Don’t Get Entangled in Your Web of Requirements

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Innovate2010
The Rational Software Conference

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Agenda

- Requirements are Everywhere
- What is Traceability?
- How do Tools Help?
- Rational Requirements Composer
- Traceability Approaches
- Best Practices
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Requirements are Everywhere
Changing Landscape of Requirements

- **More integrated systems** rather than stand alone systems
  - More interdependence of components hence more interdependence of requirements

- **More stakeholders involved** in projects
  - More requirements sources
    - Business analysts, users, customers, marketing, regulators, architects, domain experts, legacy system experts, development, testing etc.
  - Stakeholders need to validate requirements in a form they can understand
    - Need to leverage diagrams, process flows, screen sketches, use cases etc. as well as textual requirements
    - Need to be able to incorporate these different forms into the requirements process

- **Improved technology** and tools enable us to build more complex systems
  - More complex requirements
  - But users still want solutions to be easy to use!!!
Requirements are Everywhere
Also Other Challenges for Project Teams

- **Shorter market cycle times**
  - Necessitating more project agility and more frequent requirement changes

- **Drive to reduce cost and schedule**
  - Focus on productivity and value add activities

- **Teams and stakeholders are more geographically distributed**
  - Need better communication and collaboration
Symptoms of requirements issues

Suggesting a need to invest in requirements practices

Too many project surprises, overruns and failures

Customers are not satisfied with the process or the results

Analysts, developers and testers find it difficult to work in tandem

Team is bombarded by change but struggling to keep up

You aspire to greater agility but are unsure how to achieve it
Requirements are Everywhere
Web of Requirement Interdependencies
Office Tools Exacerbate the Problem

Microsoft Word
  Track Changes, Comments, Formatting nightmares, HUGE documents

Excel spreadsheets for requirement sets
  Tabular format helps (at first) until the Tabs start to grow

Visio to model process, flows, screen designs
  Slightest change requires many manual updates to the same component

PowerPoint as communication vehicle
  Dozens of presentations to crawl through for information

No way to establish relationships and link artifacts
  Have to have endless meetings to put together the pieces
Tools are Adapting to Accommodate Needed Change

Challenge is – How to best leverage the tools?
Use of general tools for requirements poses challenges

**Difficult to address:**
- Artifacts are not interrelated (are on islands)
- No team collaboration & workflow
- Ad-hoc procedures for relating and versioning artifacts
- Difficult to reuse requirements “downstream”
- Working with artifacts in well-defined groups
- Coordinated updates across related artifacts
- Generating requirements reports and documents

**Collaborative tools**

Requirements can be communicated via:
- Email
- Instant messaging
- Newsgroups
- Wikis and blogs
- Groupware
- Shared file system

**Office documents**

Requirements can be captured in …
- Documents
- Drawings
- Spreadsheets
- Pictures
Domain-specific tools help the team go to the “next level”

- Secure repository provides central location
- Team collab. & workflow
- Progressively structure unstructured information
- Artifacts are interrelated and versioned
- Requirements are reused “downstream”

Office documents

Requirements can be captured in …
- Documents
- Drawings
- Spreadsheets
- Pictures

- Collections group related artifacts
- Baselines for scoping and comparison
- Views for coordinating updates across artifacts
- Purposeful documents and dashboards

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Requirements Domain-specific

Tools enabling high-productivity practices
- Native support for various RD techniques
- Embrace office documents
- Collaboration in the requirements practices

Requirements across the lifecycle
- Relate requirements to project milestones and work items
- Testing verifies solution meets requirements
- Coverage and impact analysis, change mgmt
Good requirements *practices* are key to project success

*Address the big challenges*

<table>
<thead>
<tr>
<th>Process Challenges</th>
<th>Collaboration Challenges</th>
<th>Tools Challenges</th>
</tr>
</thead>
<tbody>
<tr>
<td>Poor requirements process or no process at all</td>
<td>Geographically distributed teams</td>
<td>Many tools and data formats</td>
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<tr>
<td>Hard to balance risk vs. process overhead</td>
<td>Outsourcing partners</td>
<td>Tools don’t work together</td>
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<td><strong>Need a right-sized process supported in the tools</strong></td>
<td>People work in silos</td>
<td>Information islands</td>
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<td>Hard to engage customers effectively</td>
<td>Heroic manual efforts</td>
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<td></td>
<td><strong>Need to align teams and converge on good requirements faster</strong></td>
<td>to pull it all together</td>
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<td><strong>Need to avoid rework/errors and improve quality</strong></td>
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How well do you Write Requirements

*Real World Advertisement Examples*

- Dog for sale: eats anything and is fond of children.

- Dinner Special - Turkey $2.35; Chicken or Beef $2.25; Children $2.00.

- We do not tear your clothing with machinery. We do it carefully by hand.

- Wanted. Man to take care of cow that does not smoke or drink.
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- Best Practices
What is Traceability?

**General Definition**

General definition of traceability is the:

"Ability to **chronologically interrelate** the uniquely **identifiable entities** in a **way that matters**."

Typically in the requirements domain we are interested in structural relationships rather than temporal or chronological relationships.
What is Traceability?

General Definition

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What is Traceability?

Requirements Specific Definitions

A much cited definition of requirements traceability:

"Refers to the ability to describe and follow the life of a requirement, in both forwards and backwards direction."

Another definition of requirements traceability stressing relationships between many kinds of development artifacts:

“Refers to the ability to define, capture and follow the traces left by requirements on other elements of the software development environment and the trace left by those elements on requirements.”
What is Traceability?
System Engineering “V” Model
What is Traceability?

**Benefits**

- **Process visibility** and auditing
  - Understand where a requirement came from, its importance, how it was implemented, and how it was tested.

- **Build the right system**
  - Verify that all stakeholder needs are implemented and adequately tested or validated.
  - Verify that there are no “extra” system behaviors that cannot be traced to a stakeholder requirement.

- **Project management and maintenance**
  - Understand requirements and project status
  - Understand the impact of changes and manage the implementation of changes
  - Keep the project team in sync
What is Traceability?

Challenges

- **Cost** of creating and maintaining traceability
  - Minimize traceability scope to achieve project goals
  - Careful with scope of manual traceability – more error prone, more time consuming and more expensive
  - Consider value based traceability (only trace high priority requirements)

- **Other considerations**
  - Instil discipline
  - Maintain integrity otherwise worthless
  - Consider long term value
  - Leverage tools
Consider **traceability** and **referencing** to be very different

- **Traceability:**
  - Focus on **structural relationships** – there is a definitive link between the entities i.e., derivation, dependance or impact

- **References:**
  - Provides **additional background information** but not a strong structural relationship
  - Helps the reader to better understand the context or to get background information
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How Do Tools Help?

Automation of Manual Actions

- Tools like Rational RequisitePro, Rational DOORS, Rational Publishing Engine and Rational Requirements Composer help by:
  - Eliminate manual errors
  - Aid changes or maintenance, e.g. suspect links, always latest view of information
  - Reporting on traceability relationships for completeness or missing relationships
  - Navigating quickly for information
  - Performing quick impact analyses
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Rational Requirements Composer

- Jazz – music to my ears!
- A bridge across the tool silos
- Effortless communication and collaboration across project teams
- All requirements artifacts can live in the same repository and be accessed via the same requirements solution
- A way to capture, connect, organize, and understand the complex web of requirements
Bridge your information islands

Embrace but move beyond Office and homegrown tools

- There are many kinds of requirements artifacts
- Many tools, data formats and repositories create information islands
- A large extended team participates in the requirements “conversation”

“The vast array of options linking artifacts sensibly with one another [in RRC] give it a definite benefit over using older, document-based approach to defining requirements ... This product is clearly a step up from our current methodology.”
- Randy Haven, IBM Global Business Services
Rational Requirements Composer:  
*Capture, Connect and Make Sense of the Web Of Information*

Use **Rich-text Documents** to capture structured and unstructured information (links, images, emails)

Capture the Current and Propose a Future State with **Business Process Diagrams**

Remove Ambiguity on Business and Technology Terminology with **Shared Glossaries**

Collaborate in real-time using **Wiki-like discussions**, to quickly achieve sign-off.

Build **Use Case Models** and Elaborate on the Processes, Actors and Activities

Visualize the User Experience with **User Interface Sketches and Storyboards**

**Rational Requirements Composer**:  
Capture, Connect and Make Sense of the Web Of Information

Let's **build a smarter planet**.
Foster collaboration and team transparency

Centralized repository, common dashboards, team-wide conversations

In-context team conversations

Social tagging (public and private)

Filter by almost any criteria

Organize artifacts into hierarchies

Artifacts matching search criteria (with customizable view of relevant attributes)

Transparency into what the team is doing
Rational Requirements Composer

Traceability Focus

RRC focuses on early life cycle informal traceability

Integration with other Rational products enables validation of requirements
How well do you Write Requirements

Real World Advertisement Examples

- Don't let worry kill you - let the church help.

- In a Los Angeles dance hall: "Good clean dancing every night but Sunday."

- In the window of a Kentucky appliance store: "Don't kill your wife. Let our washing machine do the dirty work."

- In a clothing store: "Wonderful bargains for men with 16 and 17 necks."

- Sign seen on an electricity pylon: DANGER! "To touch these wires will result in instant death. Anyone found doing so will be severely prosecuted."
How well do you Write Requirements?

Real World Advertisement Examples

- In an office: After tea break staff should empty the teapot and stand upside down on the draining board.

- In a safari park: Elephants please stay in your car.

- Red Tape Holds Up New Bridge.

- Hospitals are Sued by 7 Foot Doctors.

- Local High School Dropouts Cut in Half.
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Traceability Approaches

*It Depends!*

- **Approach really** depends on where you start from
  - New concept to the organization
  - New system within existing domain expertise
  - New functionality to existing system
  - Maintenance/bug fixes

- **Goal** of traceability
  - Compliance/audit
  - Regulations
  - Internal controls
  - Maintenance

- **Tools** available
  - None (manual)
  - Partial life-cycle coverage (one of Requirements Composer, DOORS or RequisitePro)
  - Full life-cycle coverage (Requirements Composer with RequisitePro or DOORS and Quality Manager and Team Concert)
Rational Requirements Composer

Linking Capabilities

- Rational Requirements Composer linking/traceability includes:
  - Linking from any artifact to another artifact within the tool
  - Linking to external artifacts with a valid URL
  - Custom attributes allows references to be included as attributes
  - Collaborative / Application Life-cycle Management (C/ALM) integration with:
    - Work Items (stories) in Rational Team Concert
    - Test Cases in Rational Quality Manager
  - Freeform folder structure allows implicit linking
Rational Requirements Composer

Inherent Relationships

- Rational Requirements Composer inherent right click linking support

![Diagram showing relationships between Process Task, Use Case Diagram, User Interface Sketch, Use Case, Screen Flow, and Storyboard.]

- Link
- Elaborate
- Associate

Requirements, Internal Artifacts, External Artifacts
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Moving from Files and Documents to **Requirements**

Create Content → Create Relationships → Create Views & Reports → Establish Tools Environment → Establish Process → Create Content

Let’s build a smarter planet.
Establish Process: 5 Steps to Agility

1. Timebox
2. Establish breadth
3. Prioritize
4. Go deeper
5. Repeat
1. Timebox

- **Establish direction, not perfection**
  - Use what is known to develop requirements in phases
  - Establish a time-box for each phase
  - Keep each requirements cycle short and in a specific time frame

- **Make assumptions, then move on**
  - Be comfortable with assumptions for unknowns at current phase
  - Assumptions will either fall out of scope, or become requirements

- **Don’t try to capture all the detail up front**
  - Doing so can lead to analysis paralysis
Create Content: Moving to a More Agile Approach

- Link documents, images, diagrams, and artifacts as they are collected and evolving
  - Create meaningful relationships across artifacts to paint the whole picture to the team

- Provide an accessible repository on the web for stakeholders to review and comment as needed
  - Invaluable to projects with GR component – less need for midnight calls!

- Resist the Giant Requirement Up Front (GRUF) temptation
  - Introduce a less rigid, more flexible requirements process

- Emphasis on the value of modeling
  - Fewer words, more pictures is always a good thing!
2. Establish Breadth

- Understand the ‘lay of the land’

- Identifying the boundary: scope of automation
  - High-level requirements covering the *entire* breadth of the system
  - Staying within the time-box: whatever gets missed here can move to the next iteration

- Begin with a list of use cases and actors
  - Aim for a complete actor and Use Case set, start with outlines, details then get added incrementally
The Use Case Model in Composer

- ‘Automated’ tasks in business process model
  - Helps determine the scope of the system – black box for system use cases

- Aim is to ‘discover’ all use cases
  - Usually do not get it right the first time - need to combine or merge as needed later

- Sketch of the use case diagram
  - UML notation showing system boundary, actors & use case relationships
  - Initially start with a sketch, can turn into reusable components later

- Outline of use cases and actor descriptions
  - Use Case document template- provide brief description and identify major flows only
3. Prioritize

- According to RISK
  - Technical risk: Work with the architect to determine architectural risks
  - Business risk: Have discussions that challenge the customer

- According to BUSINESS VALUE
  - Which UCs and functions will deliver the biggest bang for the buck?
  - Pareto’s Principle - 80/20 rule

- Be ready to do it again! Will have to re-prioritize requirements in the next iteration…
Composer Can Help!

- Define and set attributes (priority, difficulty, risk)
  - These will not be lost and can later be imported to RequisitePro for management

- Commenting features to communicate and help achieve consensus
  - Each stakeholder may have their own idea/agenda – facilitate difficult discussions

- Business partners, stakeholders, development teams that do not have client access can take advantage of the web
  - Easy to use and navigate as needed – can send URL links to specific artifacts

- Define a strategy for how you will use attributes and tags consistently in RRC
4. Go Deeper

- Defining depth on the features / functions that are at the top of the list
  - The first few, highest priority UCs are addressed first – business rules & messages are referenced as well

- Moving from UC outlines to detailing all flows and major scenarios
  - Going through this process, it is not uncommon to discover that one UC should actually be two, or vice versa

- Scenarios are invaluable!
  - At the heart of the iterative approach, are the end to end user scenarios that can be coded and tested for that iteration…
5. Repeat

- The number of iterations will vary, but each iteration follows the four steps again
  - Timebox
  - Breadth
  - Prioritize
  - Depth

- With each iteration, emphasis naturally shifts from breadth to developing more depth (system detail)
  - The emphasis also begins to shift from definition to management of the existing requirement set
  - Managing change becomes a big component in later iterations
Requirements Identification and Creation

- As we repeat …consistency is key…
  - Requirements Definition Plan helps to plan upfront what will be ‘outcome’ from Composer

- Requirements created in Composer based on any artifact
  - Each requirement creates a rich text document
  - Can imbed or link other artifacts into the requirement (ie. Screenshot/wireframes)

- For large projects, RequisitePro needed for management
  - RequisitePro has many features to help with more complex reporting, traceability needs

- Early lifecycle adoption identified as key success criteria
  - Requirements definition happens during proposal phase on most services engagements

- Can trace to test cases in RQM and tasks in RTC
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What Analysts are saying:
Liz Barnett, Ez-Insight: "With the Jazz project, Rational has developed **breakthrough technology** and is poised to set the standard for collaborative ALM…"

Julie Craig, EMA: "Rational’s differentiators are difficult for competitors to equal, and the new Jazz platform foundation may well turn out to be one of the best investments the Rational team has made."

Community Feedback and Testimonials

"Rational Team Concert has **excellent team collaboration** with automated project management dashboards that are transparent to everyone — not just managers. This immediate and automated feedback helps **keep teams on track and motivated** to achieve project goals."

— Han Jie, Siemens
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