

**Controlling
complexity.**

The Importance of Requirements Management



Why Requirements Management?

Cope with complexity

More agility

Better project governance

Better project efficiency

Control project scope

Deliver what the customer needs

More stakeholder engagement

Get to market faster

Better requirements validation

Manage change

Prove contractual completeness

Manage subcontractor value chain

Lower risk of project failure

Meet compliance mandates

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Smarter products & systems are changing our planet



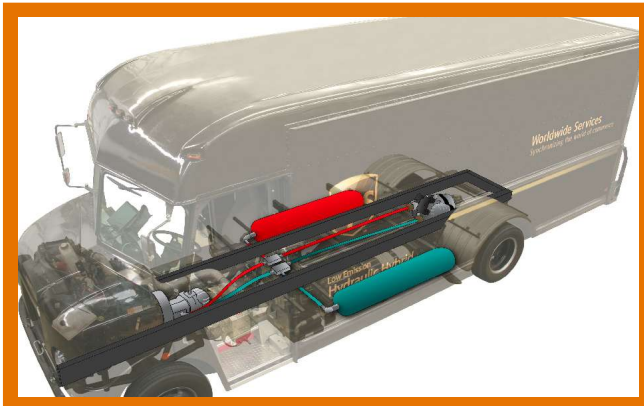
Smarter automobiles



Smarter health care



Smarter devices



Smarter hybrid vehicles



Smarter energy



Smarter defense systems



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Software Is Driving Much of the Value as System Complexity Grows

Automotive



- 90% of innovation is based on electric/electronic systems
- 80% of this innovation is based on embedded software

Aerospace & Defense



- F-22 Raptor, released in 2003, contains 1.7 million lines of code
- F-35 Lightning II, scheduled for 2010, will have 5.7 million lines of code

“Embedded software has evolved from a hidden component driving functionality to the keystone of product differentiation and end-user experience.”

VDC Research, October, 2008

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Poor Requirements Management has a Significant Impact on your Business

Requirements Rework

- Errors, late detected in the Maintenance phase can cost up to **200 times** more than detected early in Requirement Analysis phase¹
- **More than 40%** of development budget can be consumed by poor requirements²

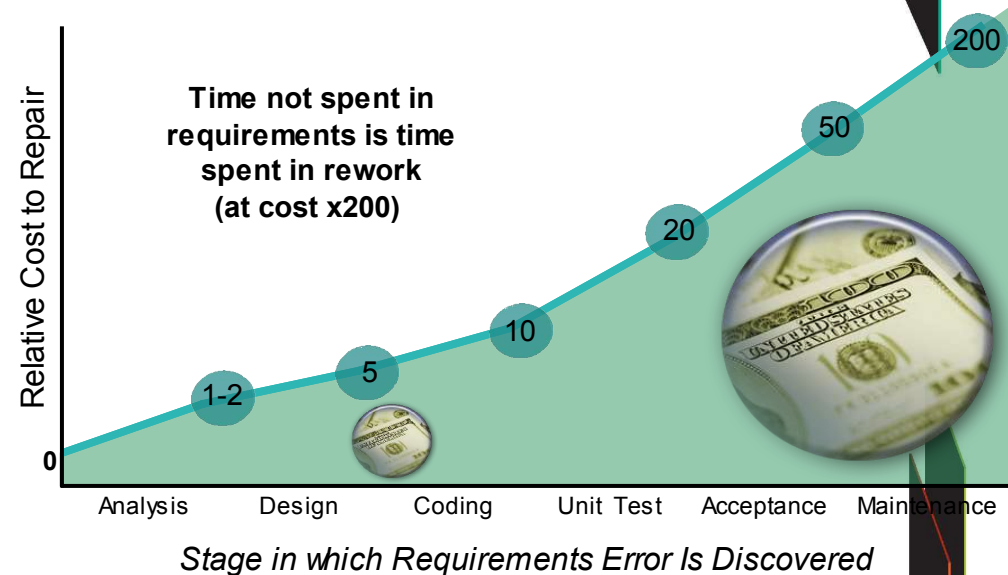
Project Impacts

- **41%** of projects fail to deliver the expected business value and ROI³
- **49%** of projects overrun original estimates³
- **28%** of projects on time and on budget⁴

Project Delays

- Being late to market by 6 months or more will cost organizations 33% of the 5-year ROI⁵

Requirements issues drive excessive rework, delays, poor quality, and project failures



“Our research indicates 80-plus percent of development failures result directly from poor requirements gathering, management, and analysis.”

IDC, November 2007

Sources: 1) Leffingwell & Widrig, “Managing Software Requirements,” Addison Wesley, 1999 2) IAG Consulting, 2008 3) Dynamic Market Limited, 2007 4) Standish Group, 2001 5) Don Reinertsen, McKinsey, 1983

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Process and Collaboration Challenges

To Deliver Higher Quality Systems & Software, Defined By Accurate Requirements and Project Information

CTO/Programme Director



We struggle with delivering complex projects on time, to cost and with the quality that the customer asked for

"It's impossible to roll up multiple-project information to know we are on track or not"

Requirements Manager



The customer often gives us bad requirements –it's a nightmare tracing how they are implemented by internal and external suppliers

"I need to implement a process that supports collaboration with customers, project team and suppliers"

Project Engineer



Many of my colleagues are working on their own specifications, so I am never sure where the latest requirements are or what status they are at"

"I need access to a live central repository and to know that I am looking at the latest approved requirements"

QA Manager



Audit is a nightmare as the project teams and suppliers do things differently

"Everyone need to be following the same process and creating the same metrics and reports"

Developer



Requirements change but why doesn't anyone tell me?

"I need a process that ensures traceability between my requirements and changes. I need to know the status of those changes"

Project Manager



We do ok on our small projects, but on our really large ones my teams as well as the suppliers struggle to get all the pieces to fit together...

"I need to implement a process that enforces traceability between all my project information and supply chain"

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Collaboration

Complexity

Requirements Management is recognized as a Best Practice for project management. It is mandatory for CMMI level 2 and above, and for Certification in Aeronautics (DO-178B, DO-254), Railway Transportation (EN-5012x), Automotive (ISO26262, IEC 61508), Medical Systems (FDA 21 CFR) ,...

Competition

Compliance

Rational. software



IBM supports a systematic requirements process to help you deliver products that are successful and profitable

Requirements Definition + Requirements Management

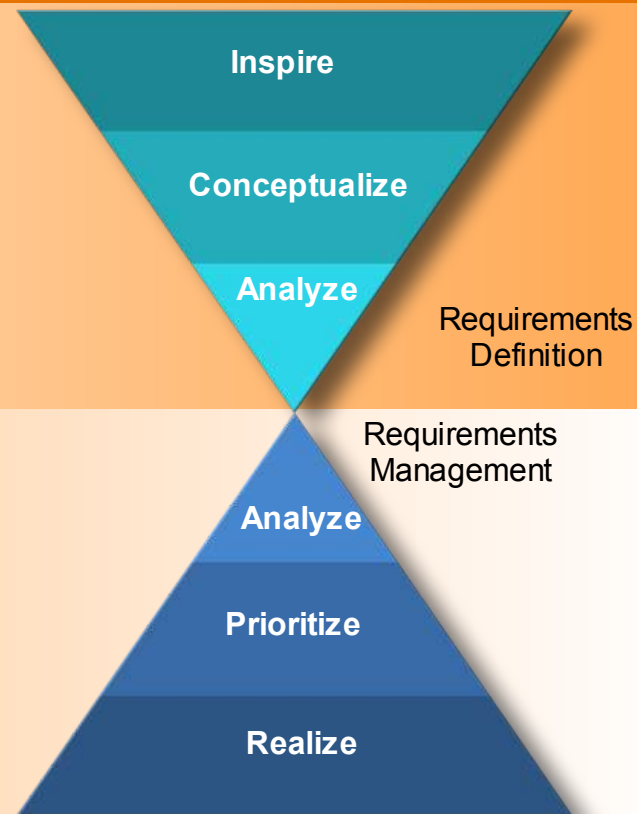
Are we solving the *right* problem?

Elicit, capture, elaborate, review and discuss requirements using a variety of techniques and notations.

Enabling Business and Technology Experts to Collaborate on Requirements

Are we solving the problem *right*?

Put requirements into structures and relations using attributes, linkages and traces. Manage change using impact and coverage analysis.

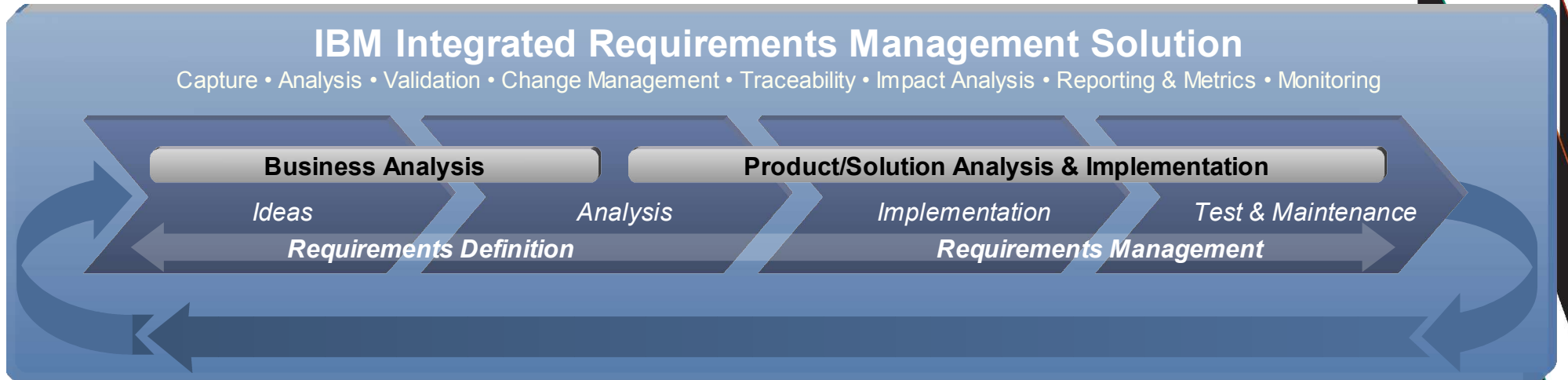


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A “requirements view” across the lifecycle

For Programs, Projects, Products, Systems and Systems-of-Systems



- Traceability - manage compliance every level)
 - Improve ability and efficiency in managing change
 - Reduce defects and cost of recall / in-service modifications
 - Quality improvements – higher user satisfaction
 - Cope with higher complexity
- (at
- Common repository – use the latest versions and know where they are
 - Use of attributes provide for reporting
 - Supply chain
 - better visibility of solution and compliance to customer requirements
 - easier validation of deliverable(s)
 - Reduce the need for re-training when staff move projects

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Rational DOORS is part of the IBM Rational Requirements Definition and Management Solution

Elicit

- Engage stakeholders early and often to identify the need

Specify

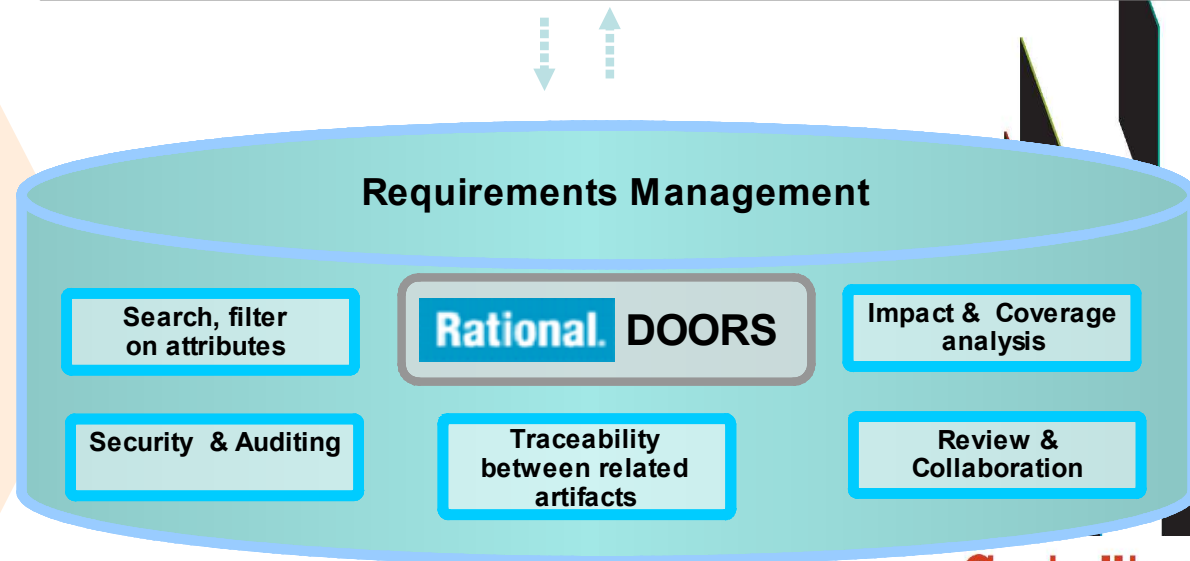
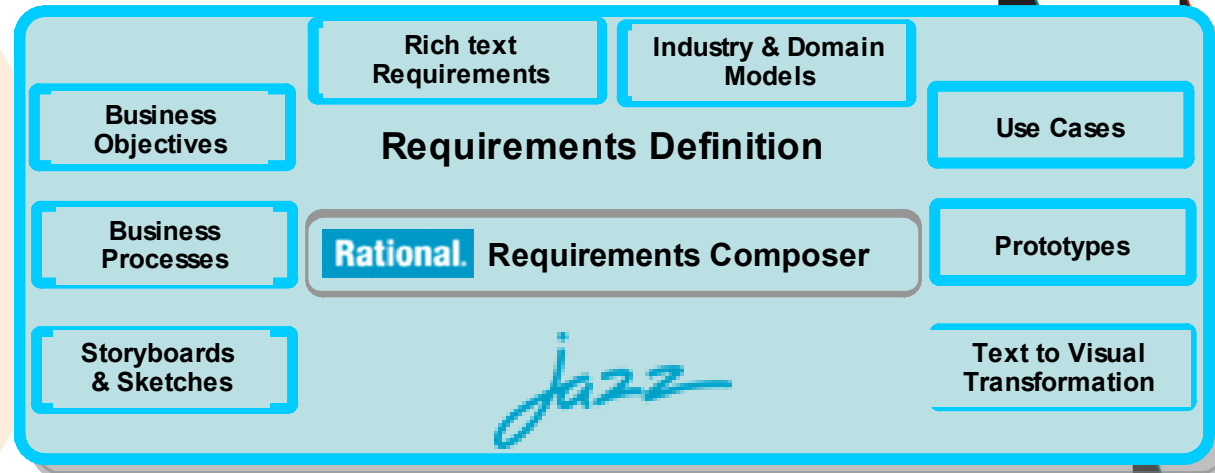
- Capture clear, unambiguous and actionable requirements

Validate

- Stakeholders review what is important and sign off with confidence

Control scope

- Which requirements have been tested and delivered?
- Which requirements have changed since the project scope was originally approved?
- Who approved this change to the requirements?
- Which tests must be updated for this requirement change?



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Global Business Equals Global Development

Need for Precision

- Increased global community demands an increase of global business and collaboration
 - Geographically distributed development teams that cannot collaborate and work in silos
 - Difficulty achieving consensus among stakeholders and partners
 - Inability to make informative decisions and plans
 - Slow approval/review cycles from extended site locations
- Distributed teams / remote users need easier and faster access to requirements
 - Reliance on out-of-date or stale data is not sufficient
 - Concurrent participation for development process is essential



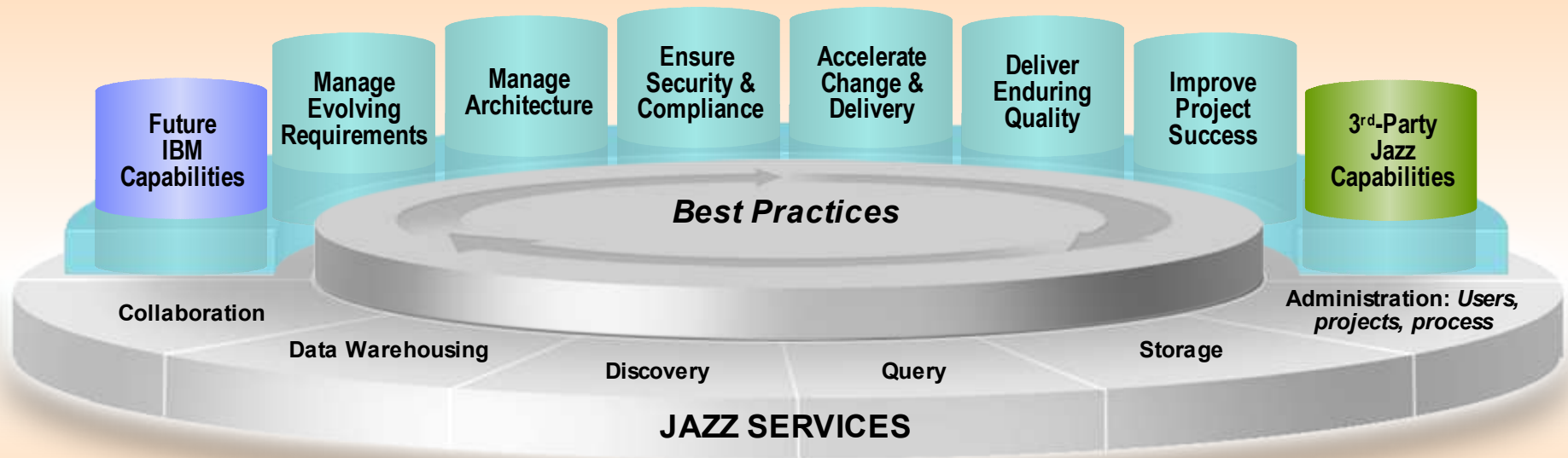
*The increased expansion
of global expansion and
global business has raised
the stake for collaborative
development tools*

*The Rational DOORS
Family*

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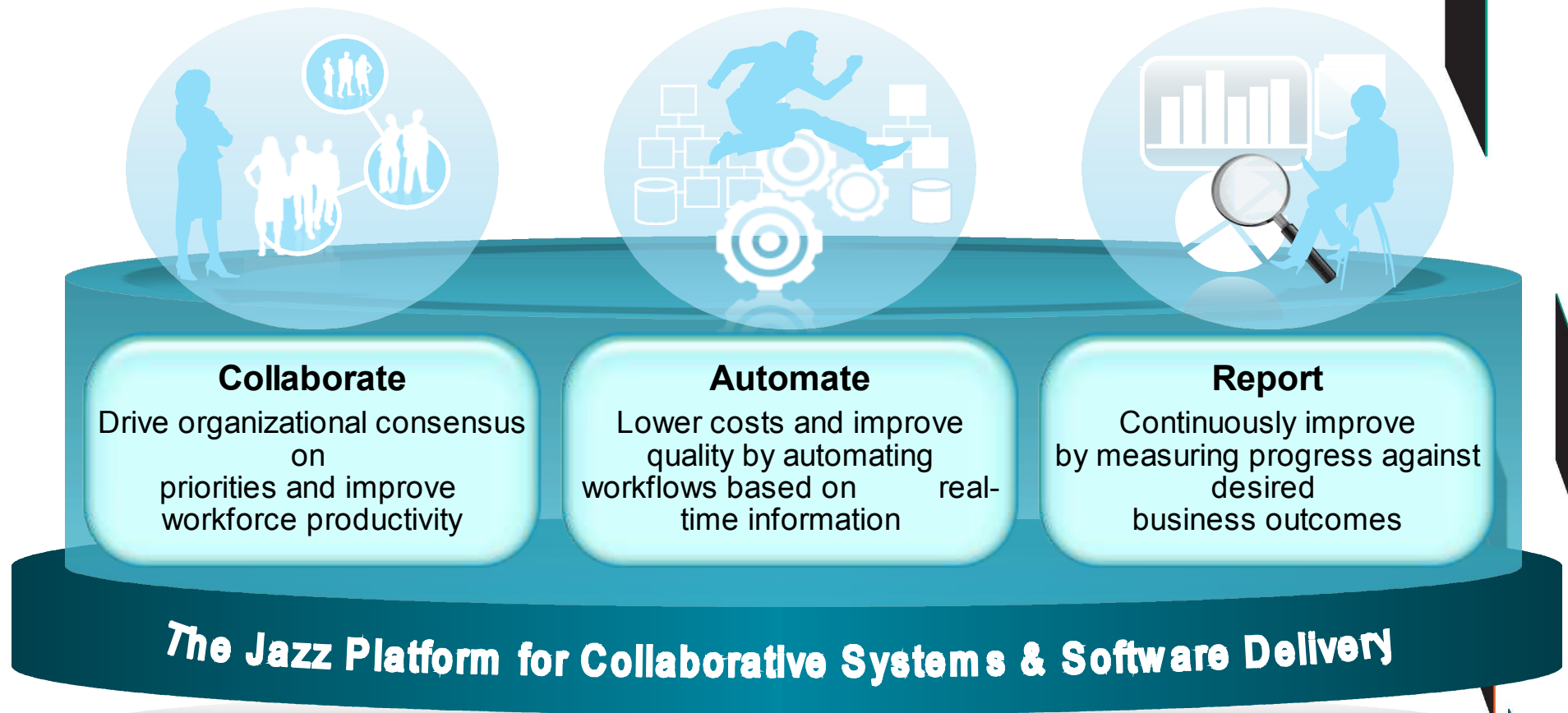


The Jazz platform for collaborative systems & software delivery



A platform for the business process of systems & software delivery

Aligning with evolving business priorities and stakeholder constituencies



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Questions

Increased Involvement Improves Quality

Improve the development process

“Year-over-year, EMF survey results continue to show that incomplete or vague requirements continue to be the number one issue.

EMF data suggests that a broader adoption of requirements management and change management tools will result in significant ROI gains.

Development teams using requirements management processes still can suffer from poor requirements quality and team disconnect

Delayed product deliveries and poor design outcomes requiring the removal of features from product deliveries add significant cost (and market risk) to companies.”

Incomplete or vague requirements	50.6%
Insufficient time	46.6%
Insufficient resources	38.2%
Design complexity	34.7%
Integration issues	31.7%
Creating documentation for the design	22.4%
Insufficient expertise	20.0%
Training new team members	17.5%
Discovering defects late in development cycle	17.0%
Lack of enabling tools	10.5%
Standards compliance	10.3%
Developers leaving company or project	10.3%
Lack of understanding of existing software for reuse	9.8%
Lack of larger building block solutions	5.1%
Other	3.5%

- Embedded Market Forecasters: Embedded Development Tools & RTOSes, World Markets, user perspectives and strategic issues,
 - Jerry Krasner, Ph.D., MBA, Dolores A. Krasner, July 2009

