Gaining Control of Your Constantly Changing Requirements

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Software Development Lifecycle Webcast Series 2008

Rational software

@business on demand.

# Gaining Control of Your Constantly Changing Requirements

- The reality: requirements change

- Planning for requirements management

- Automating requirements management

- People, processes and technology

- Looking into the (near) future

- Summary

The reality: requirements change

Why do we go to the trouble of managing requirements?

▶ Requirements will change during the software development lifecycle

  ▪ Perception, communication and information gaps are discovered

  ▪ Business conditions change

  ▪ Project scope must be carefully monitored

▶ Modern development processes expect and embrace change (Agile, RUP based variants, Scrum)
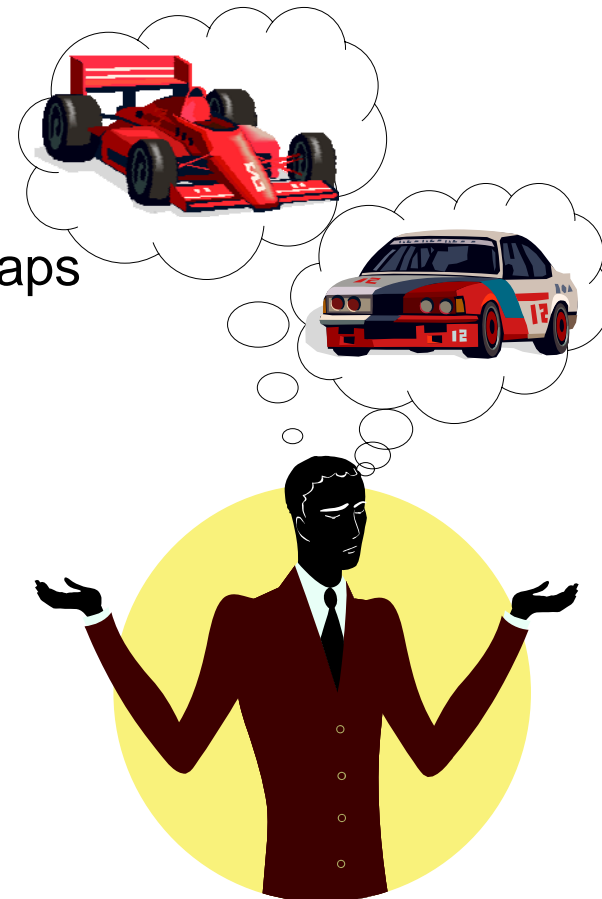
Questions posed by requirements change

**Each change to requirements poses questions**

- Who requested this change?

- Who needs to be notified of this change?

- Which use cases are affected?

- Do we have tests to verify the new behavior?

- Which components are affected by this change?

- How will this affect project scope?

We cannot effectively manage the Software Development Lifecycle unless we can answer these questions posed by change
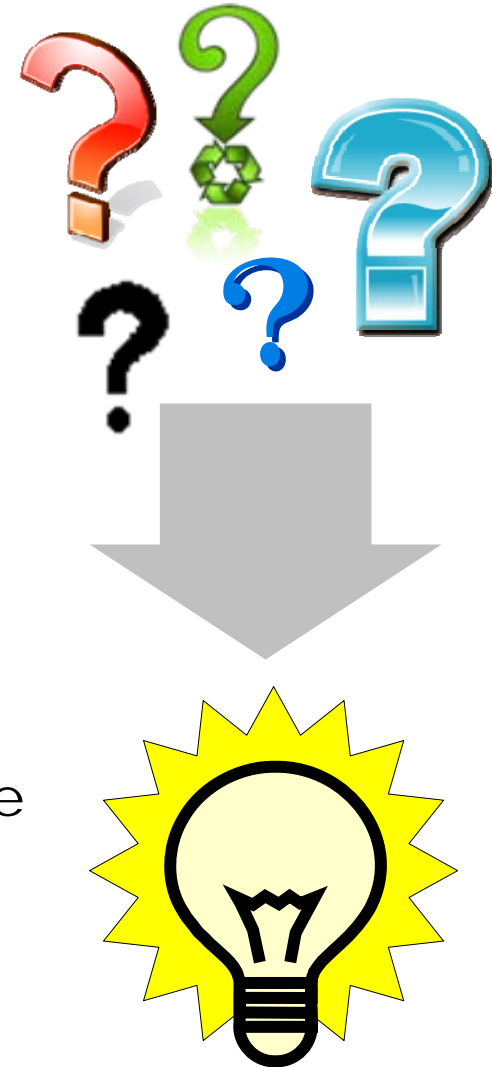
We pay dearly when we cannot efficiently answer questions posed by change

BUSINESS REQUIREMENTS PREMIUM*
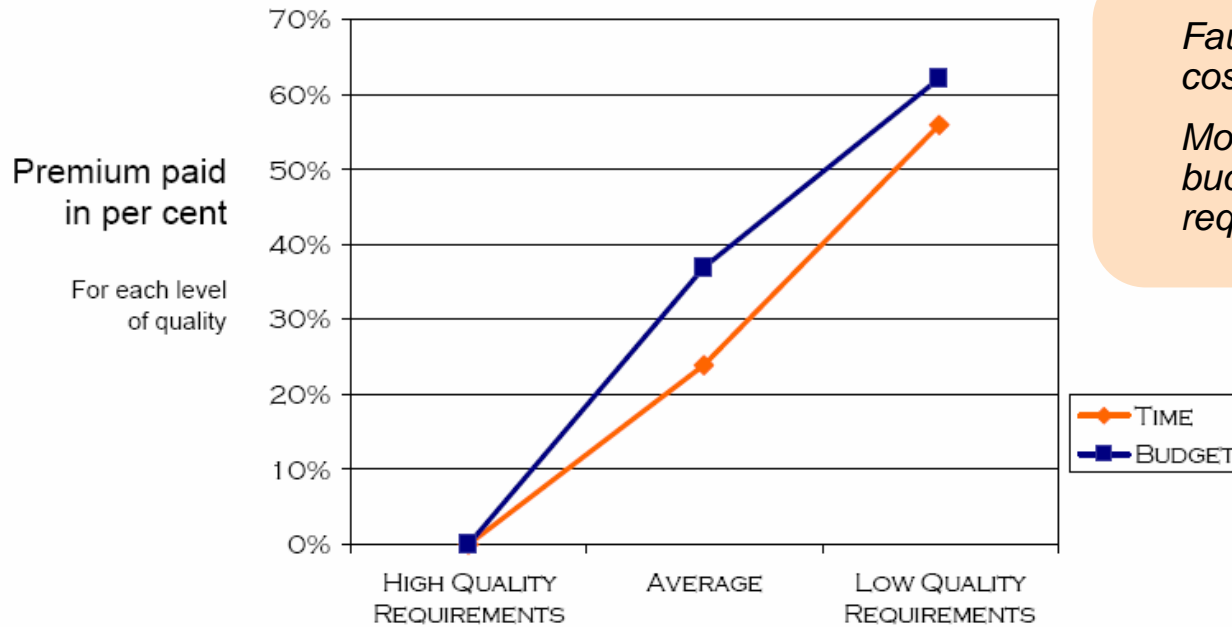
Faulty requirements on average cost an additional $2.24MM

More than 40% of IT development budget will be consumed by poor requirements

* Average increase in the overrun on time or cost versus projects that used high quality requirements
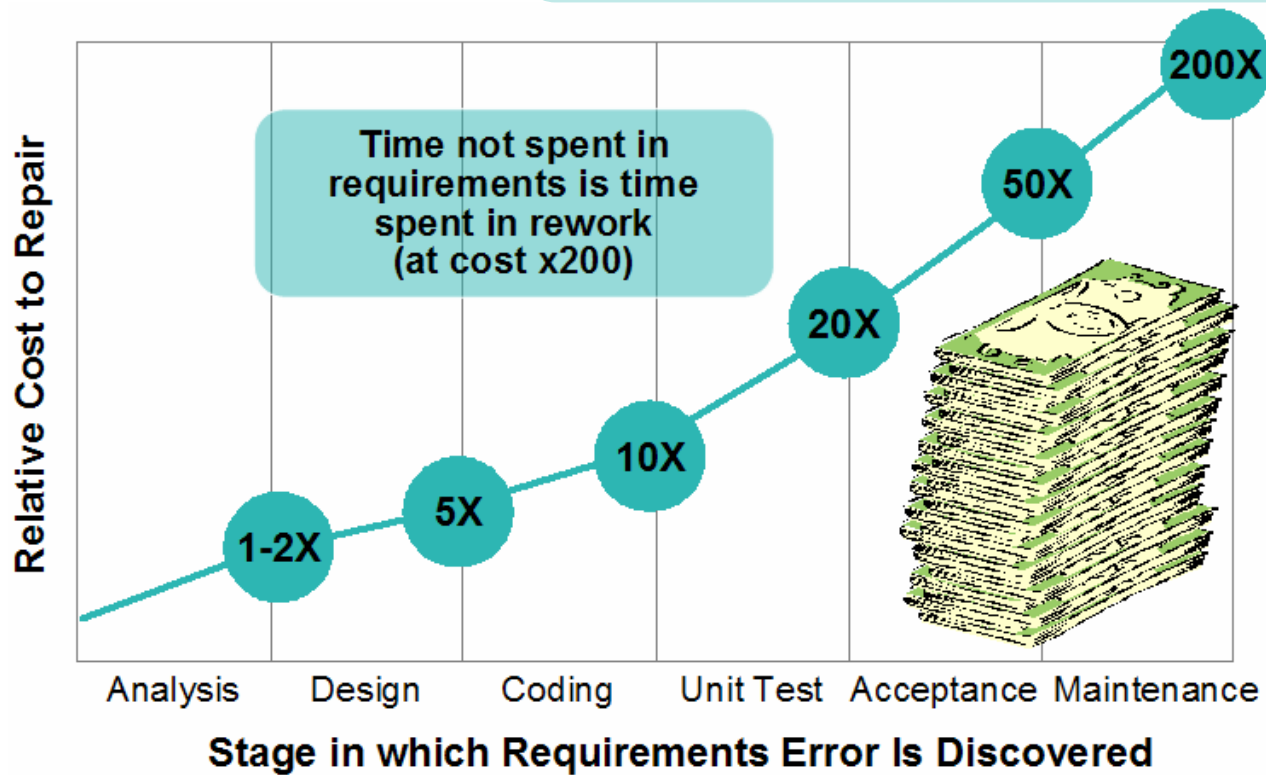
N=109
Source: IAG Business Analysis Benchmark, 2008

We pay dearly when we cannot efficiently answer questions posed by change

*Unmanaged Requirements Cause Unmanageable Budgets … a primary reason for excessive rework, delays, poor quality, and **project failure***

Time not spent in requirements is time spent in rework (at cost x200)

Relative Cost to Repair

- 1-2X
- 5X
- 10X
- 20X
- 50X
- 200X

Analysis   Design   Coding   Unit Test   Acceptance   Maintenance

Stage in which Requirements Error Is Discovered

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The Requirements Management Plan

A textbook definition:

> *A systematic approach to eliciting, organizing, and documenting the requirements of the system, and establishing and maintaining agreement between the customer and the project team on the changing requirements of the system.*
>
> *Rational Unified Process*

Practically speaking…

The Requirements Management Plan – *Intent*

The requirements management plan provides a blueprint for answering questions posed by change

Which questions will we need to answer?

▶ Will we comply with specific regulatory requirements?
- e.g. FDA 21 CFR Part 11, Sarbanes-Oxley

▶ Will we maintain an audit trail for all changes?

▶ How will we share project status?

The Requirements Management Plan – *Traceability*

The requirements management plan describes how traceability will be used

▸ Traceability is the linking of requirements with everything else

- Use cases to business requirements
- Tests to use cases

Analysis based on traceability provides answers to questions posed by change

▸ Business justification

- Why do we have this use case? Does it support a business objective?

▸ Coverage

- Do we have tests to verify the new behavior?
- Do we have use cases that cover our features?

▸ Impact

- Which use cases are affected by this business rule change?
- Which components might we need to modify?

The Requirements Management Plan
Project and solution characteristics

The requirements management plan is indicative of project and solution characteristics

▶ What types of requirements will we manage?

- Business objectives, business rules, features, use cases, non-functional requirements

- Capability gaps (SAP® development)

▶ What attribute values will we maintain for requirements?

- Status, Priority, Planned Iteration, Contact Name

▶ What levels of security must be enforced?

- Who gets access to which requirements?

▶ Will we maintain multiple releases?
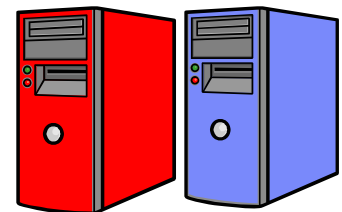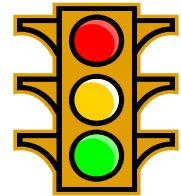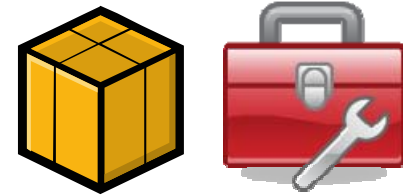
The Requirements Management Plan
Team demographics

Right-size your development process

The requirements management plan is indicative of team demographics

▶ What roles are involved in defining and managing requirements?
  - business analyst, architect, tester, project manager, etc.

▶ How large is the project team?
  - Will people act in multiple roles?

▶ Will we outsource development?
  - Who owns the requirements?

▶ Can we gather everyone in the same room to get answers?
  - Is the team geographically distributed?

The Requirements Management Plan
Change control

Right-size your
development process

The requirements management plan describes how we will control change

How much control do we need?

- Do we simply need to find answers to our questions?
- Must changes be approved before they are made?
- How much of an audit trail is required?
- How complex is our project environment?

When is the right time to introduce change control?
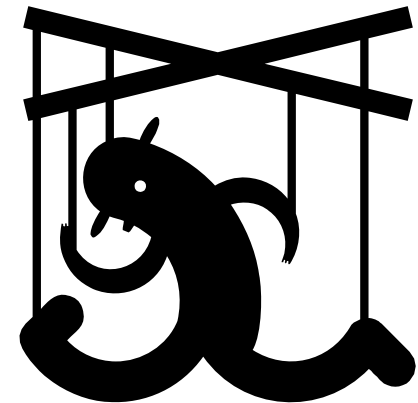
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Managing Requirements with IBM Rational RequisitePro

Requirements management for the whole team

- **IBM Rational RequisitePro**
  - ▶ Flexible, integrated requirements and use case management

- **Key Benefits**
  - ▶ Secure requirement repository for easy access and control
  - ▶ Robust web interface for remote access
  - ▶ Live Word requirements documents for ease of use and lowered learning curve
  - ▶ Powerful database infrastructure for filtering and reporting

Organizing Requirements
Types, Attributes, Views, Packages

> **Requirement types** *are defined by attributes*
>
> **Attributes** *store answers to questions posed by change*

✓ User-defined requirement types

✓ User-defined attributes

✓ User-defined filters (views)

✓ User defined packages
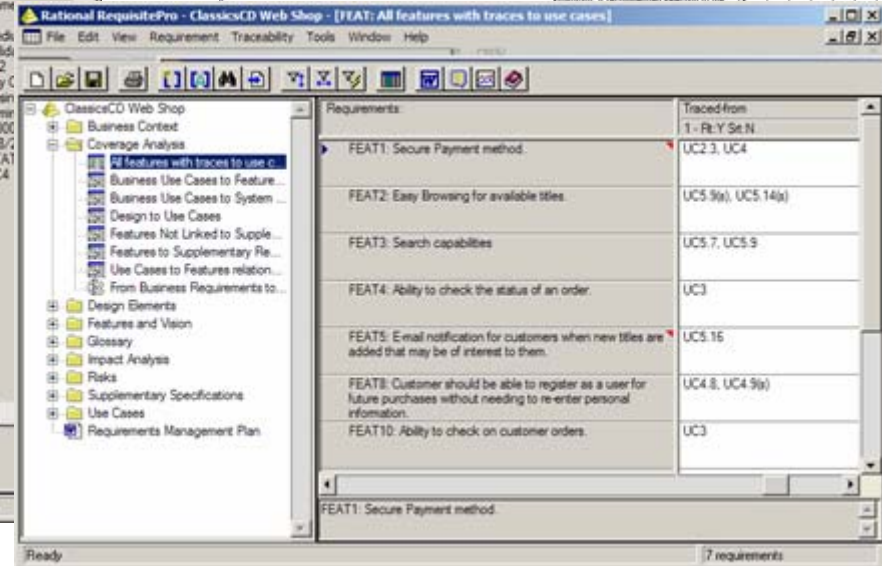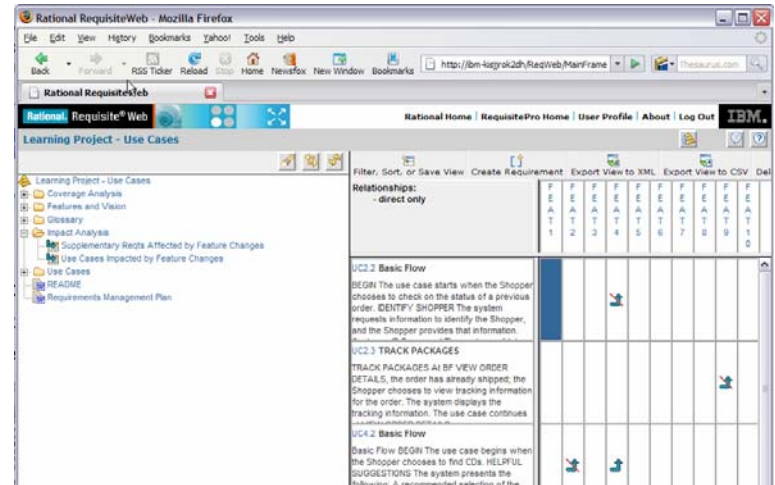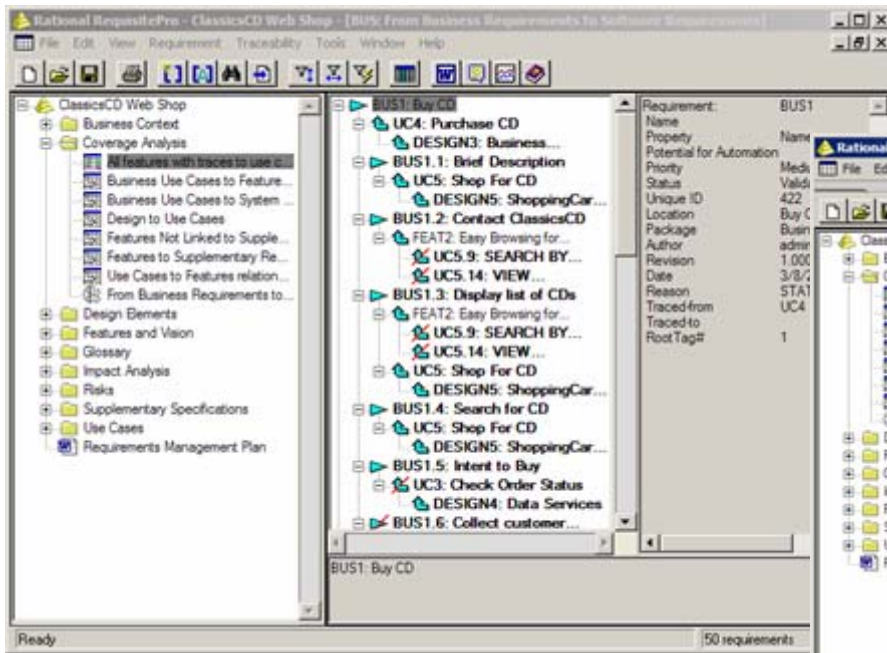
Managing Changing Requirements
Traceability

✓ Graphical trace matrix

✓ Textual trace matrix

✓ Graphical trace tree

Communicating Changes and Their Impact

✓ Email notification of changes

✓ Suspect links

"With Rational RequisitePro's suspect links, my team members and I can immediately see changes that are made…"

Jason Oliver, Kodak

Integration - Rational Software Architect/Modeler

See Traceability Information in Requirement Trace View

Questions & Answers

Which features are covered by the "Bid on Item" use case?

Which components realize the "Bid on Item" use case?

Integration – Rational ClearQuest Test Manager

Tag	Requirement	Configured TC	Verdict	Defect Id	Defect Heading	Defect Priority	Defect State
+FEAT12	The Buyer should be able to cancel his/her own bid before the bid is accepted.	AUCT00000180	fail	AUCT00000191	Cancel bid function does not actually cancel build	1-Resolve Immediately	Submitted
+FEAT2	The Seller should be able to create an auction by describing an item or service	AUCT00000184	fail	AUCT00000200	Auction not accepting reserve bids	2-Give High Attention	Closed
+UC4.2	Register Basic Flow	AUCT00000168	fail	AUCT00000199	System lets you register multiple accounts with same login	1-Resolve Immediately	Submitted

RequisitePro feature requirements

Test cases

Defects

Questions & Answers

Do we have tests to verify the Register Basic Flow use case?

Which features are not available until we fix the "Auction not accepting reserve bids" defect?

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Automation is not the *entire* answer…

Successful requirements management is also about the skill and experience of the people managing requirements

SUCCESS PROBABILITIES

Proportion of Projects that were described as "Successful" or "Unqualified Successes"

- 80%
- 70%
- 60%
- 50%
- 40%
- 30%
- 20%
- 10%
- 0%

Lowest Third — 10.0%
Middle Third — 38.9%
Upper Third — 72.7%

Competency of Business Analyst Team/ Quality of Business Requirements

Source: IAG Business Analysis Benchmark, 2008

IBM Software Services for Rational

- *A Global network of highly skilled experts with broad architectural knowledge, deep technical skills and best practices expertise working with IBM Rational clients to*

  ▸ *Help automate, integrate and govern the core business process of software and systems delivery with worldwide support.*

  ▸ *Accelerate the deployment of Rational software, helping to minimize risks, and maximize investments to meet business goals*

  ▸ *Offers a variety of services to help clients define and improve software development best-practices for their organization*

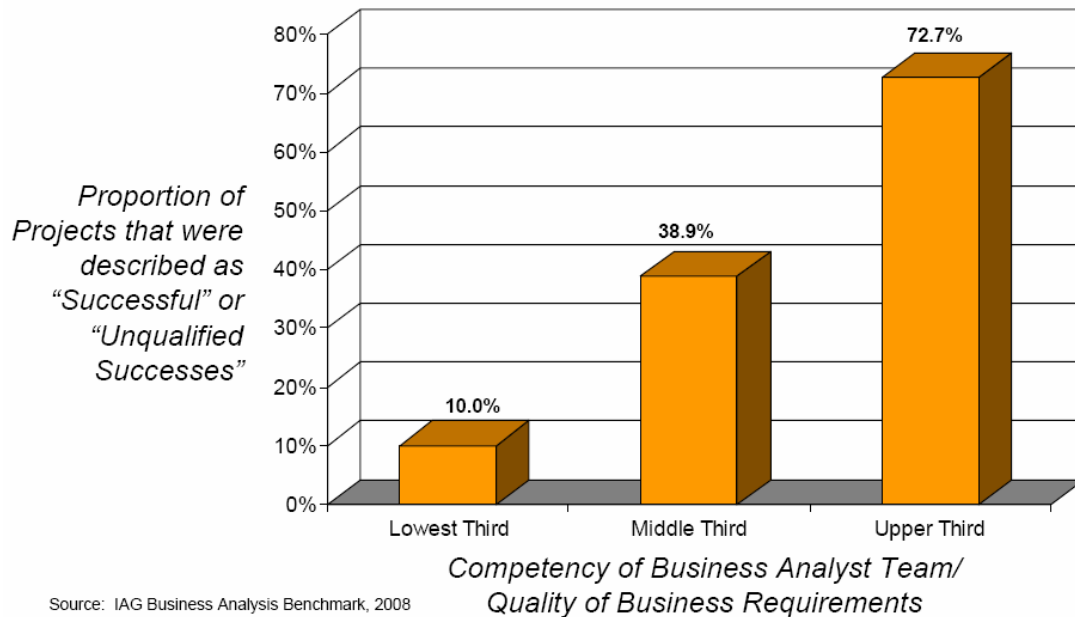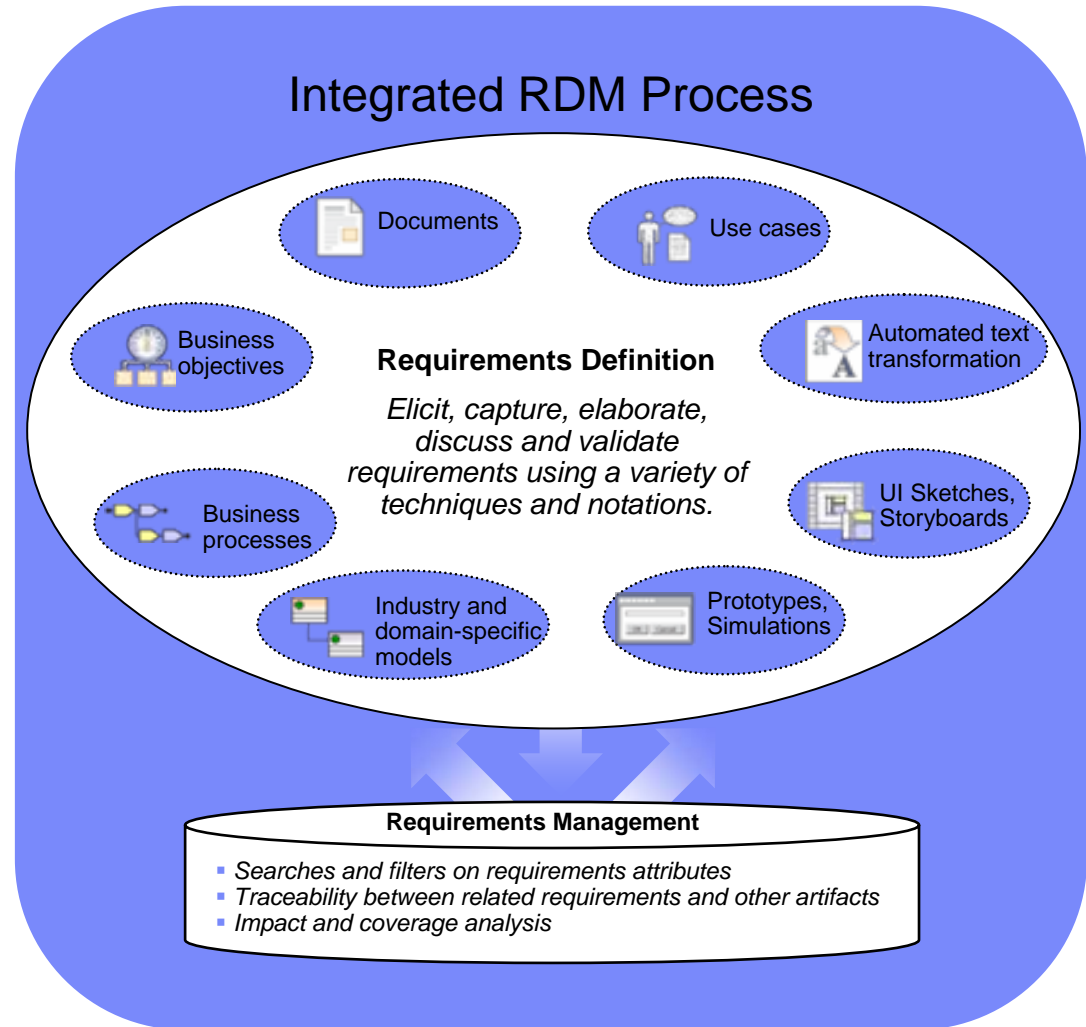# Gaining Control of Your Constantly Changing Requirements

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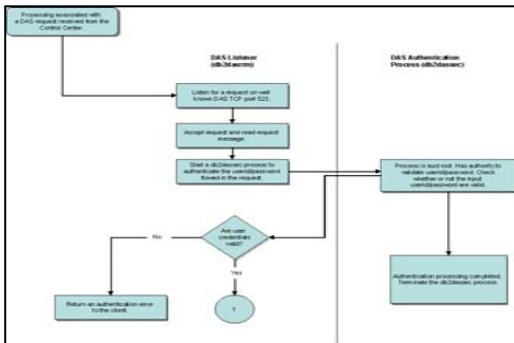- Looking into the (near) future

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Requirements Definition and Management (RDM)

- ❑ More ways to elicit, discover, and specify requirements

- ❑ Elaborate and validate thoughts so that better requirements are managed

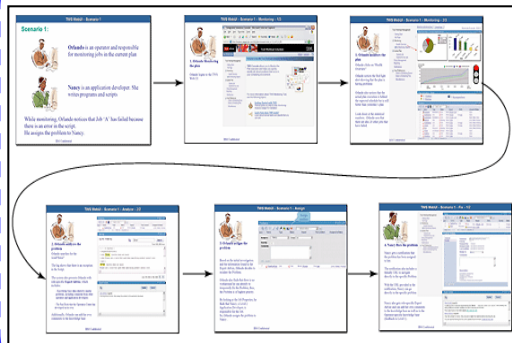- ❑ *Definition* makes what you *manage* more valuable

Integrated RDM Process

Documents

Use cases

Business objectives

Requirements Definition

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

Automated text transformation

UI Sketches, Storyboards

Business processes

Industry and domain-specific models

Prototypes, Simulations

Requirements Management

- ▪ *Searches and filters on requirements attributes*
- ▪ *Traceability between related requirements and other artifacts*
- ▪ *Impact and coverage analysis*

Elicit, capture, elaborate, discuss and validate

Business Process Diagrams
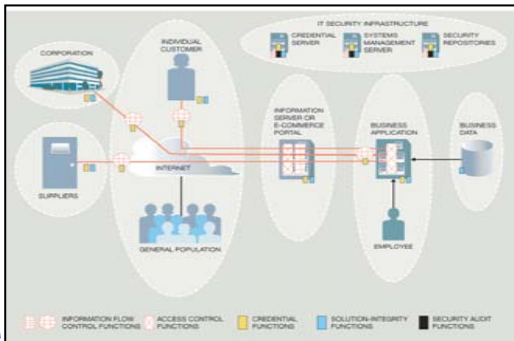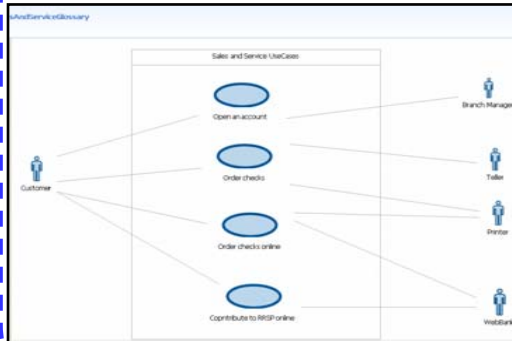

Storyboards

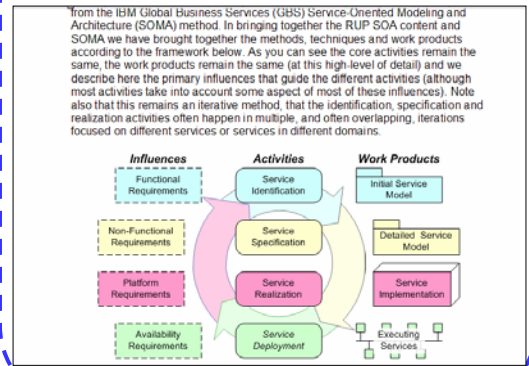

UI Sketching

Sketches / Visuals

Use cases

Rich Content Capture / Share

Emphasis on requirements definition can reduce the impact of requirements change

- **Challenges** in aligning business and IT around a shared understanding of the problems and desired solutions is a driving factor of project failures in many organizations. Uncertainty, driven by **perception, knowledge, and communication gaps** during the requirements process, materializes in downstream processes as **delays and rework**.

- Organizations need to **collaborate in context** to bridge these gaps. RUP guides teams through the use of **powerful, yet simple, tools for eliciting, enhancing, and connecting ideas**, confusion and rework is reduced, allowing teams to reduce downstream risks and speed time to market.
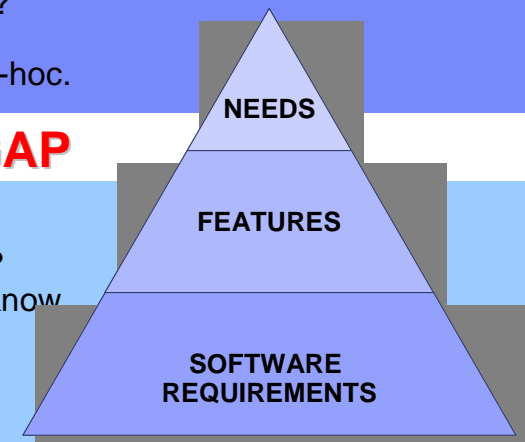
Perception

Knowledge

Communication

Problem Space
Are we solving the right problem?
Where we know what we know.
Frequently discontinuous and ad-hoc.

GAP

Solution Space
Are we solving the problem right?
Results linked to who / what we know
Structure accelerates issues

NEEDS

FEATURES

SOFTWARE REQUIREMENTS

IBM Rational and Telelogic

More information coming soon

- IBM completed its tender offer for Telelogic A.B. on April 3rd

- We will preserve client investments in both Telelogic and IBM Rational solutions

- We will support two complementary approaches to Requirements Management

  - Telelogic DOORS will continue to be the solution of choice for customers who develop complex technical systems and demand a highly scalable solution well-suited for strongly governed projects

  - Rational RequisitePro will remain the basis of our solution for software and IT projects with need for agility and tight integration with software development and testing tools

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Summary

- Requirements change

- Each change poses a number of questions
  - ▸ We must answer these questions to effectively manage the development lifecycle
  - ▸ The requirements management plan provides a blueprint for answering these questions
  - ▸ Traceability is the primary mechanism for finding answers

- The right amount of change control, introduced at the right time, maximizes effectiveness

- Automation isn't the entire answer, but it is key for managing change

- There is an increased emphasis on managing better requirements

IBM Rational Software Development Conference 2008

June 1 – 5, 2008; Orlando, Florida

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- Executive Summit 2008
- 3- and 5-hour Technical Workshops
- Access to IBM Engineers and IBM Research

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- IBM Rational Software Delivery Platform
- Process and portfolio management
- Change and release management
- Quality management
- Architecture management

- Rational trial downloads
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- developerWorks Rational
- IBM Rational TV
- IBM Rational Business Partners
- IBM Rational Case Studies

Backup

Challenge – Too Many Requirements Errors

- **Challenge**
  - ▶ Team members don't have a have a requirements process, they don't know where the latest requirements are, and they find it difficult to understand a big list of shall statements.

- **Resolution**
  - ▶ Have secure central requirements repository accessible on a local network or over the internet
  - ▶ Support alternate types of requirements like use cases, features, and user stories
  - ▶ Provide best practices and process guidance
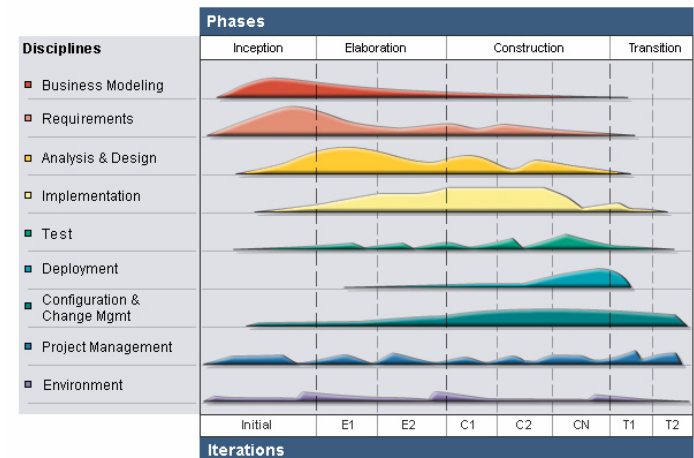
Challenge – Hard to Organize and Report on Requirements

- Challenge
  - ▶ There is no consistent organizing principle and it is very difficult to sort or filter requirement based on information like priority and release.

- Resolution
  - ▶ Document types and associated templates provide guidance
  - ▶ Requirement types provide structure.
  - ▶ Requirements attributes provide necessary information to sort, search, and filter

Challenge - Change Not Managed

- Challenge
  - ▸ Team members don't know what has changed over time. They have no way to understand what the impact of a change will be.

- Resolution
  - A requirements audit trail (history) provides a record of all changes.
  - Traceability and suspect links provide visibility into change impact
  - Automatic notification of revisions to requirements
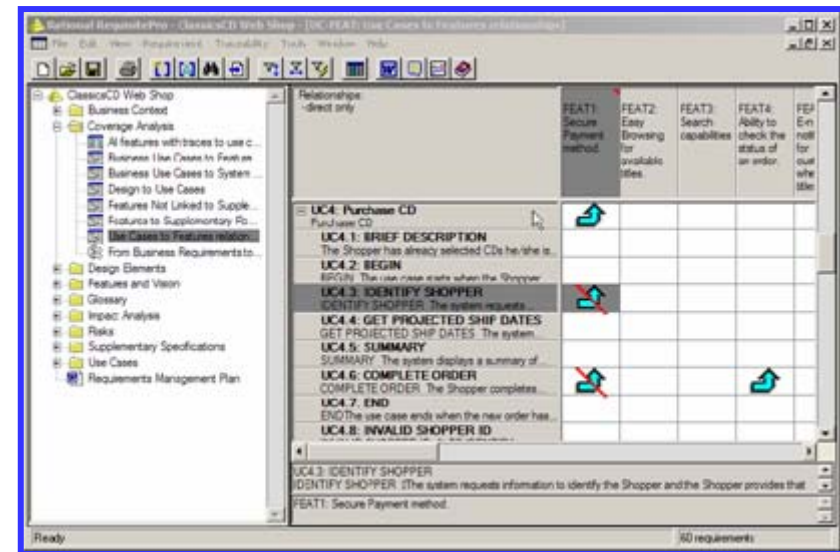
IBM Rational Software Delivery Platform
Integrated Requirements Management

Requirements add little value unless they are <u>used</u> in the planning and development of the software

✓ Requirements are integrated within all parts of the software development process

Governance & Lifecycle Management

Process & portfolio management

Change & release management

Quality management

Architecture & construction

Integrated Requirements Management
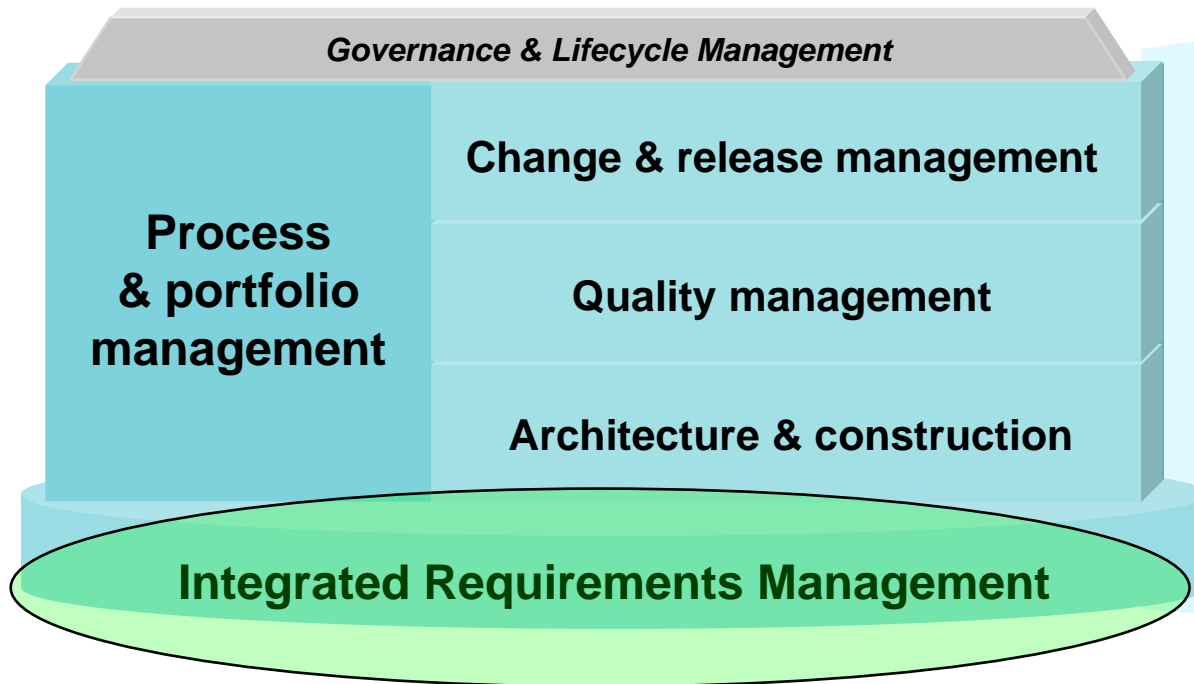
✓ Ensure that applications meet business needs by tracing to business process models

✓ Understand the impact of a change via full lifecycle traceability

✓ Verify quality by linking requirements to test cases

✓ Understand status, resources, cost, return, and other financial assessments associated with requirements

Integrated Requirements Management

Create and manage software requirements and use cases
Rational RequisitePro

Requirements Analyst

Create business process models and business requirements

WebSphere Business Modeler
Rational RequisitePro

Business Analyst

Develop data and architectural models from business process models and software requirements

Architect

Rational Software Architect
Rational Data Architect

CONTINUOUS

COLLABORATIVE

COMPREHENSIVE

Link requirements with project plans, financials and status
Rational Portfolio Manager

Project manager

Use models and requirements to write code

Developer

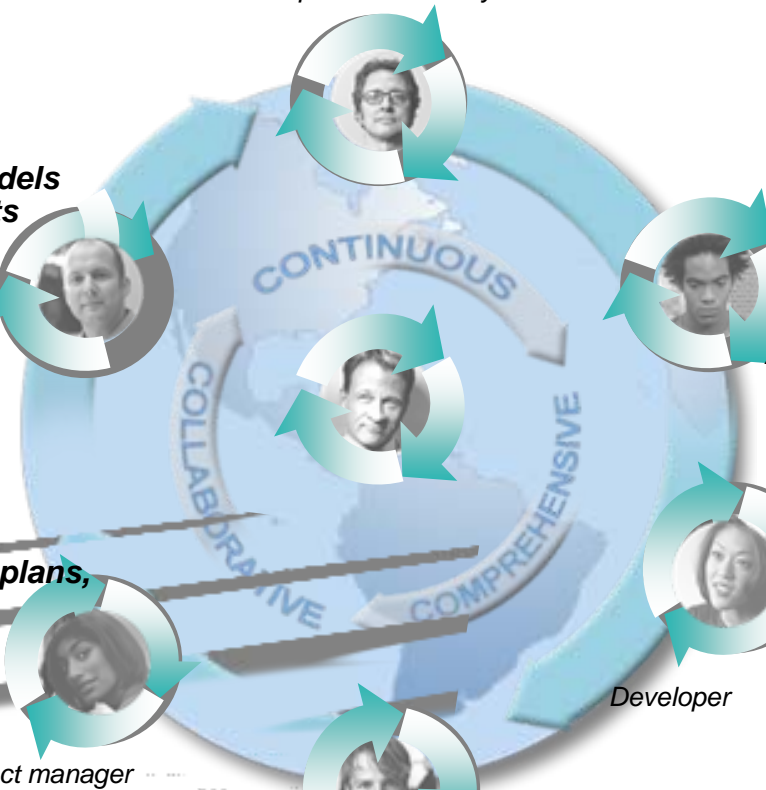*Rational Application Developer*

Use requirements and use cases to create test cases

Tester

Rational ClearQuest

Ready For Rational Partner products

All RequisitePro Integrations

Product	Capability
IBM Rational Software Architect	Draw use case diagrams; link requirements to design elements and code.
IBM Rational Software Modeler	Draw use case diagrams; link requirements to design elements.
IBM Rational ClearQuest	View requirements; trace enhancement requests to requirements; trace test assets to requirements.
IBM WebSphere Business Modeler	Trace business model elements to business and system requirements.
IBM WebSphere Integration Developer	View and link requirements for SOA application development and other integration projects.
IBM Rational Application Developer	View requirements from within IDE: trace requirements to code.
IBM Rational Systems Developer	Manage and trace requirements for complex systems.
IBM Rational Data Architect	Collect data requirements; trace data base designs to requirements.
IBM Rational Portfolio Manager	Associate work, financials, status to requirements.
IBM Rational Test Manager	Trace test cases to use cases and other requirements.
IBM Rational Unified Process	In-context process help from within RequisitePro.
IBM Rational SoDA	Generate integrated reports.
Raven Professional	Process descriptions within RequisitePro automatically visualized as activity diagrams.
iRise Studio	Define requirements in iRise by prototyping, and manage them in RequisitePro.

IBM Rational's business model
A strategic partner in enabling business innovation & transformation

Business imperatives

- Global capability

- Business flexibility

  - Time to value

- Risk & compliance management

Governance & lifecycle management

Rational. software

Governing the business process of software & systems delivery

Decades of proven process expertise & customer success

Business innovation & transformation

- Alignment

- Control

- Efficiency