



InterConnect 2015

The Premier Cloud & Mobile Conference

February 22 – 26

MGM Grand & Mandalay Bay
Las Vegas, Nevada

#ibminterconnect

Lab DSE-5071

**Designing Impact Analysis capabilities
for Product Line Engineering**

February 2015



Please Note

IBM's statements regarding its plans, directions, and intent are subject to change or withdrawal without notice at IBM's sole discretion.

Information regarding potential future products is intended to outline our general product direction and it should not be relied on in making a purchasing decision.

The information mentioned regarding potential future products is not a commitment, promise, or legal obligation to deliver any material, code or functionality. Information about potential future products may not be incorporated into any contract. The development, release, and timing of any future features or functionality described for our products remains at our sole discretion.

Performance is based on measurements and projections using standard IBM benchmarks in a controlled environment. The actual throughput or performance that any user will experience will vary depending upon many factors, including considerations such as the amount of multiprogramming in the user's job stream, the I/O configuration, the storage configuration, and the workload processed. Therefore, no assurance can be given that an individual user will achieve results similar to those stated here.

Acknowledgements and Disclaimers

Availability. References in this presentation to IBM products, programs, or services do not imply that they will be available in all countries in which IBM operates.

The workshops, sessions and materials have been prepared by IBM or the session speakers and reflect their own views. They are provided for informational purposes only, and are neither intended to, nor shall have the effect of being, legal or other guidance or advice to any participant. While efforts were made to verify the completeness and accuracy of the information contained in this presentation, it is provided AS-IS without warranty of any kind, express or implied. IBM shall not be responsible for any damages arising out of the use of, or otherwise related to, this presentation or any other materials. Nothing contained in this presentation is intended to, nor shall have the effect of, creating any warranties or representations from IBM or its suppliers or licensors, or altering the terms and conditions of the applicable license agreement governing the use of IBM software.

All customer examples described are presented as illustrations of how those customers have used IBM products and the results they may have achieved. Actual environmental costs and performance characteristics may vary by customer. Nothing contained in these materials is intended to, nor shall have the effect of, stating or implying that any activities undertaken by you will result in any specific sales, revenue growth or other results.

© Copyright IBM Corporation 2015. All rights reserved.

- **U.S. Government Users Restricted Rights - Use, duplication or disclosure restricted by GSA ADP Schedule Contract with IBM Corp.**

IBM, the IBM logo, ibm.com, Interconnect, Rational, and DOORS are trademarks or registered trademarks of International Business Machines Corporation in the United States, other countries, or both. If these and other IBM trademarked terms are marked on their first occurrence in this information with a trademark symbol (® or ™), these symbols indicate U.S. registered or common law trademarks owned by IBM at the time this information was published. Such trademarks may also be registered or common law trademarks in other countries. A current list of IBM trademarks is available on the Web at "Copyright and trademark information" at www.ibm.com/legal/copytrade.shtml

Other company, product, or service names may be trademarks or service marks of others.



Contents

Overview	5
Lab Setup	6
Validating that the Jazz server is running	6
Introduction to Automated Meter Reader	8
Analyzing Impact	10
Configuration Management concepts	10
Exploring Work Items	12
Logging in to the Jazz applications	12
Opening the AMR (CCM) project	13
Exploring Impacted Requirements	16
Select a Configuration Context	17
Using the Link Explorer	18
Using traceability views	22
Establishing links	24
Using links to estimate complexity	26
Summary of this Lab	27

Overview

In this lab you will explore the Impact Analysis capabilities in the Systems and Software Engineering solution using Requirement Management, Quality Management and Configuration Management.

In this lab you will get hands on experience with the following tools

- IBM Rational Team Concert
- IBM Rational DOORS Next Generation
- IBM Rational Quality Manager
- IBM Rational Configuration Manager

Over the course of this lab, you will explore the concepts of Impact Analysis:

- Understand change requests and impact analysis tasks
- Understand traceability and lifecycle artifact links
- Understand how to use global configurations and how to work with artifacts and links in the configuration context
- Understand how to explore artifacts links and assess impact
- Understand how to create links to track impact and downstream work on impacted artifacts

Lab Setup

This lab will use a Jazz server running various services for Configuration Management, Requirements Management, Quality Manager and Reporting within a VMware image. The Jazz server hosted on this image will be accessed through a web client to access needed applications and data, within the lab activities. Combining the server and the clients is not a normal configuration but is required to get all the resources needed for this lab into an easily portable image.

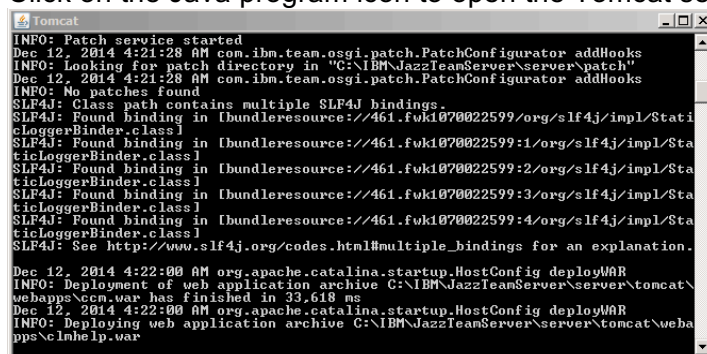
The VMWare image with the Jazz server should already been started by the lab staff.
As a first step in this lab you may optionally validate that the Jazz server is running on your machine.
You may also proceed directly to next main section in the lab.

Validating that the Jazz server is running

1. Log into the Windows server
 - a. Press Ctrl-Alt-Del
 - b. Log in as
 - User: Administrator
 - Password: Rati0nal
2. Check if the Tomcat server is running
 - a. In the Windows Taskbar, look for a Java program icon and a Tomcat server process.



- b. Click on the Java program icon to open the Tomcat server process.

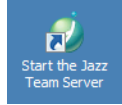


- c. Confirm that the server is running.
If the Tomcat server process is running, proceed to next main section in the lab.
If no Tomcat server process is running, proceed to the step below to 'Starting the server'

3. Starting the server

ONLY PERFORM THIS STEP IF THE JAZZ SERVER IS NOT STARTED

- a. On the desktop, double click on the **Start the Jazz Team Server** icon



- b. A command window titled **Tomcat** will open.
In 3-5 minutes you'll see the output, as shown above, with the "Server startup in ..." message.

Note: Be patient. Starting the servers is an operation that a real user never does. Users normally run continuously on a dedicated server environment managed by an administration team.

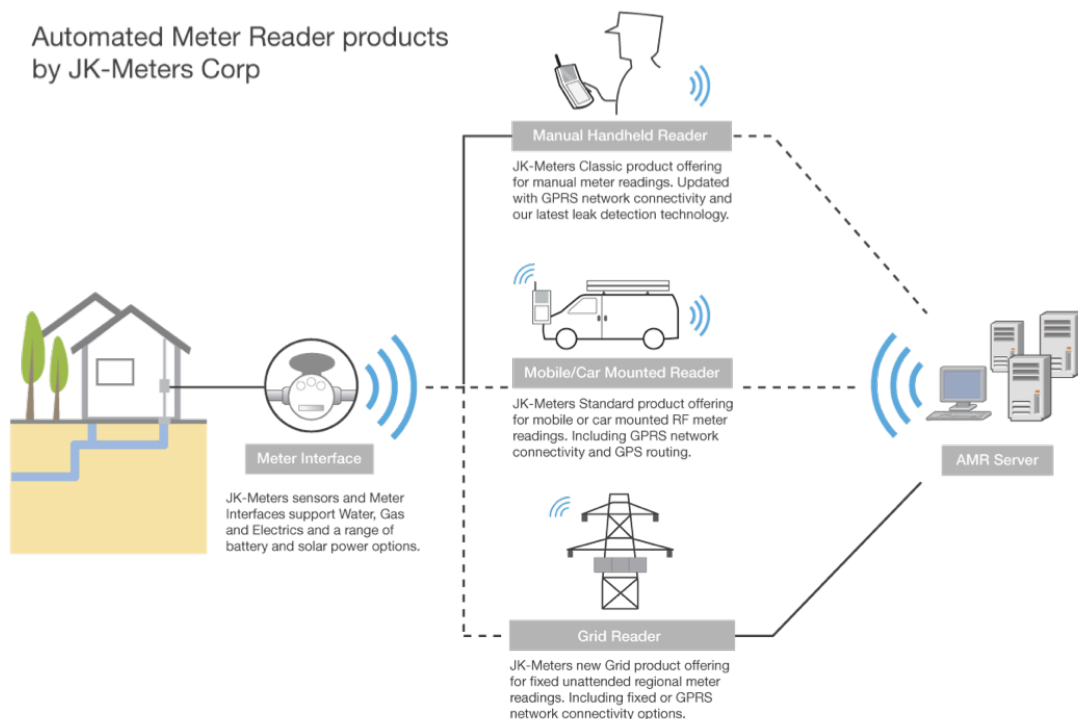
If in doubt on the state of the server, check with the lab staff before proceeding.

- c. Minimize the Tomcat server process window (DON'T click X!).

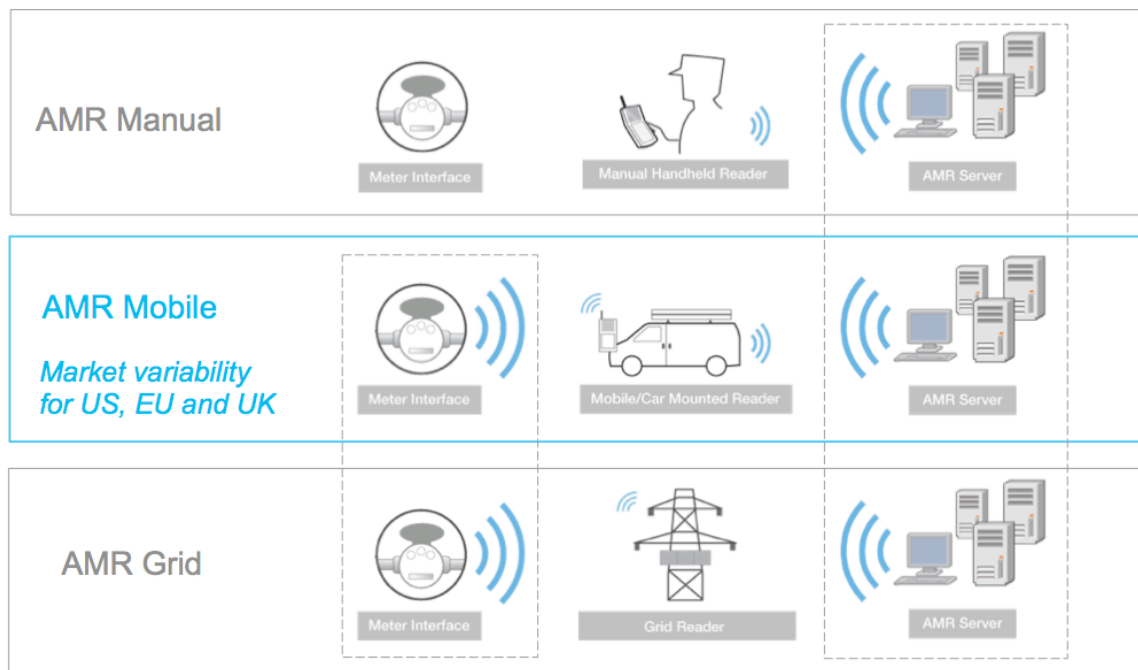
Introduction to Automated Meter Reader

This lab uses artifacts from the Automated Meter Reader sample data for reporting. The Automated Meter Reader sample uses a fictitious company JK Meters Corp, aspiring leaders of Smarter Flow Products for Utilities.

The Metering Division at JK Meters Corp has a range of Automated Meter Reader products in its product line. The most successful product is the Automated Meter Reader for Water Flow (see figure below). The product consists of meter interface units mounted on water pipes. The meter interface unit measures flow and delivers data to handheld or car mounted meter readers. The registered meter readings are uploaded from the handheld devices to the AMR server data management system manually. Uploading of data is performed continuously by the mobile meter readers using a mobile network connection, or manually when returning to the office at the end of the day when using the manual meter reader product. The Metering Division is currently investing in improved features in the product lines and new AMR products. An innovative new AMR Grid product reduces the operational cost of utility services by providing fixed grid meter readers that continuously reads a wireless grid of residential or industrial meter interface units and uploads data over a fixed network connection.



The Automated Meter Reader products are configured from reusable components. These component subsystems are developed and delivered by the Meter Reader, Meter Interface and AMR Server platform teams. The platform teams deliver the component subsystems with feature variability for the product line. For example, the Meter Interface team delivers wired and wireless variants of the component for the Manual and Mobile products. The Meter Reader team delivers variant components for Manual, Mobile and Grid products.



The Automated Meter Reader products have been delivered to utility customers in US. JK Meters Corp is growing its market share by developing variants for other regional markets. The variants are configured with regional requirements on power voltage, dimensions on pipe mounting, regional units of flow and volume, language configuration for the handheld meter readers and regional city maps for GPS routing.

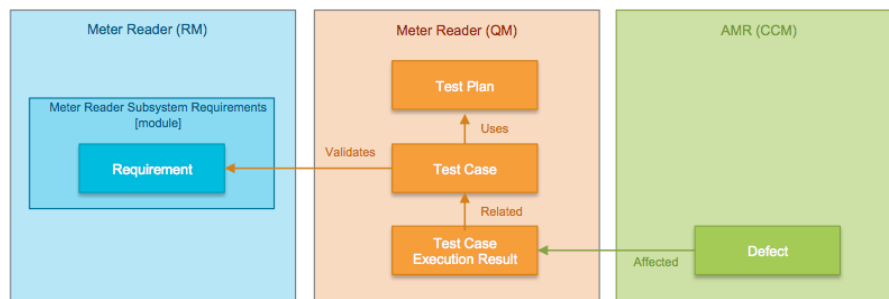
In this lab you will explore how the impact of changing requirements for a Mobile UK product are impacting artifacts in the US product variant.

Analyzing Impact

Configuration Management concepts

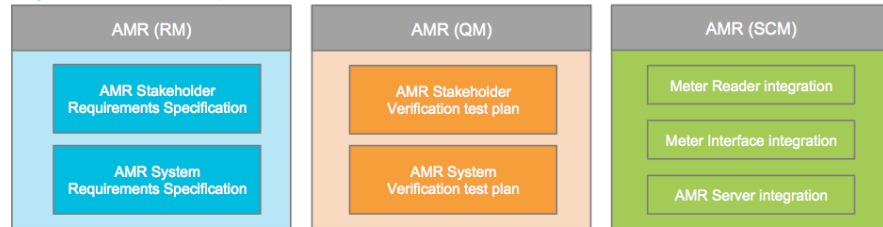
In this initial part of the lab you will learn about key concepts in configuration management, like *artifacts*, *links* and *components*.

The Automated Meter Reader (AMR) development teams are using the Systems and Software Engineering solution from IBM to manage the *system engineering artifacts* like requirements, tests, designs and source code. The artifacts are linked using traceability relationships. Examples of such links are shown in the figure below. In blue we indicate requirements for the 'Meter Reader (RM)' component specified in a 'Meter Reader Subsystem Requirements' module. Each requirement may be linked to a Test Case in the 'Meter Reader (QM)' component. Related requirements and test cases are linked using *validates* links. Test Cases are linked to *using* Test Plans and the results of run tests are linked to *related* Test Case Execution Results. In case a test run fails a Defect may be linked using an *affected* link.

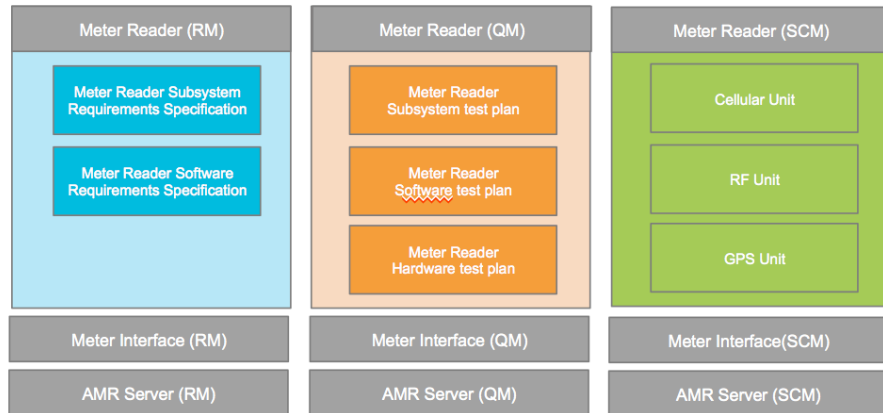


As indicated in the figure above, a *component* is a unit of organization consisting of a reusable set of artifacts. The Automated Meter Reader (AMR) teams are using components to organize the lifecycle artifacts under development. The teams have defined components for the system / product level and at each subsystem level, figure below. Separate components are used, at each level, to manage requirements, tests, designs and source code.

System level components

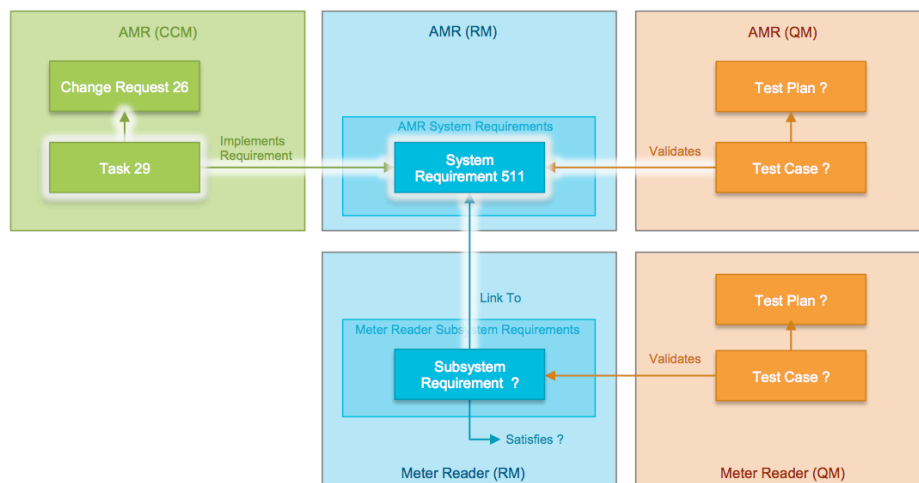


Subsystem level components



The Automated Meter Reader (AMR) team responsible for developing a UK variant of the AMR Mobile product has received a change request related to new stakeholder requirements on the product. The change request has been decomposed into impact analysis tasks to analyze the impact from changes on stakeholder requirements. One of the changes which we will focus on in this lab is the market expectation for 4G mobile communications standard to be used by the Meter Reader subsystem in the Mobile UK product.

In the next section of the lab you will start exploring the change request and the impact analysis task. In following sections of the lab you will use the traceability links established between the impact analysis task and the system artifacts, as indicated in the figure below. You will navigate in the context of the 'AMR.S Mobile US' global configuration.



Exploring Work Items

You will now explore some of the requirements components in the Automated Meter Reader (AMR) product.

Logging in to the Jazz applications

In this lab you will use a generic user **rational**.

1. Click on the **Firefox** icon on the Windows taskbar.



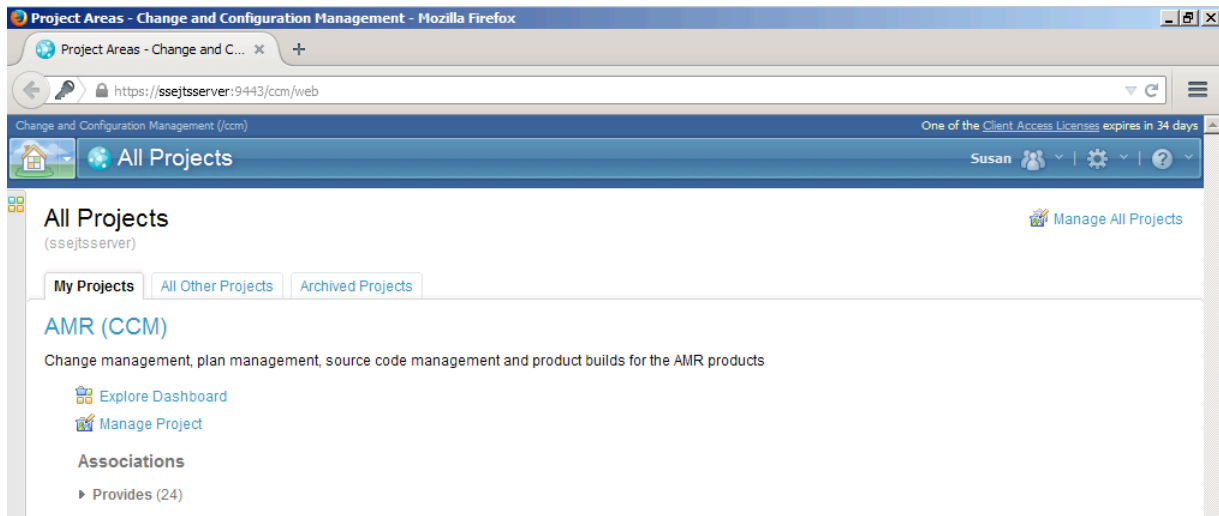
2. Choose the **ccm** bookmark to open the Rational Team Concert application
Alternatively enter the URL **<https://ssejtsserver:9443/ccm/web>**
3. Log in as User: **rational** with Password: **rational**



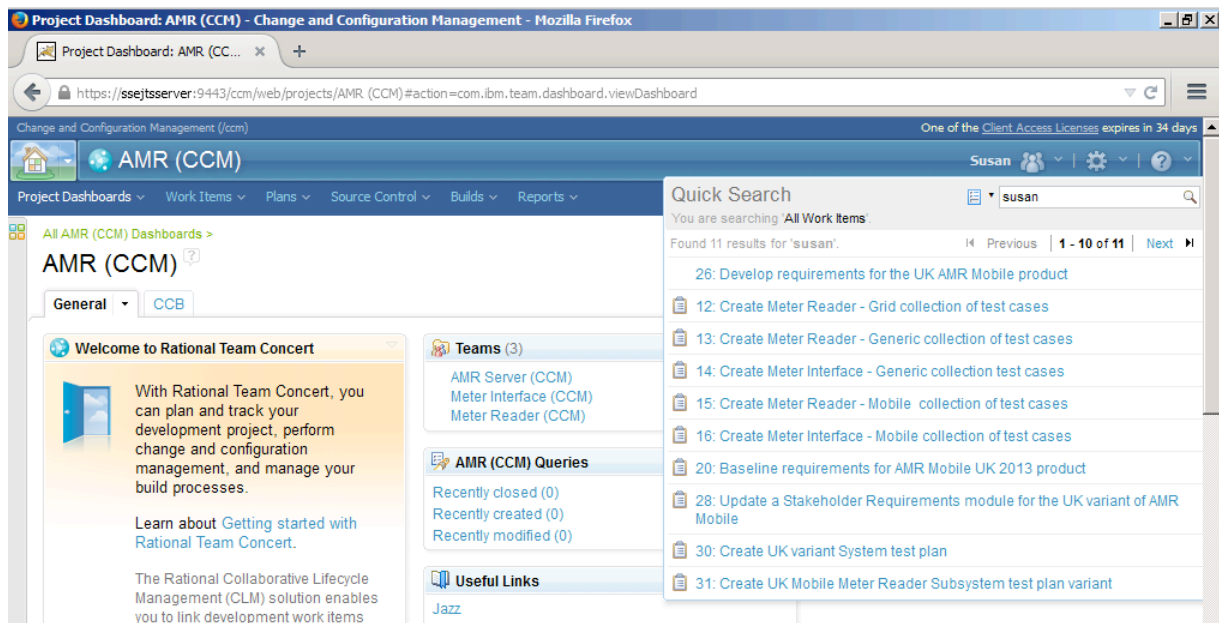
Opening the AMR (CCM) project

You will now open and explore the work items and plans Automated Meter Reader (AMR) product.

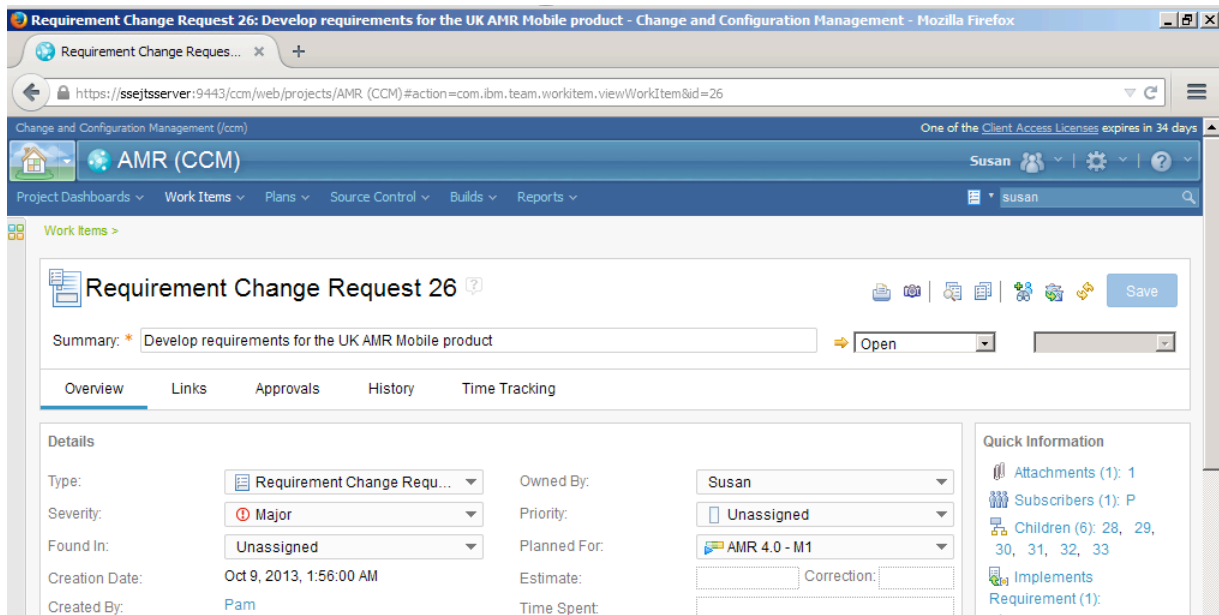
1. In the All Projects list, click 'AMR (CCM)'



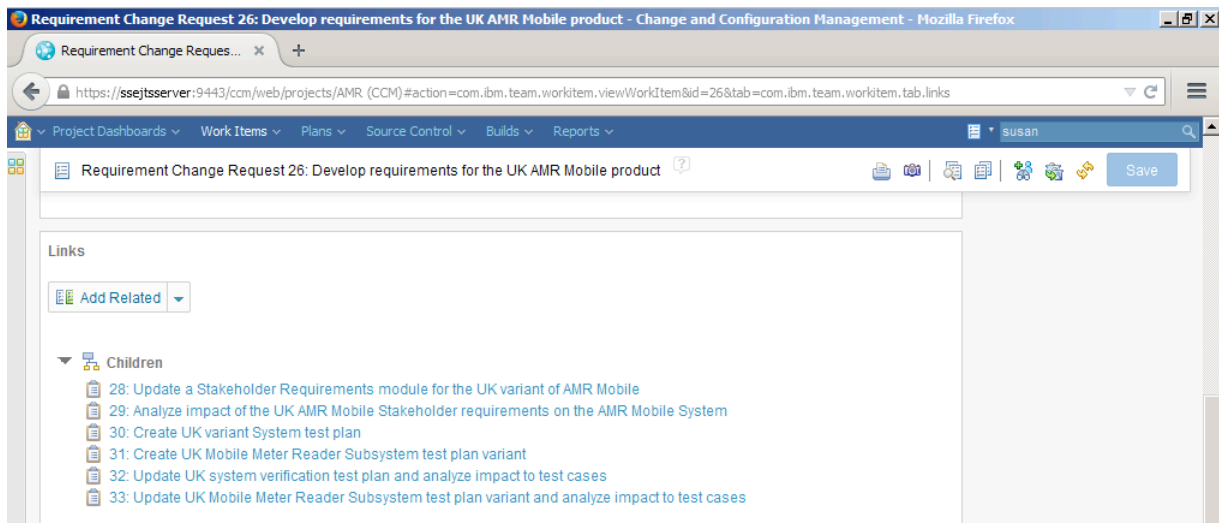
2. The AMR (CCM) project area opens. In the **Quick Search** field, type susan. A list of work items assigned to Susan is shown.



3. In list of work items, click on the link **26: Develop requirements for the UK AMR Mobile product**. The work item is opened in the editor.



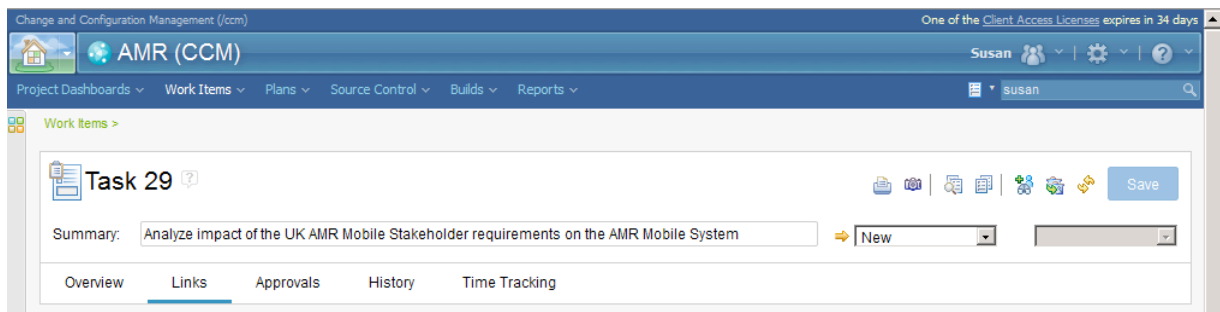
4. Click on the **Links** tab to view the artifacts linked to 'Requirement Change Request 26'. Scroll down on the page to view the Links section



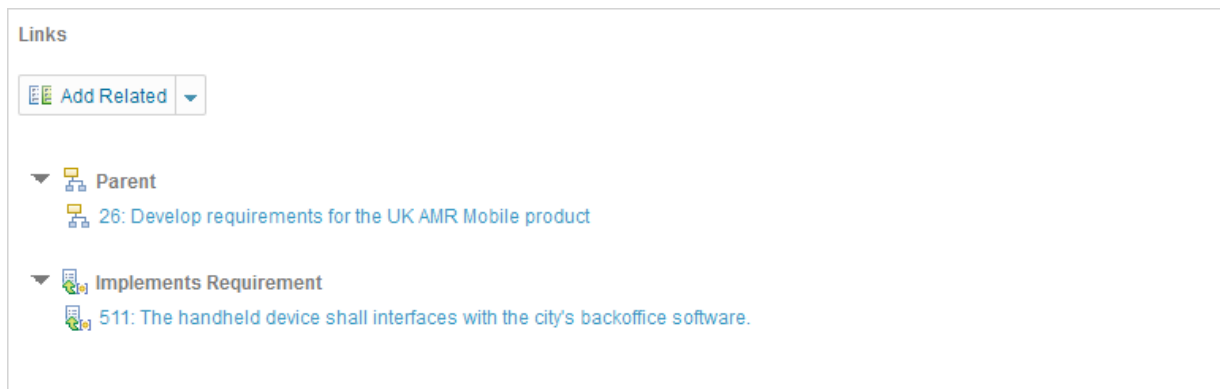
Note: The 'Requirement Change Request 26' links to a set of tasks in the **Children** section. These tasks represent work that needs to be completed update stakeholder requirements, analyze the impact of change, and plan and perform downstream work to implement the changes.

The 'Requirement Change Request 26' also links to the 'Stakeholder Requirements' module. This module should be updated by the team based on the new stakeholder requirements document attached to the change request in the **Attachments** section.

5. In the **Children** section, click on the task **29: Analyze impact of the UK AMR Mobile Stakeholder requirements on the AMR Mobile System**. 'Task 29' is opened in the editor.
6. Open the **Links** tab in Task 29.



7. Scroll down on the page to the **Links** section in the **Links** tab



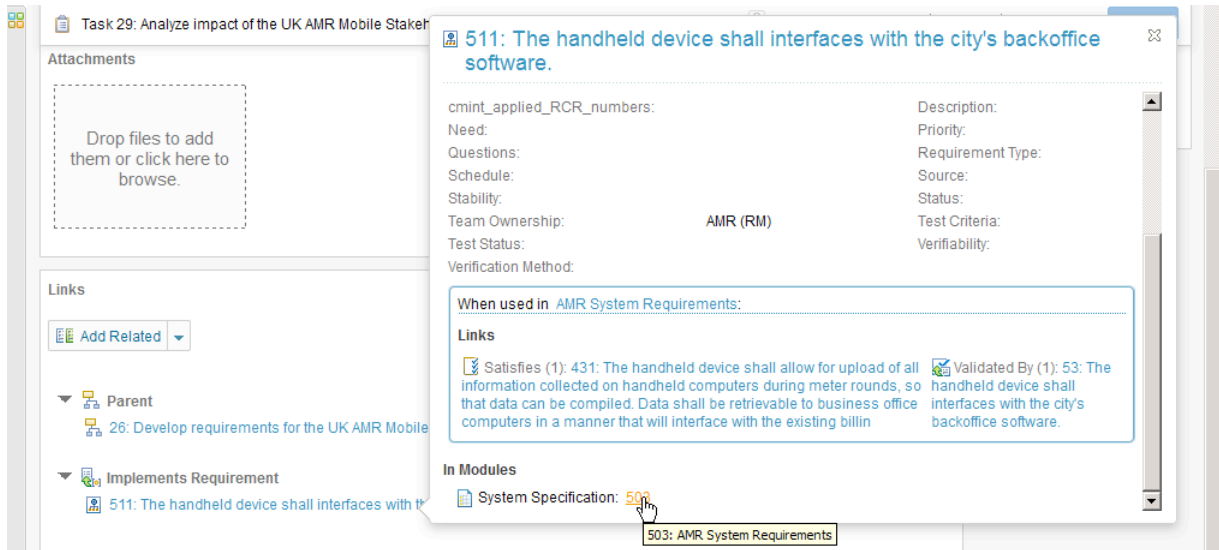
Note: 'Task 29' links to a system requirement '511: The handheld device shall interfaces with the city's back office software'. This requirement has been previously identified as impacted by 'Requirement Change Request 26' and linked to the impact analysis task 29 as the context for the impact analysis.

You will now start exploring what artifacts might be further impacted by changes to system requirement '511: The handheld device shall interfaces with the city's back office software'.

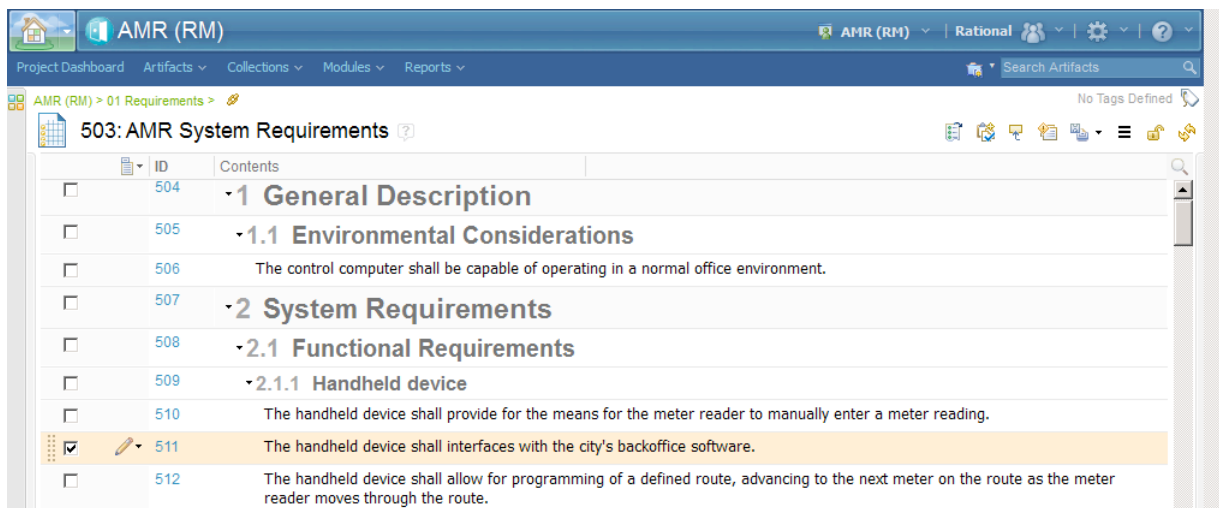
Exploring Impacted Requirements

You will now trace from the work item view in Rational Team Concert to system requirements in Rational DOORS NG.

1. Hover over requirement link **511: The handheld device shall interfaces with the city's backoffice software**. Wait for the rich hover preview to open.

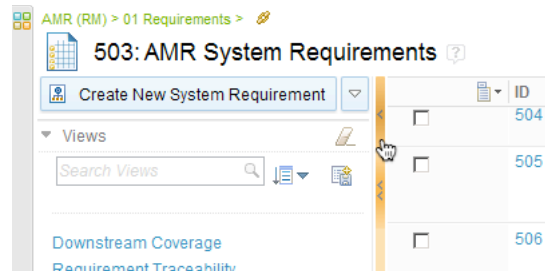


2. In the rich hover preview, scroll down to the **In Modules** section.
3. Click on the link to the **System Specification: 503**.
Hold down the ctrl-key while clicking to open the requirement in a new browser tab. Rational DOORS NG opens and loads the 'AMR (RM)' project. The '503:AMR System Requirements' module is opened in the editor with requirement '511' selected.



Note: Collapse the left sidebar by clicking on the < icon on the splitter to make the **Contents** column wider.

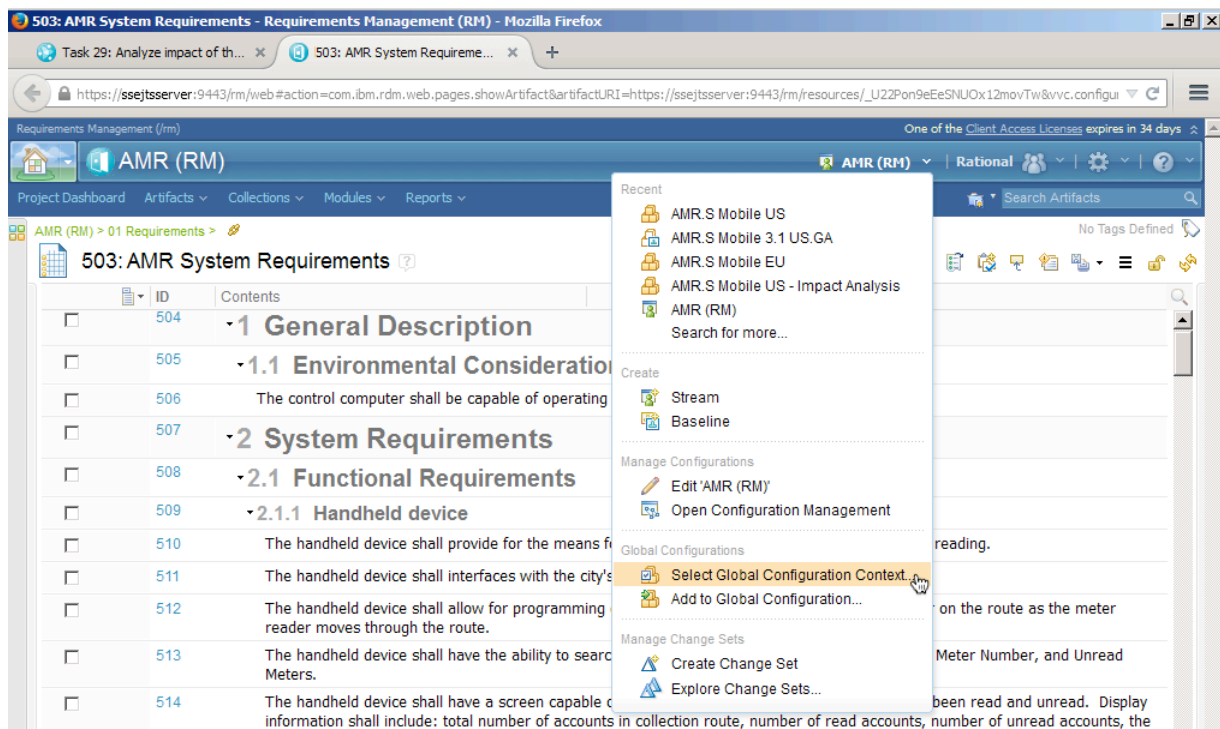
Clicking on the < > icon will collapse both left and right sidebars.



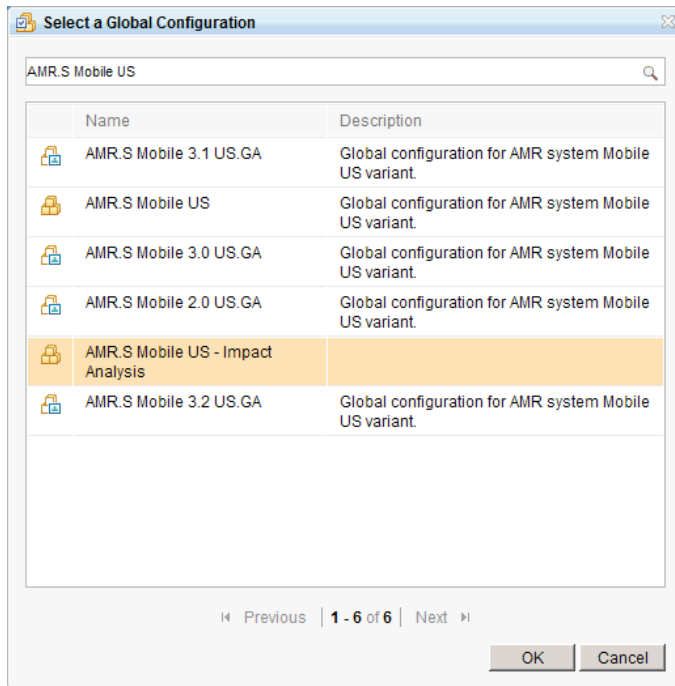
Select a Configuration Context

Before proceeding to browse artifacts and links you need to select a global configuration context that defines the versions of the artifacts to be selected. You will choose the 'AMR.S Mobile US' global configuration.

1. From the Configuration Management menu on the banner, choose **Select Global Configuration Context...**

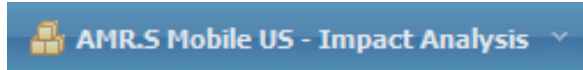


2. In the **Select a Global Configuration** dialog, type **AMR.S Mobile US** in the search field. From the list of found configurations, select '**AMR.S Mobile US – Impact Analysis**'. Click **OK**.



3. The 'AMR (RM)' project is reloaded with the selected configuration context.

Note: The selected context is shown on the banner.

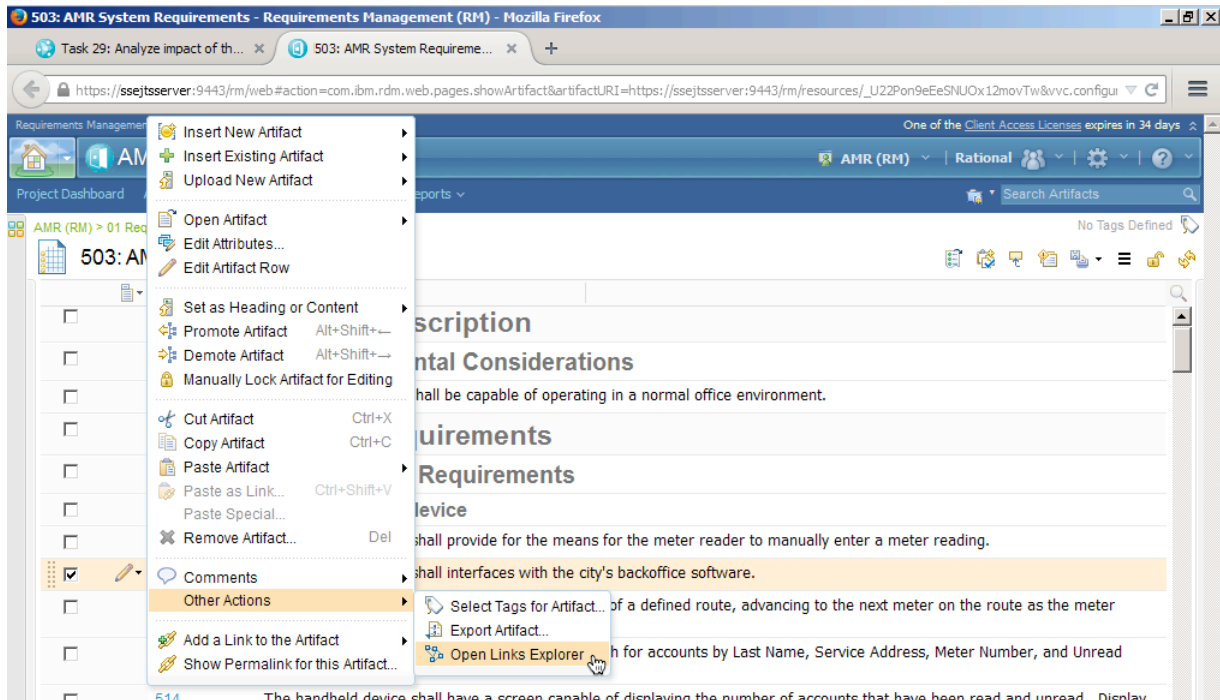


Using the Link Explorer

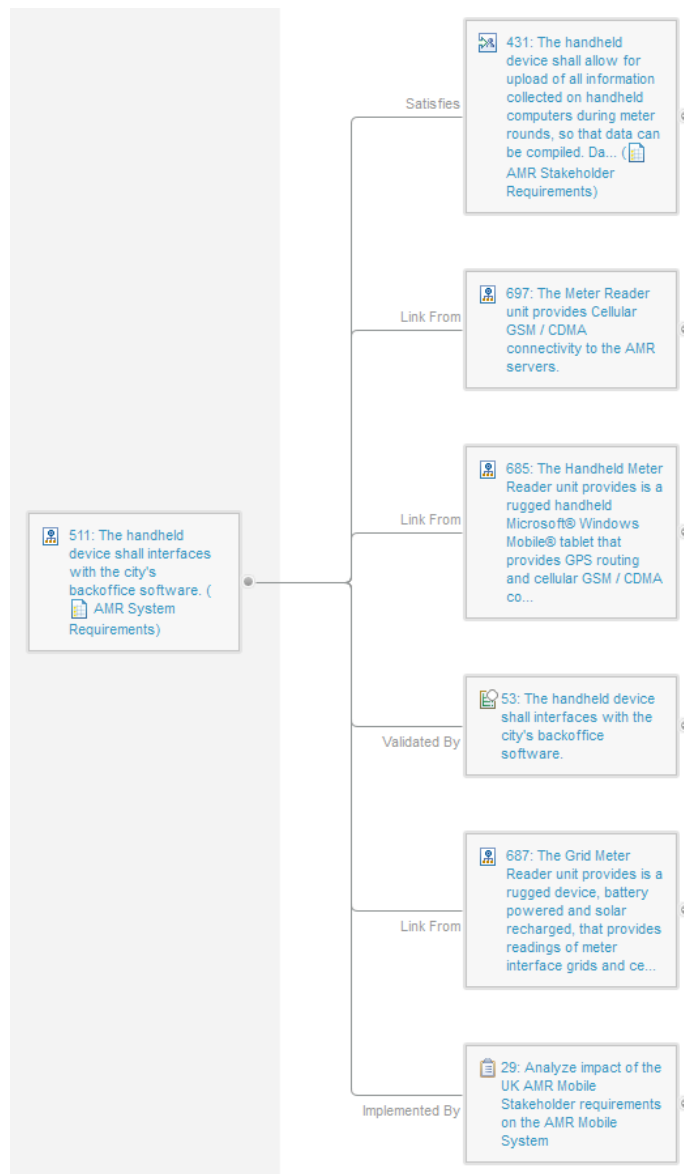
You will now use the Link Explorer in Rational DOORS NG to visualize the artifacts linked to impacted requirements and tests cases.

1. Move the cursor to the row with requirement '511'. The row will highlight and a button with a pencil icon () will be shown.

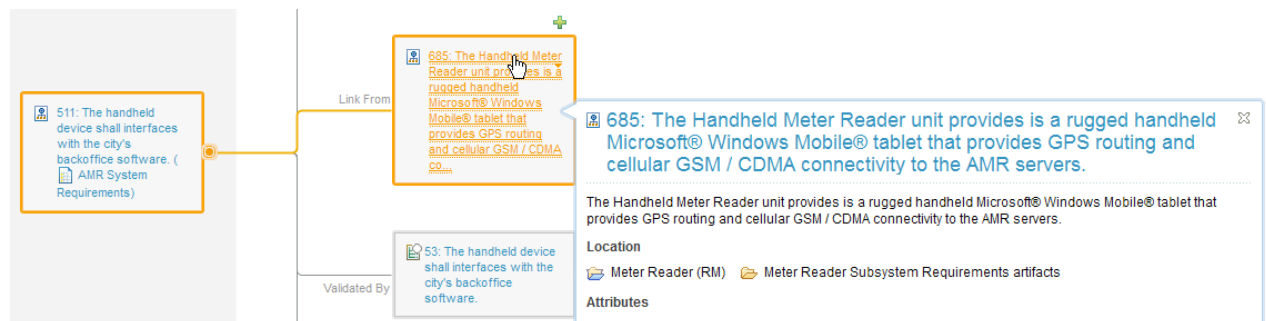
2. Click the menu from the pencil icon and choose **Other Actions > Open Link Explorer**.



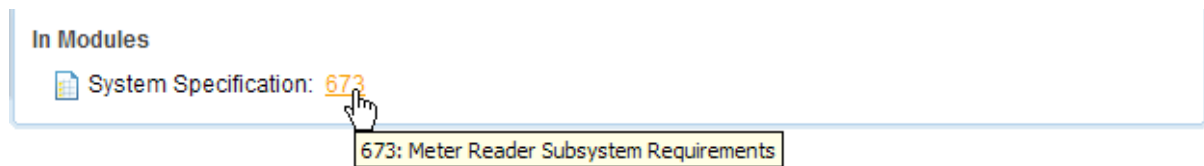
3. The **Diagram view of related links** window opens. Scroll or use the zoom controls to view the full diagram. See image below.
4. Analyze the artifacts and links shown on the diagram.
Notice the following links from requirement 511.
 - An *Implemented By* link to the impact analysis Task 29. This is the link we navigated earlier to get to requirement 511.
 - A *Satisfies* link to the stakeholder requirement with ID 431. This is the up-stream stakeholder requirement that is driving the change request for a new mobile communication standard.
 - Three *Link From* links to subsystem requirements with IDs 685, 687 and 697. These requirements are specified in the 'Meter Reader System Requirement' module. From the requirement text we see that they are related to the US communication feature and the GSM/CDMA mobile communication standard. We may conclude that these requirements will be impacted by a stakeholder requirement change to adopt a 4G mobile communication standard.
 - A *Validated By* link to the system validation test case with ID 53. This is the test case that will validate that the Mobile Reader handheld device will connect and upload meter readings to the AMR Server.



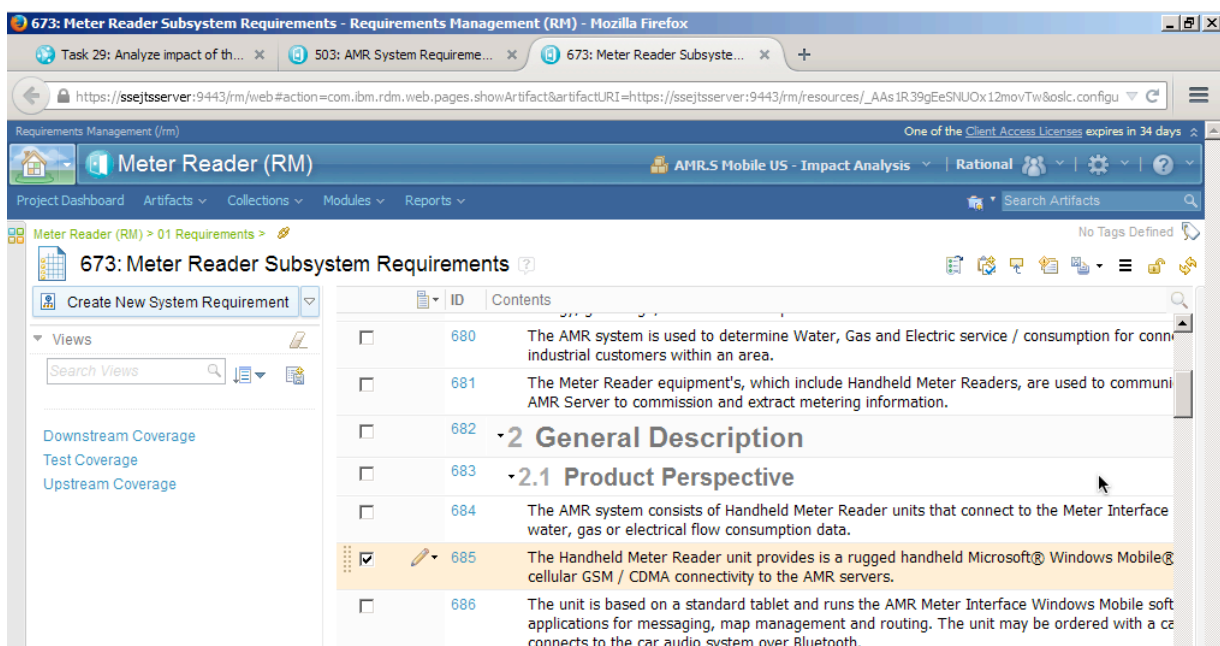
Note: Hovering your cursor over the artifacts shows a rich hover preview with more detail on the linked artifact, like some of their attributes.



5. Hover your cursor over requirement with ID '685'. Scroll down on the preview and click on the link to open the requirement in '673: Meter Reader Subsystem Requirements' module. Hold down the ctrl-key while clicking to open the module in a new browser tab.



6. The '673: Meter Reader Subsystem Requirements' module opens with requirement '685' selected.



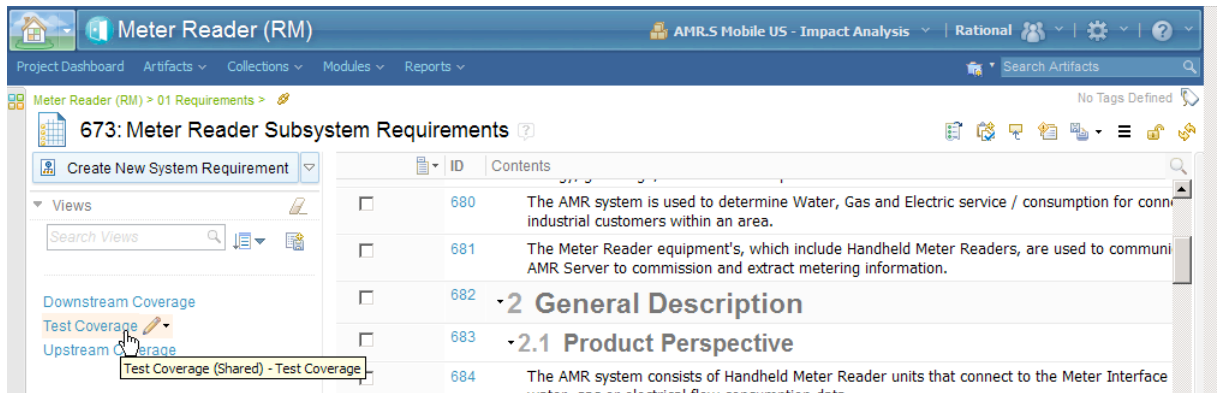
Note: The module '673: Meter Reader Subsystem Requirements' is contained in the 'Meter Reader (RM)' project. Browsing the link will open the Meter Reader project in the editor in the context of the 'AMR.S Mobile US – Impact Analysis' configuration context.

You have now explored the requirement links from system requirements to subsystem requirements. In the next step you will view a traceability table view with requirements and test cases in the 'Meter Reader Subsystem Requirements'. You will also use this view to browse to linked test cases.

Using traceability views

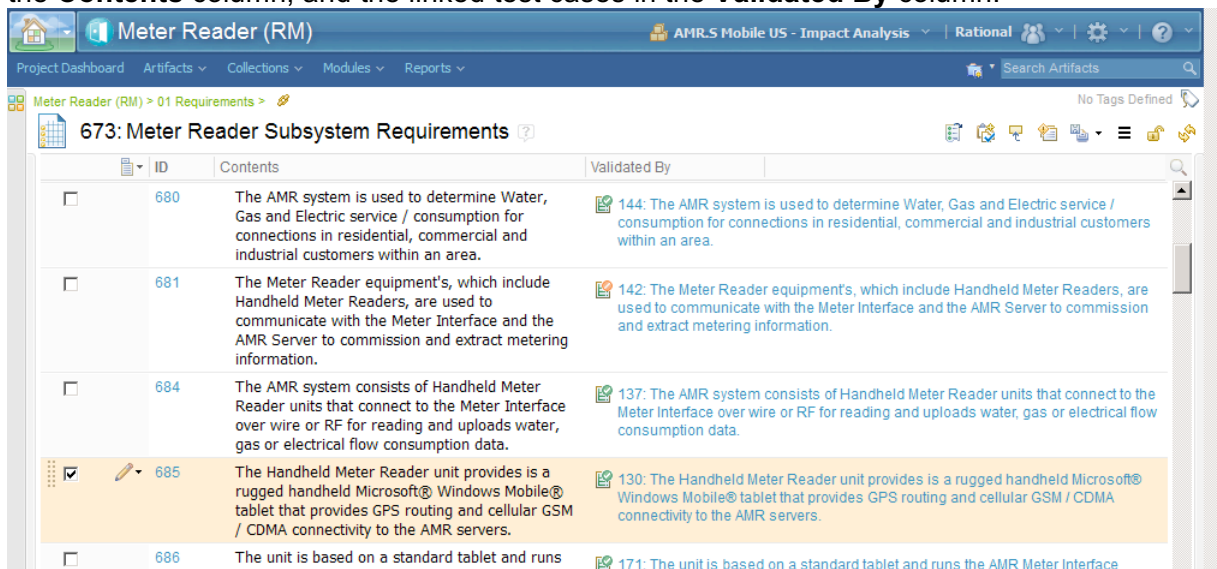
You will now view trace relations from module requirements to test cases.

1. Return to the browser tab with Rational DOORS NG, the 'Meter Reader (RM)' project, and the '673: Meter Reader Subsystem Requirements' module.
2. In the **Views** section in the left sidebar, click on the **Test Coverage** view.

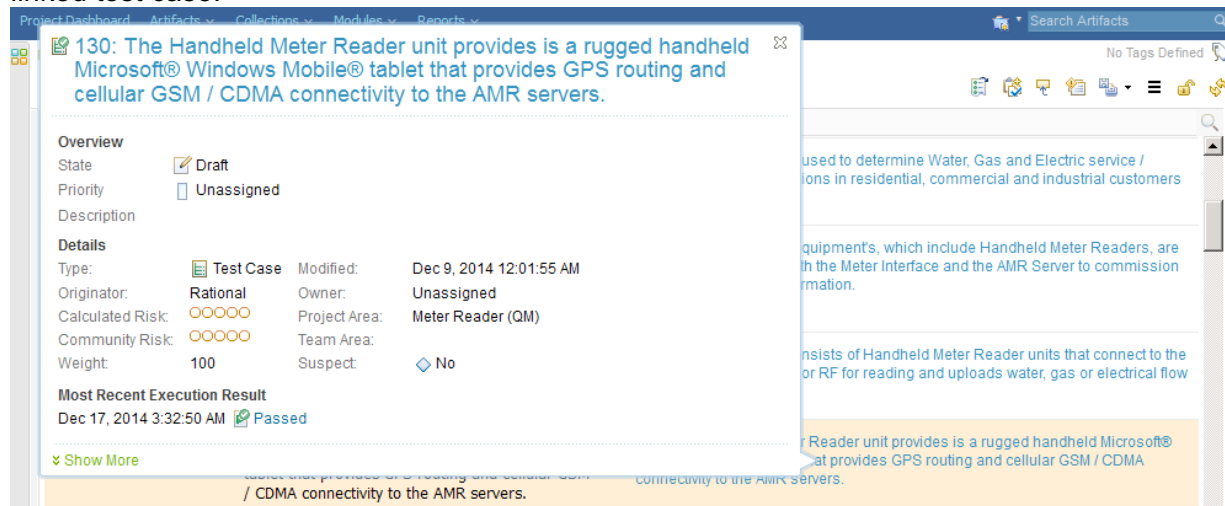


Note: If the left sidebar is collapsed, hover over the splitter and click the > button to expand the sidebar.

3. The requirements view is updated and a traceability view is shown with requirement to the left in the **Contents** column, and the linked test cases in the **Validated By** column.



Note: The icons on the **Validated By** column indicate the **Most Recent Execution Result** of the test case. Hovering over the test case will show a rich hover dialog with more details on the linked test case.



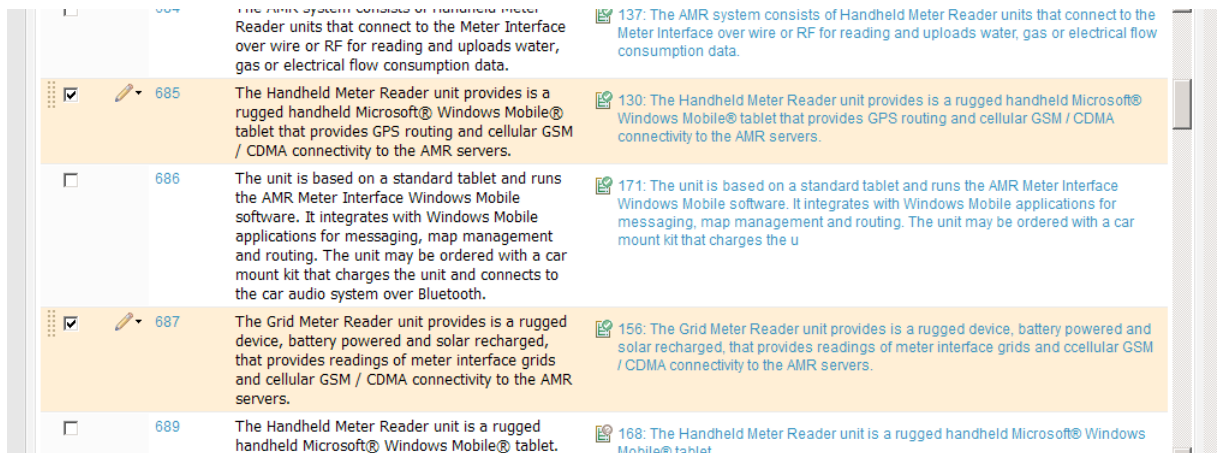
The conclusions we can make from the impact analysis is that the Meter Reader subsystem is impacted by this requirement change and we should track changes to the three subsystem requirements.

You will in the next section establish a *Tracked By* link to the impact analysis task to track this identified impact.

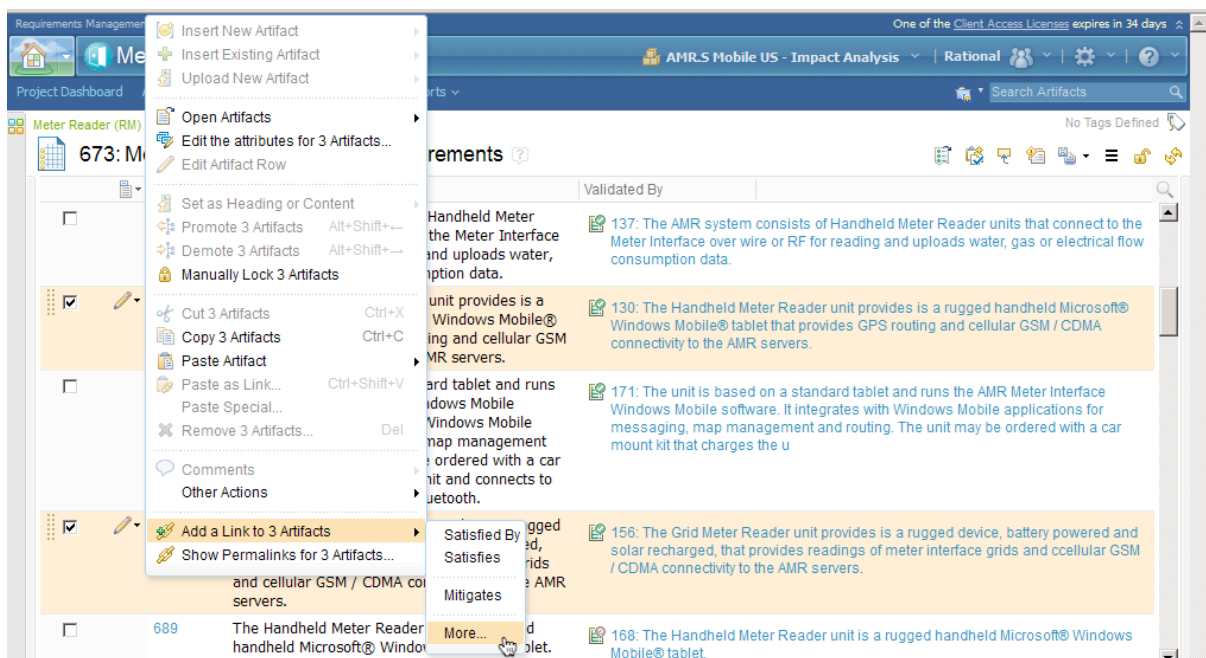
Establishing links

You will now link the three subsystem requirements to the impact analysis task.

1. Return to the browser tab with the '673: Meter Reader Subsystem Requirements' module.
2. Select the three impacted subsystem requirements with IDs '685', '687' and '697' by clicking the check-box () on each requirement.



3. Click the menu from the pencil icon () on one of the selected requirements, and choose the **Add a Link to 3 Artifacts > More...** command.



4. The **Create Link** dialog opens.
Choose the **Link type: Tracked By**
Type 29 to search for the impact analysis task.
Select task '29' from the list of found work items.
Click **OK**.

Create Link

Kind of link to create: * Link type: **Tracked By** From artifact: <multiple artifacts>

Artifact Container: **AMR (CCM)**

☒ Choose Existing ☐ Create New

Project Area: **AMR (CCM)**

☒ Search by Keyword or Work Item Number ☐ Search by Query

Type: **Task**

Work Item Number or Words Contained in the Text. Use quotes for a phrase search:

29

Matching Work Items: 1 result(s)

29: Analyze impact of the UK AMR Mobile Stakeholder requirements on the AMR Mobile System

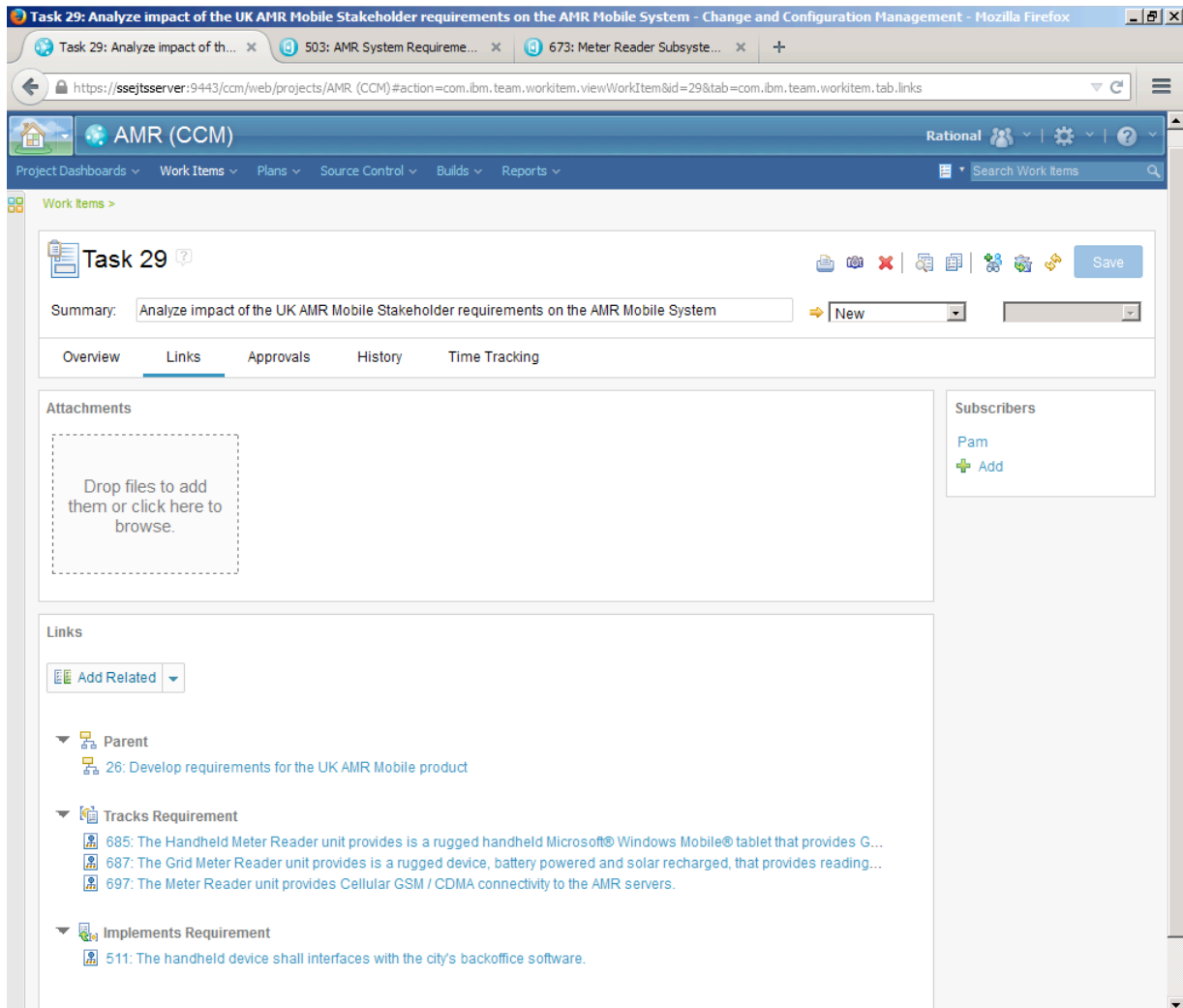
OK **Cancel**

You have now created three new links from the impacted subsystem requirements '685', '687' and '697' to the impact analysis task '29'.

You will now return to the impact analysis task in Rational Team Concert and estimate complexity.

Using links to estimate complexity

1. Return to the browser tab with Rational Team Concert.
Alternatively, click on the **ccm** bookmark or enter the URL **https://ssejtsserver:9443/ccm/web**
2. Open the 'AMR (CCM)' project and open 'Task 29' using the **Quick Search** field
3. Click on the **Links** tab on 'Task 29' and scroll down to the **Links** section.



Note: The three links we created in the previous part is now showing on the impact analysis task.

You can now estimate complexity of the impact form the impact analysis task. Requirement 511 will be updated based on new stakeholder requirements. This will impact the Meter Reader subsystem and requirements 685, 687 and 697.

Summary of this Lab

In this lab you have explored the concepts of Impact Analysis by

- Using impact analysis Tasks to assign work
- Using a global configuration to work with artifacts and links in a configuration context
- Using lifecycle artifact links to explore and assess impact
- Create links to the impact analysis task to track impacted artifacts

Visit [IBM.com](https://www.ibm.com) for more information on Requirements Management, Quality Management, Configuration Management, Reporting and Analytics capabilities in the Systems and Software Engineering solution.