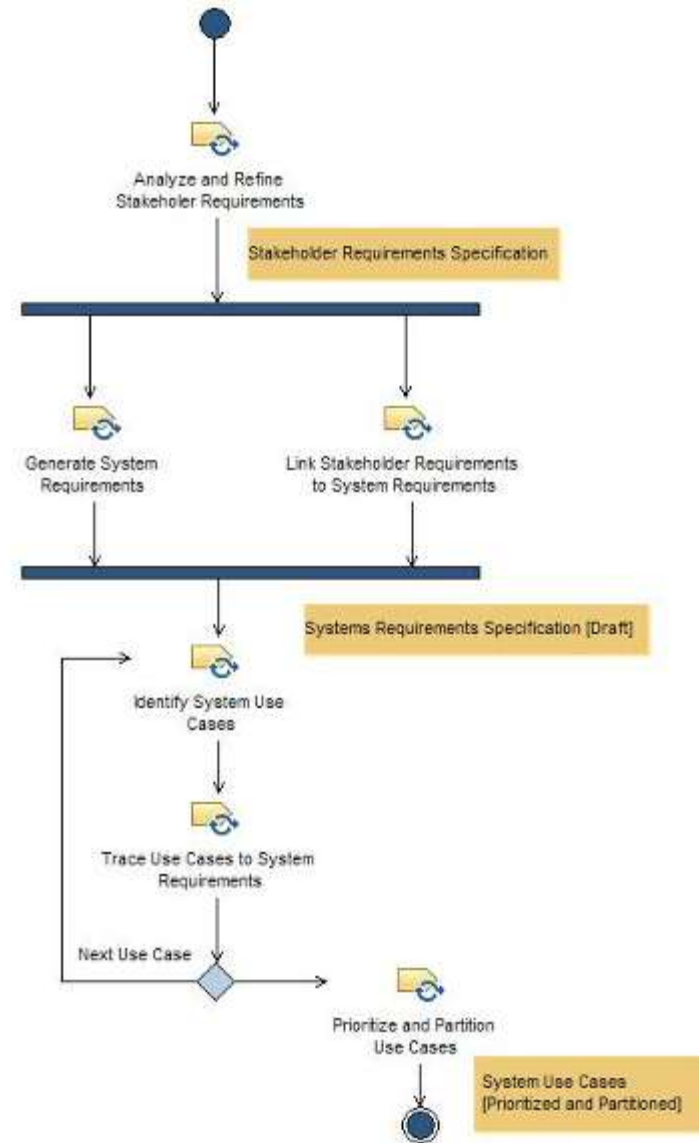


Specify, design, implement and validate complex products and the software that powers them with an integrated set of tools, practices, and services.

Process Management and Enactment

The engine of lifecycle management

- **Improve quality and predictability** by leveraging proven practices and patterns of success
- Quickly and easily **compose** right-sized project/team processes and **deploy process, methods and tools to project**
- Surface process guidance in-context directly within practitioner tools to **speed on-boarding, process adoption and return on investment in Rational tools**
- **Simplify compliance** with pre-defined methods and mappings to industry standards and regulations
- **Unify process management and enactment** with integrated process, methods and tools
- **Increase productivity** and turn “know-how” into competitive advantage



Introducing Rational Engineering Lifecycle Manager

New cross-lifecycle capabilities for Systems and Software Engineering

How?

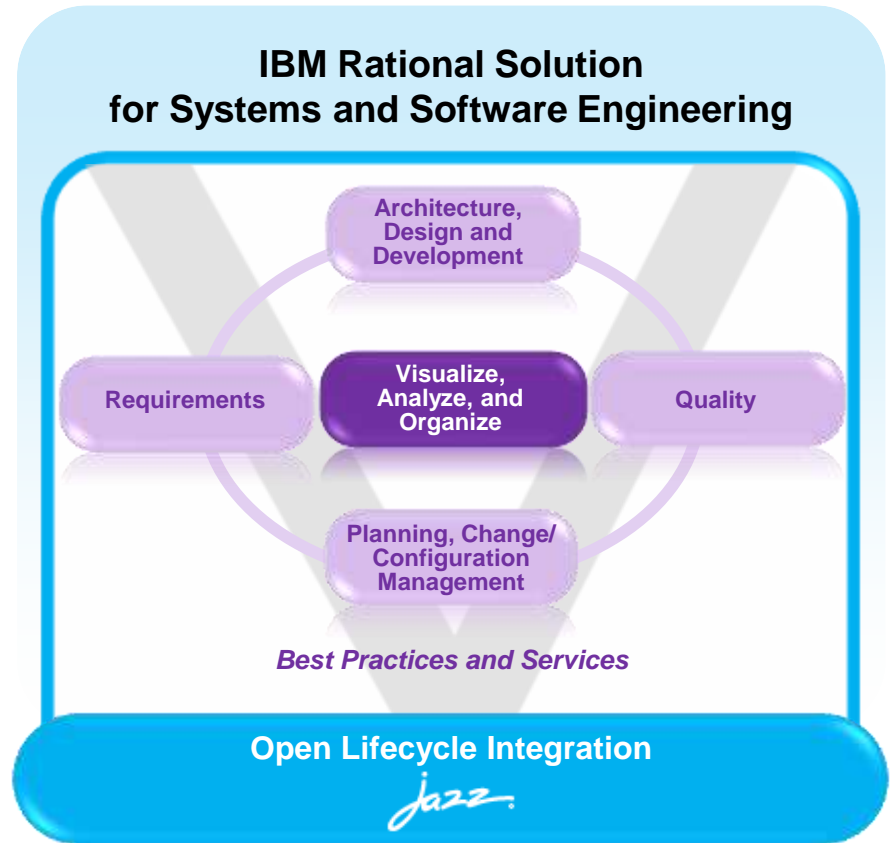
New capabilities that deliver views of your cross-lifecycle engineering data – enabling your multi-disciplinary engineering teams to be more productive and make better decisions.

What's new?

IBM Rational Engineering Lifecycle Manager

Visualize, analyze and organize engineering artifacts 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 Engineering Lifecycle Manager is the first tool of its kind. RELM fills a large gap to help manage complexity in fast-paced, multi-team, multi-disciplined complex systems development."

- 321 Gang, IBM Premier Business Partner