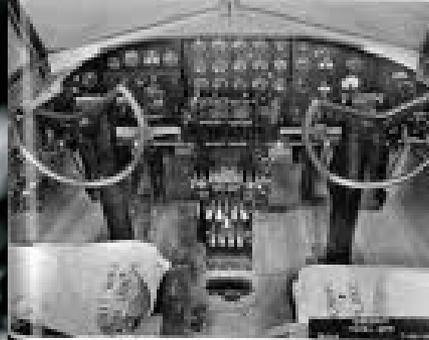


“Too Much Plane”



- Boeing Model 299 (ultimately the B-17)
- US Army Air Corps new bomber competition
- October 30, 1935; Dayton, Ohio
- Elevator lock was not properly released
- NY Times reported “*too much plane for one man to fly*”
- Solution: Creation of a *Pilot Checklist*



Today: Software is the invisible thread of Innovation

Drivers of our business

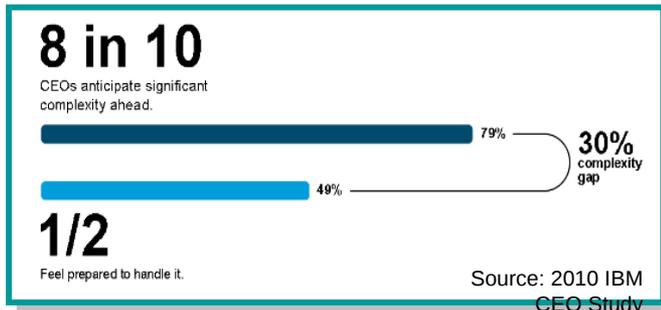


Innovation is increasingly becoming a driver of business goals

- Attract new customers
- Improve customer service
- Create new revenue streams



Software is increasingly driving value in manufactured products
Average 2010 automobile contains more lines of SW code than a fighter jet



Introduction of SW brings complexity yet few are prepared to handle it
Manufacturers are now faced with developing a core competency in Software and Systems Engineering



Realities can stall software-driven innovation

Complexities in software delivery are compounded by market pressures

Complex, Multi-platform Systems and Applications

62% of companies have agile projects requiring integration with legacy systems

Increasing Regulatory Compliance Pressure

Driven by Safety and Compliance

Globally Distributed Software and Product Supply Chains

50% of outsourced projects are expected to under perform

Cost Reduction

70% budget locked in maintenance and **37%** of projects go over budget

Unpredictability in Software Delivery

62% of projects fail to meet intended schedule

Changing Requirements and Time to Market

30% of project costs are due to rework and poor execution of requirements



What we are hearing from our customers...

“We want an Integrated engineering toolset”

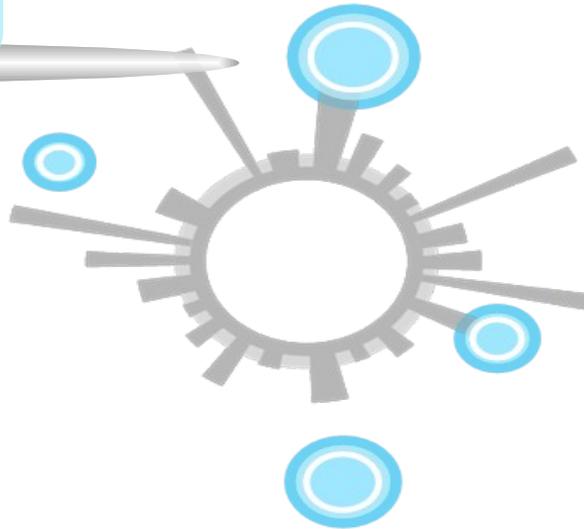
“We want to: ‘design anywhere, build anywhere’ with standardized scalable tools/process”

“We want to improve collaboration across engineering disciplines, teams and sometimes programs”

“We want to increase system and software level reuse”

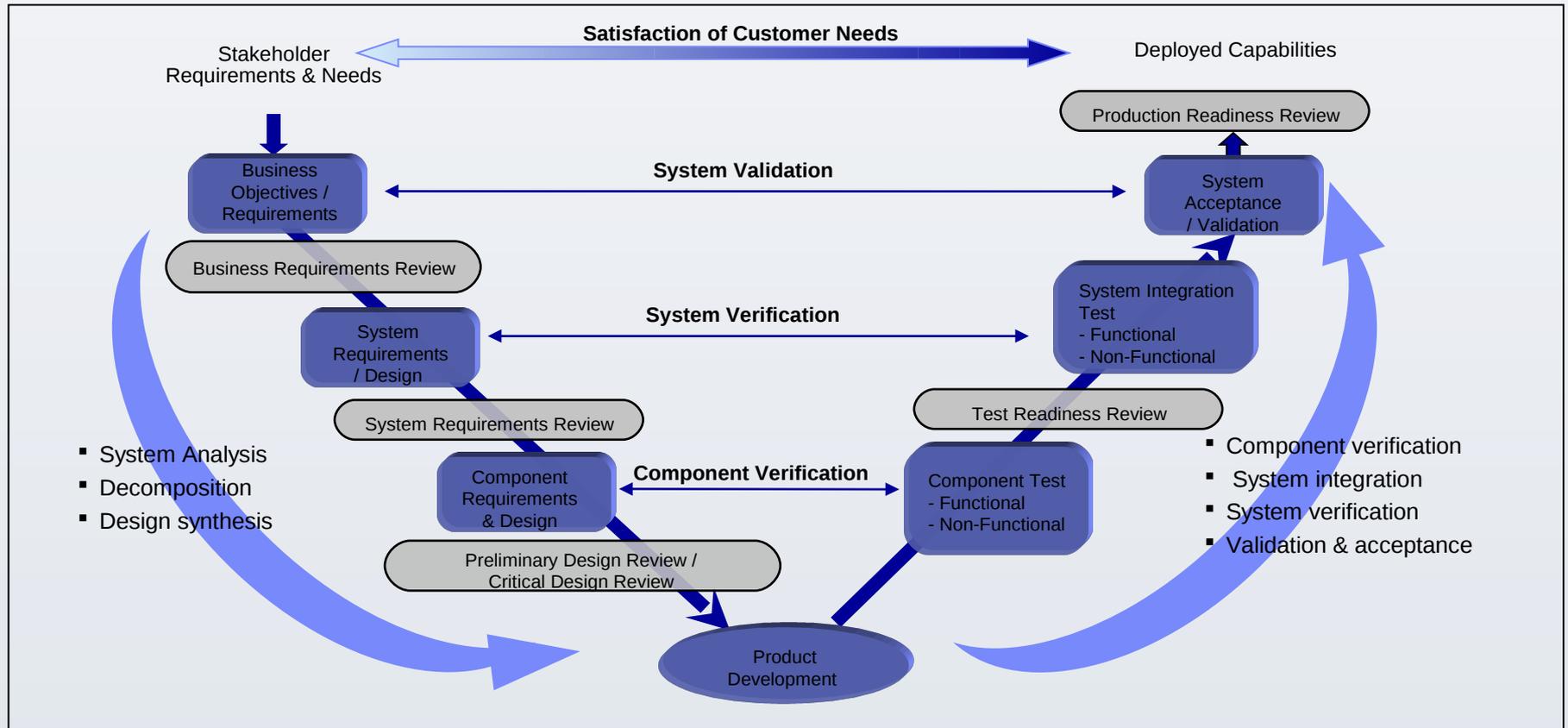
“We want to automate and optimize testing from unit-level to subsystem to acceptance”

“We want to manage engineering tooling more effectively”



Systems Engineering to the rescue

“Systems engineering integrates all the disciplines and specialty groups into a team effort forming a structured development process that proceeds from concept to production to operation. Systems engineering considers both the business and the technical needs of all customers with the goal of providing a quality product that meets the user needs.” INCOSE



Built on a core product set

Measurement, Reporting and Analytics

Rational Publishing Engine, Rational Insight

REQUIREMENTS MANAGEMENT

Manage all system requirements with full traceability across the lifecycle

Rational DOORS

QUALITY MANAGEMENT

Achieve “quality by design” with an integrated, automated testing process

Rational Quality Manager

ARCHITECTURE & DESIGN

Use modeling to validate requirements, architecture and design throughout the development process

Rational Rhapsody & System Architect

COLLABORATION, PLANNING & CHANGE MANAGEMENT

Collaborate across diverse engineering disciplines and development teams

Rational Team Concert

Product Line Engineering

Big Lever

Best Practices, Process Standards & Quality

Rational Method Composer

Integrate

Collaborate

Optimize

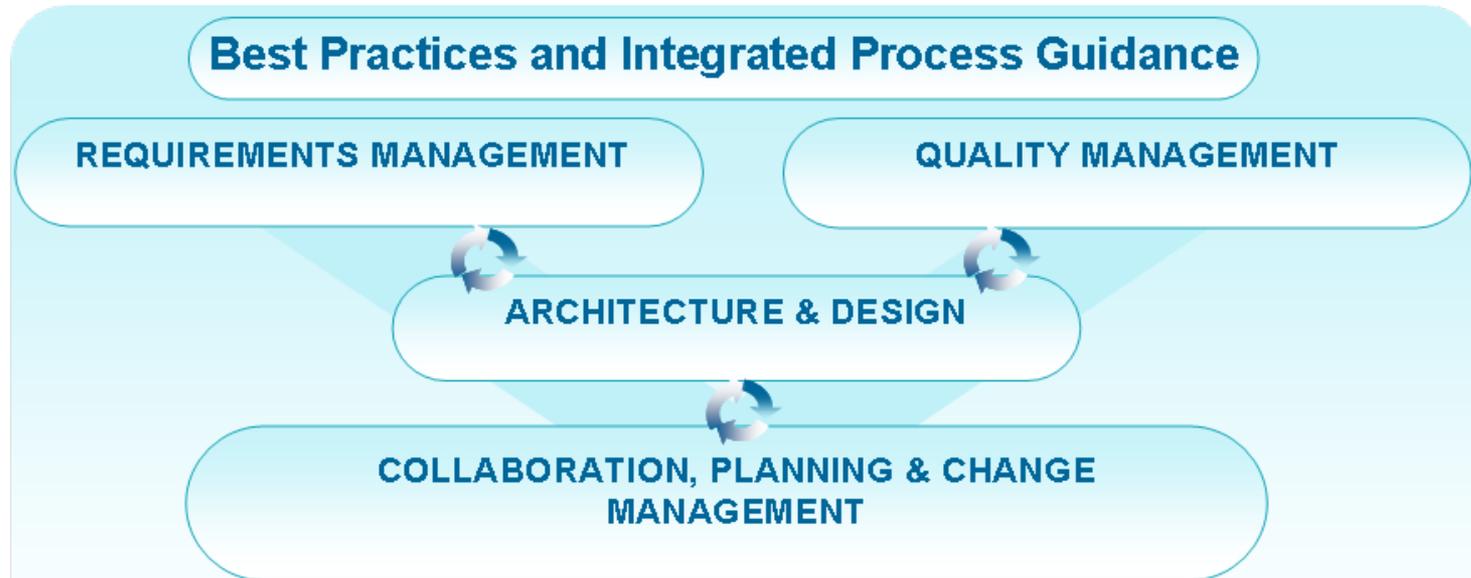
Open Services for Lifecycle Collaboration

Best-of-breed capabilities, integrated on a common platform



Rational Solution for Systems & Software Engineering

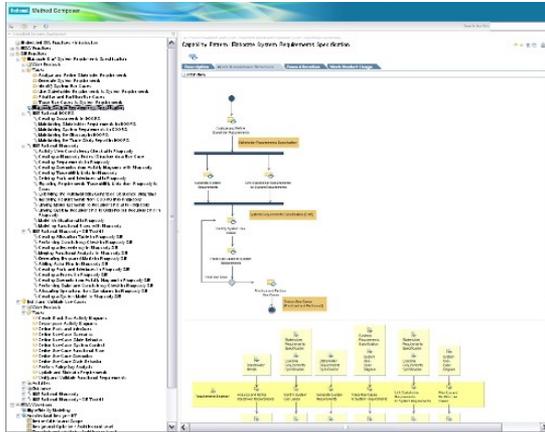
Best Practices, Tools and Services on an open platform



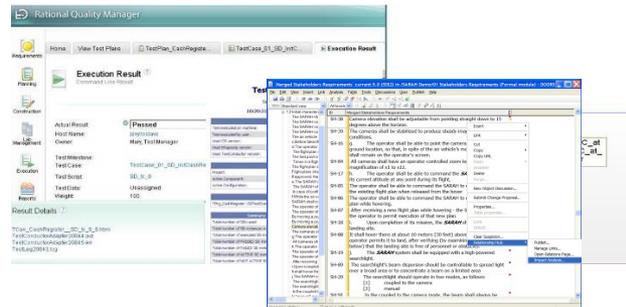
 *Open Services for Lifecycle Collaboration*



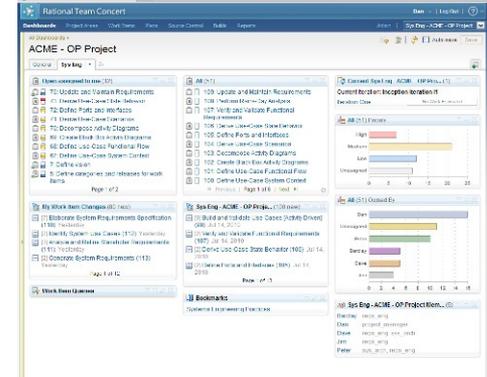
Practice library



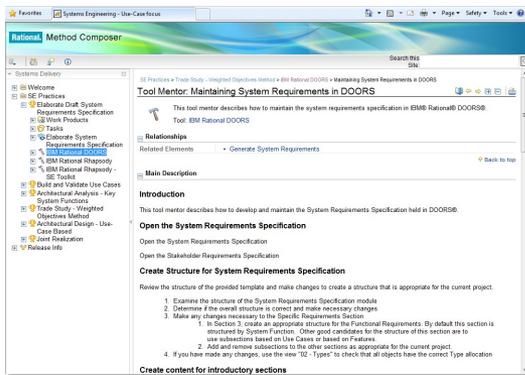
Starting templates



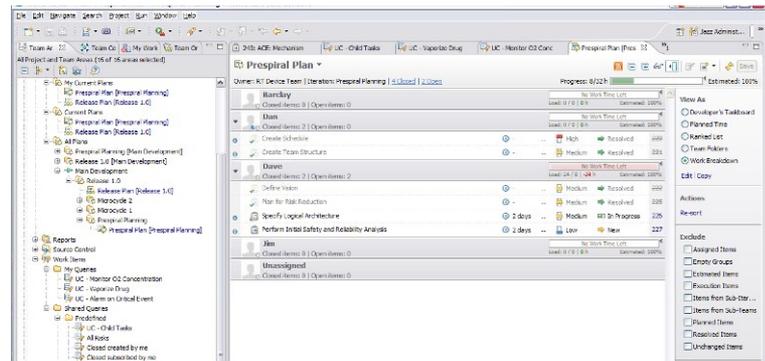
Dashboards



Tool mentors



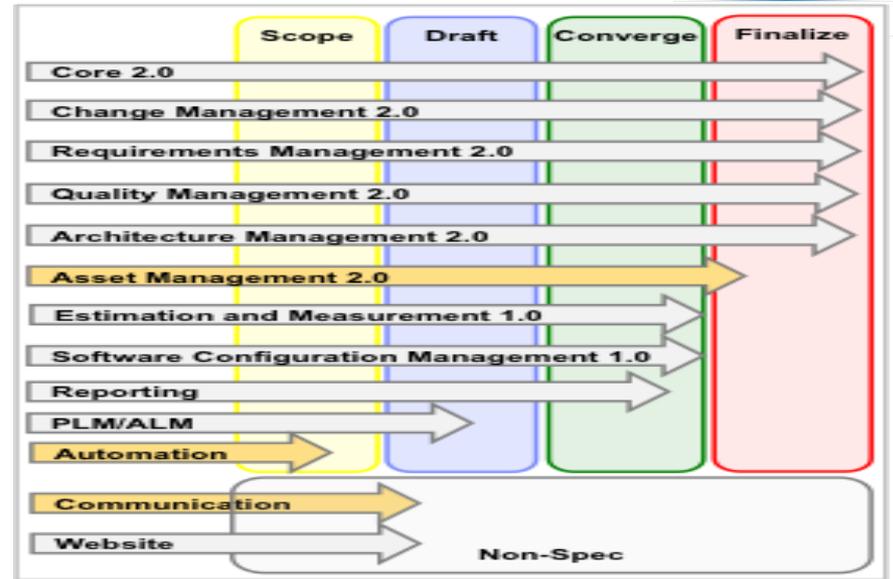
Auto generation of practice work items



Open Services for Lifecycle Collaboration Community



- New specifications and associations
 - For Change, Quality, Requirements, Architecture Management & Asset Management
 - Aligning with W3C linked data
 - SPRINT and CESAR Research projects
- New implementations
 - IBM Collaborative Lifecycle Management and Collaborative Design Management solutions
 - Several commercial and open source projects¹
- New expansion into ALM-ISM integrations
 - Starting with integrations between help desk and lifecycle change management
 - Rational integrations with Tivoli Service Request Manager and Rational Team Concert
- Eclipse Lyo
 - OSLC SDK Project to create reference implementations, test suites, and code libraries and samples
- New Website Design (<http://open-services.net>)
 - To showcase OSLC contribution and engage non-technical participation



- | | |
|-------------------|-------------------|
| Accenture | QSM |
| APG | Rally Software |
| BigLever | Ravenflow |
| Black Duck | Shell |
| Boeing | Siemens |
| BSD Group | General Motors |
| CESAR | IBM |
| Citigroup | Institut TELECOM |
| EADS | Integrate Systems |
| Emphasys | Northrup Grumman |
| Galorath | Oracle |
| General Motors | QSM |
| IBM | Rally Software |
| Institut TELECOM | Ravenflow |
| Integrate Systems | Shell |
| Northrup Grumman | Siemens |
| Oracle | |

Accelerating Development for A&D and Automotive

Supporting industry-specific methodology

- Extends base Solution with industry-specific A&D and Automotive content
- Accelerates process and practice guidance

▪ A&D

- Support for defense architecture frameworks (e.g., DoDAF, MoDAF)
- Support for **DO-178B** standard: the international and de facto standard for certifying all aviation safety-critical software.



▪ Automotive

- Support for AUTOSAR, an industry standard for ECU development
- Support for **ISO 26262**, an upcoming new automotive functional safety standard for in-vehicle electric and electronic (E/E) systems



Accelerating Development for Electronics

Supporting industry-specific methodology

- **Extends the Solution with support for HW/SW Co-design.**
 - Provides process, practice guidance and tooling that support developing hardware and software better in synch
 - Lifecycle approach with multiple entry points
 - Integrations with key EDA companies like Cadence and MentorGraphics



Collaborative Design Management

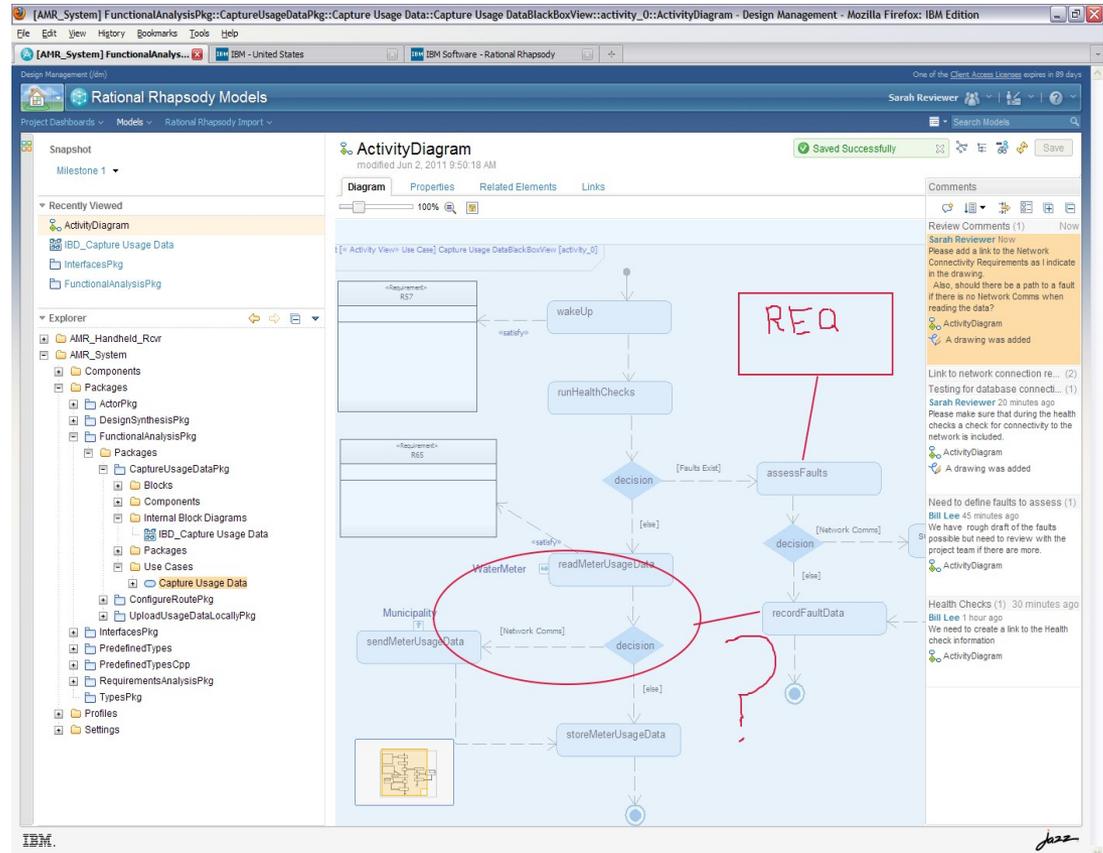
Enhance cross-team collaboration in systems & software design

Central Design Hub

- Enterprise-wide search, review, analyze, and reuse
- Links elements to artifacts
- Navigate and visualize relationships

Stakeholder Collaboration

- Mark-up diagrams
- Discussion thread
- Web client



“The ability to review and comment on models from the Web client encourages feedback from a wide array of stakeholders... leading to faster consensus and improved quality of solution designs.”

– Lars Tufvesson, Sellegi

Invensys Rail Dimetronic

Dimetronic leverages Rational solution to improve rail safety



What's smart?

- Train monitoring and communications

Control the movements of trains capable of travelling 350 km/hr

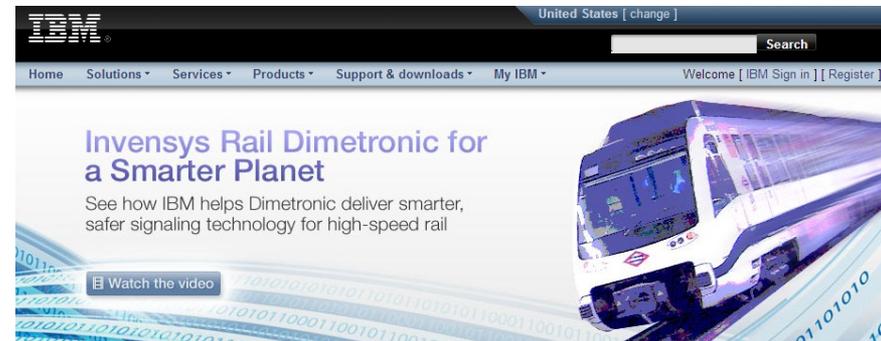
Smarter business outcomes

- Reduced time to market of safety-critical railway signaling applications by 40%

While meeting stringent safety regulations

How IBM helps Dimetronic develop smarter products

- Translate complex requirements into a functional system design
- Automatically generate code that must meet stringent safety regulations
- Speed developers' response to frequent changes and new requirements
- Provide customers and regulators with comprehensive documentation and reports



[Watch the video](#)

IBM & EADS

- Reduce time to market
- Improve quality
- Reduce cost of development, integration and test
- Improve the confidence of the customer
- Improve collaboration across engineering disciplines and with suppliers

MBDA
MISSILE SYSTEMS

 **AIRBUS**
AN EADS COMPANY

 **ASTRIUM**
AN EADS COMPANY

 **CASSIDIAN**
AN EADS COMPANY

 **eurocopter**
an EADS Company

EADS

"DOORS' biggest win relates to its support of traceability in tracking customer needs through fulfilment and across the full development lifecycle"

Sharon Crossby - Lead Requirements Manager, EADS Astrium



AIRBUS A380



EUROCOPTER EC135



A400M



EUROFIGHTER



METEOR



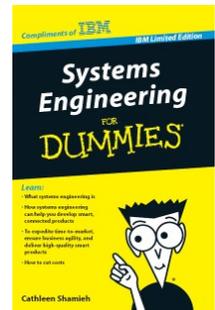
GALILEO



ARIANE 5

Resources for more information

- **Rational Solution for Systems and Software Engineering**
 - [Systems Engineering for Dummies ebook](#)
 - [Aberdeen Self Assessment on System Engineering](#)
 - [Taming the Complexity of Smarter Products with Systems Engineering](#)
 - [Demo video: 8 min](#)
 - [Executive Brief: Turning product development into competitive advantage](#)
- **Automating Process Guidance**
 - [Accelerating Collaboration Across the Systems Development Lifecycle](#)
- **Industry Resources**
 - [Webcast: Success with Model-Driven Development for DO-178B Projects](#)
 - [Webcast: Creating & Managing Requirements for Hardware and Software Design](#)
 - [Video: The Chevrolet Volt: IBM Rational Software Helps GM Deliver Smarter Products](#)



Web pages

- [IBM Rational solution for systems and software engineering](#)
- [IBM Rational systems engineering and software solutions for aerospace and defense](#)
- [Jazz.net Community site: Systems Engineering and Embedded Software Development](#)

Symposium: Seize the Day

- Take advantage of all the sessions
- Meet your peers, develop new relationships
- Ask us questions

Make This Your Day – Interact – Ask - Provide Feedback



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