IBM Engineering Roadmap Update: What You Need to Know

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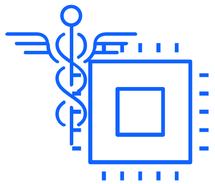
IBM Engineering enables customers with complex engineering needs

Automotive

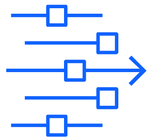
Aerospace & Defense



Electronics & Medical Devices

Public & Government

Regulated Finance & Insurance



Infrastructure

Our strategic focus addresses

Complexity

deliverable interacts with multiple other systems

Compliance

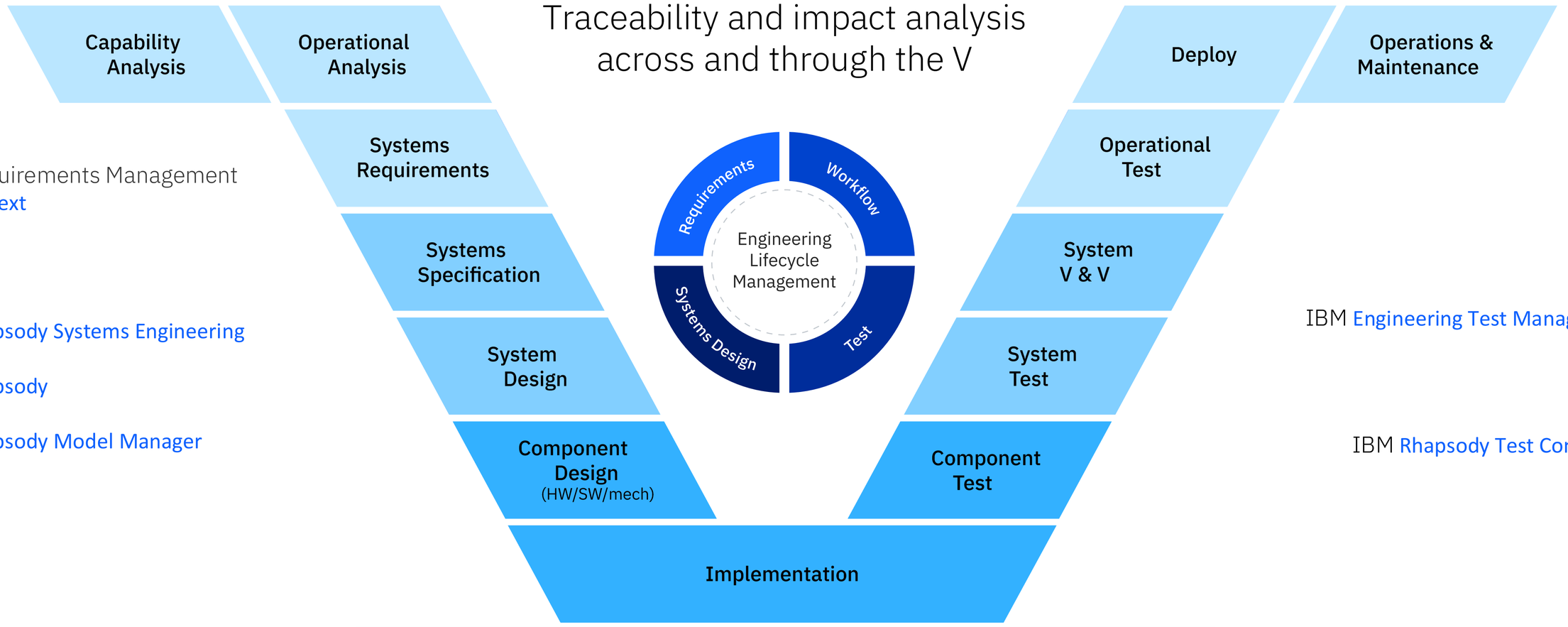
safety- and mission-critical systems, including those subjected to regulatory standards

Distributed Work

large, multi-faceted development organizations or partner/supplier chains

ELM is the foundation for complex software and systems development

IBM Engineering solution



IBM Requirements Management
DOORS Next
DOORS

IBM Rhapsody Systems Engineering

IBM Rhapsody

IBM Rhapsody Model Manager

IBM Engineering Test Management

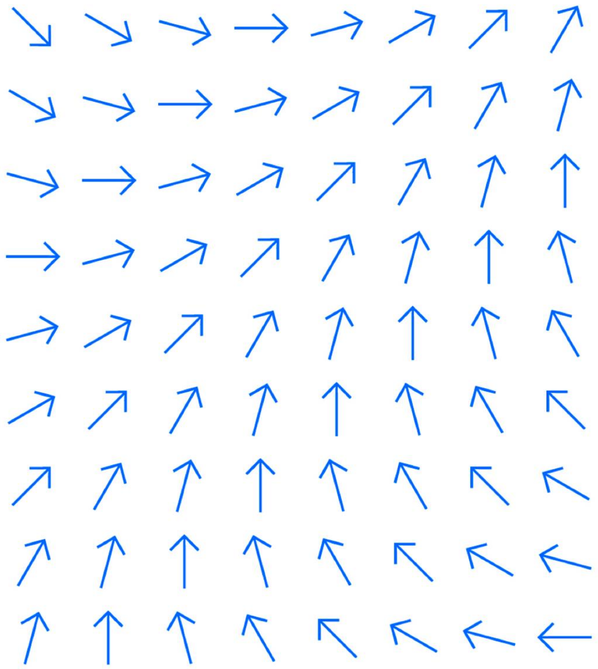
IBM Rhapsody Test Conductor

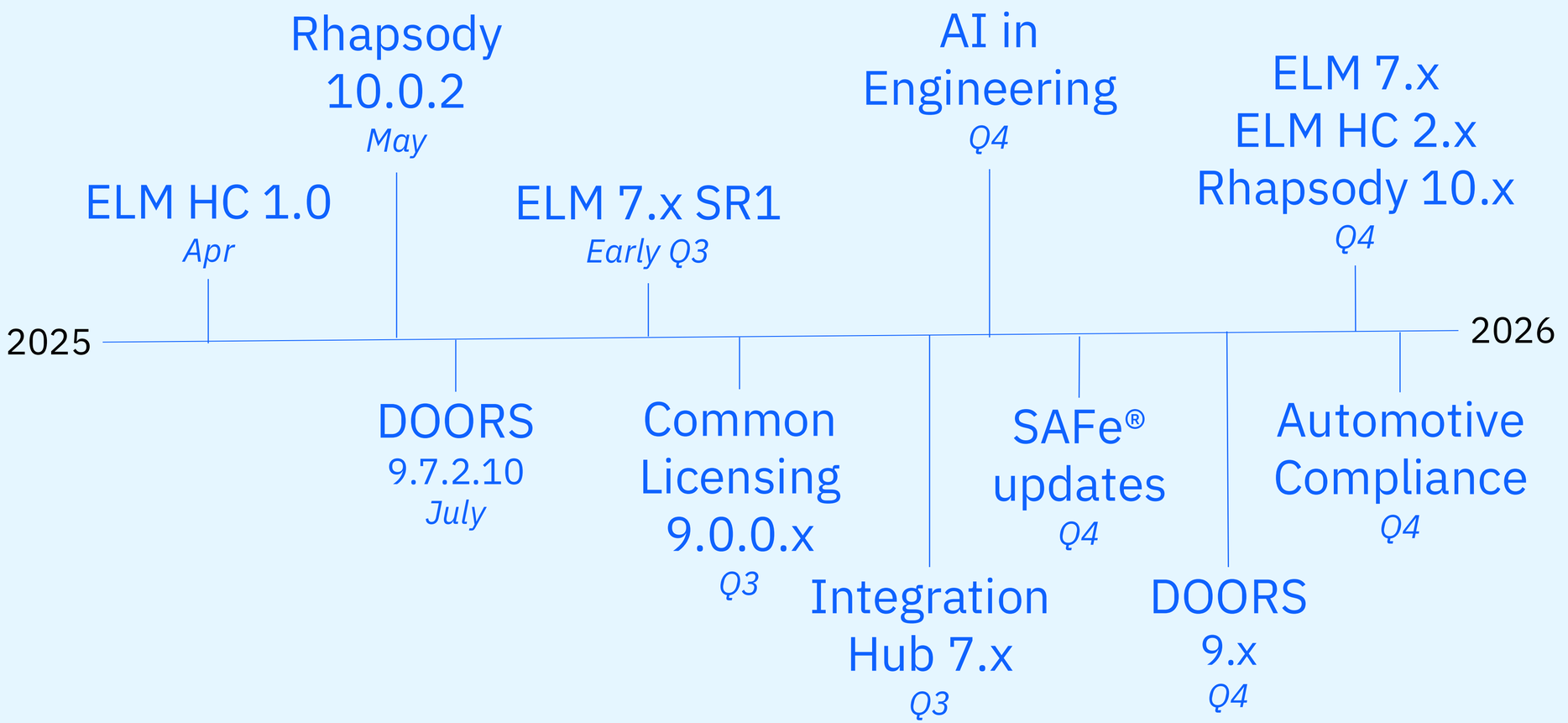
IBM Global Configuration Management
IBM reporting and Engineering Insights
IBM Publishing

IBM Engineering Workflow Manager
IBM Method Composer
IBM Automotive Compliance
IBM Integration Hub

Jazz Reporting Service

IBM ELM deliveries projected in 2025

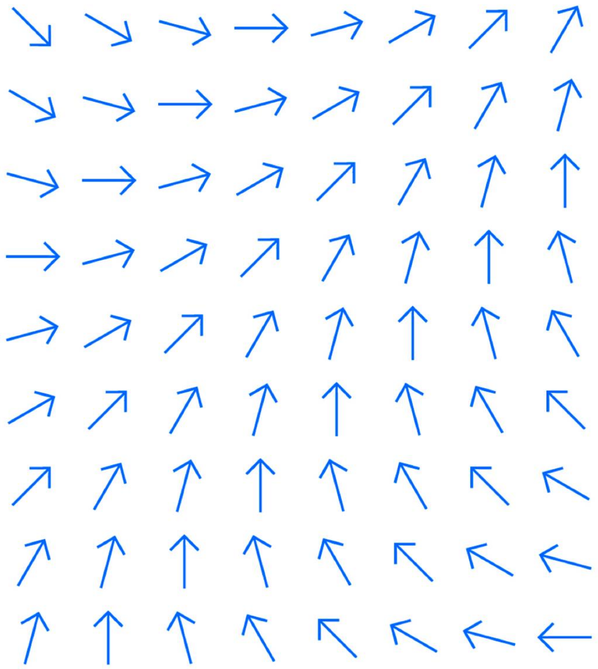




Quarterly: Rhapsody Systems Engineering releases
Regularly: ELM iFixes

ELM 7.1

builds on IBM leadership in…



1

Digital Thread

Defines and helps teams manage dependencies among engineering data from their tools

Link between models with OSLC-AM (RMM), including with the new Rhapsody Systems Engineering (employing SysML v2)

Simplified linking: drag-n-drop across RMM browser windows

Larger/more convenient drop zone for work item drag-n-drop linking and adding attachments

Engineering Insights knowledge / traceability graph using LQE rs

2

Reporting

Automates the gathering and presentation of project and program-wide status information and program deliverables

Report on additional dimensions in historical metrics when using LQE

Built-in Report Builder type explorer documents data source schemas, simplifying advanced report authoring

Reporting performance, scale reliability, availability:

- New relational database store for LQE is the default
- DOORS Next log-based TRS required
- Removed many cases for needing to reindex

3

Configuration and Change Management

Improves the process of defining, reviewing, and changing artifacts in the context of the larger product under design or development

Create DOORS Next baseline at a time in the past

Export requirements in a baseline using an existing ReqIF definition

Enforce unique config names in ETM

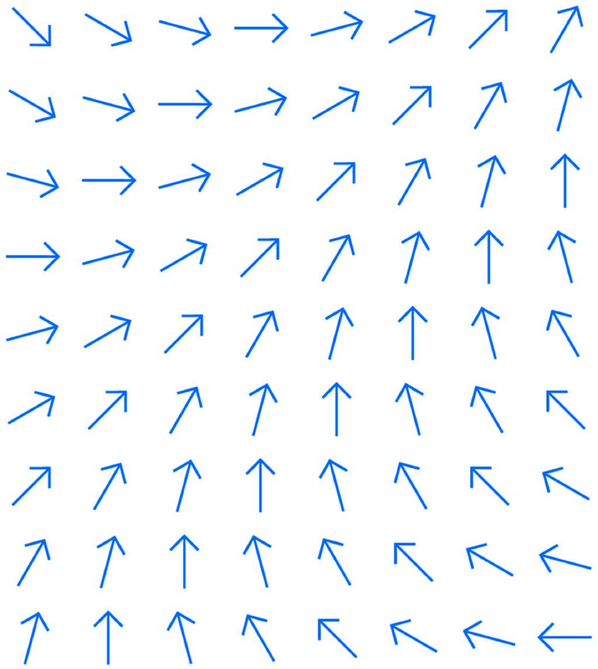
Use a more flexible and consistent grammar for more predictable EWM-Git workflow

Code review improvements

LDX rs: link index moved to relational store and combined with LQE rs (one less server!)

ELM 7.1

builds on IBM leadership in…



4

Agile Engineering

Facilitates planning and managing work to reduce time to market, minimize bottlenecks, and accelerate the flow of work across the value stream for continuous value delivery

Express yourself: images and tables in work items descriptions

Enhance agility using latest guidance for SAFe®
– Updated flow metrics reports and templates

Extend Automotive Compliance
– ASPICE 4.0 updates
– ASPICE for Cybersecurity
– Improved TARA and guidance on vulnerability management

5

User Productivity

Practitioners and administrators can work faster with less overhead and fewer opportunities for error

Get the requirements data you need in front of you:
– Ancestors and descendants
– Advanced filtering

Easier navigation through Rhapsody models in web browser with RMM sidebar model explorer

6

Operating at Scale

With hardened deployments, increased data and user scale, and keeping current with the specific operation environment and integrations

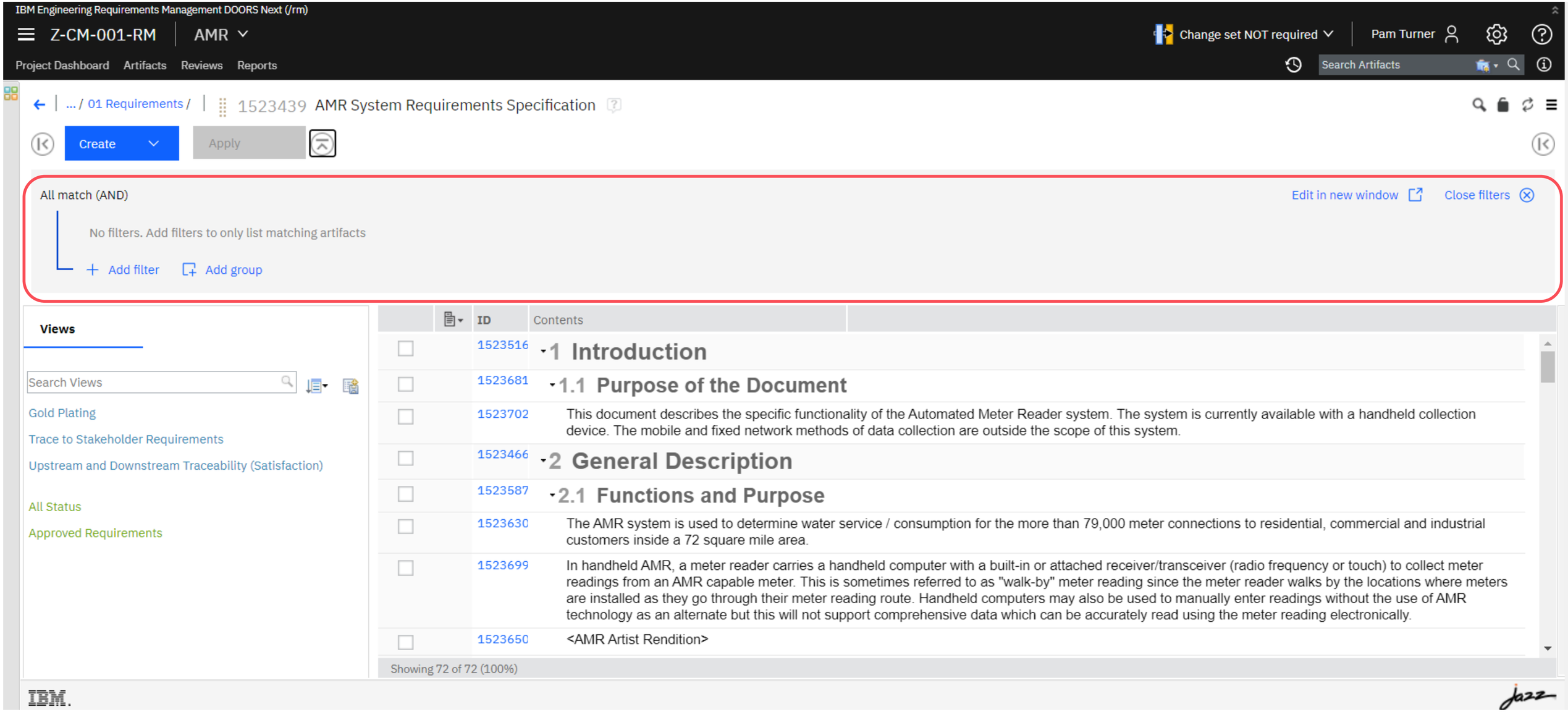
Easier auditing of user access and permissions
– APIs and logging

Performance optimizations
– Significant improvements in report queries with LQE rs
– Significant improvements in versioned link lookups for UIs with LDX rs
– Other improvements

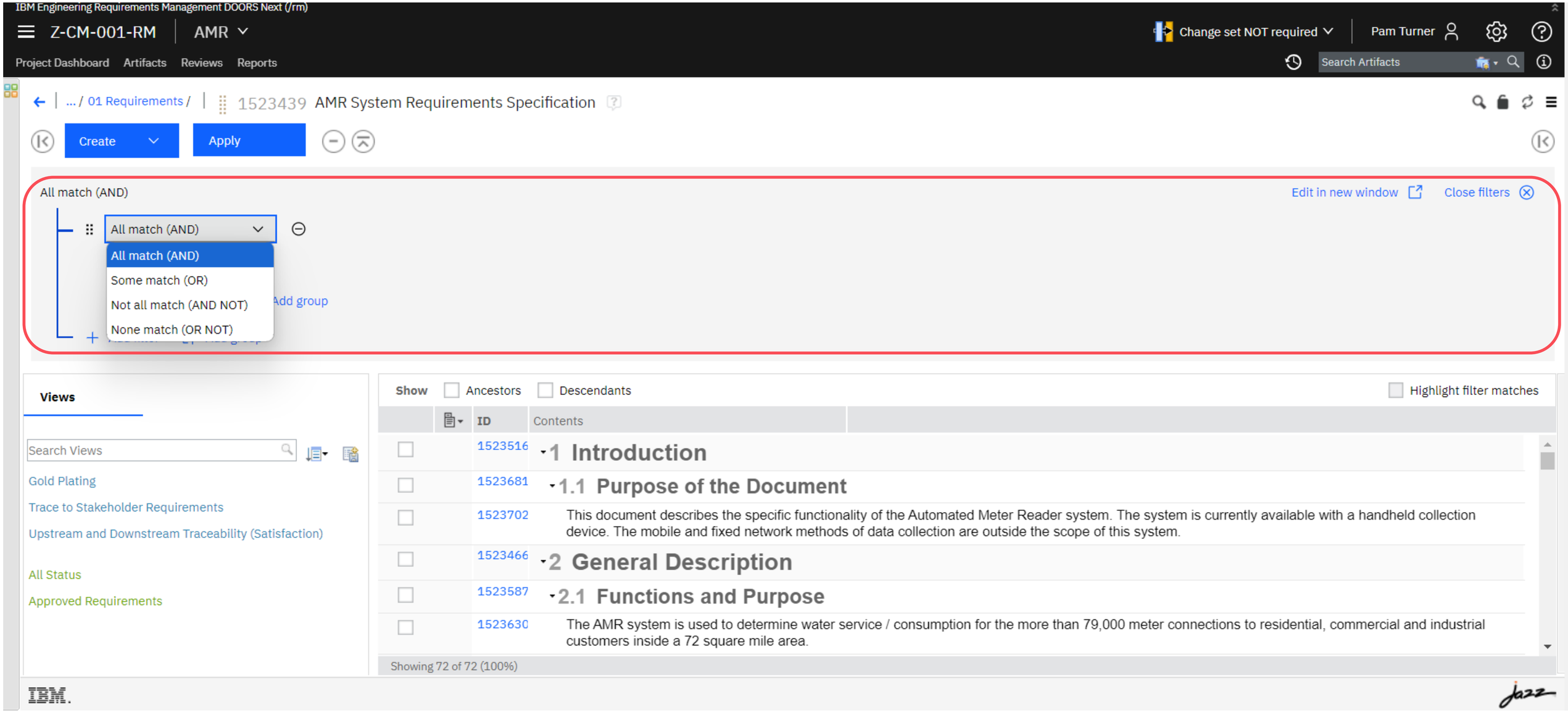
Secure deployments
– updates to components, specified operating environment, and integrations

DOORS Next

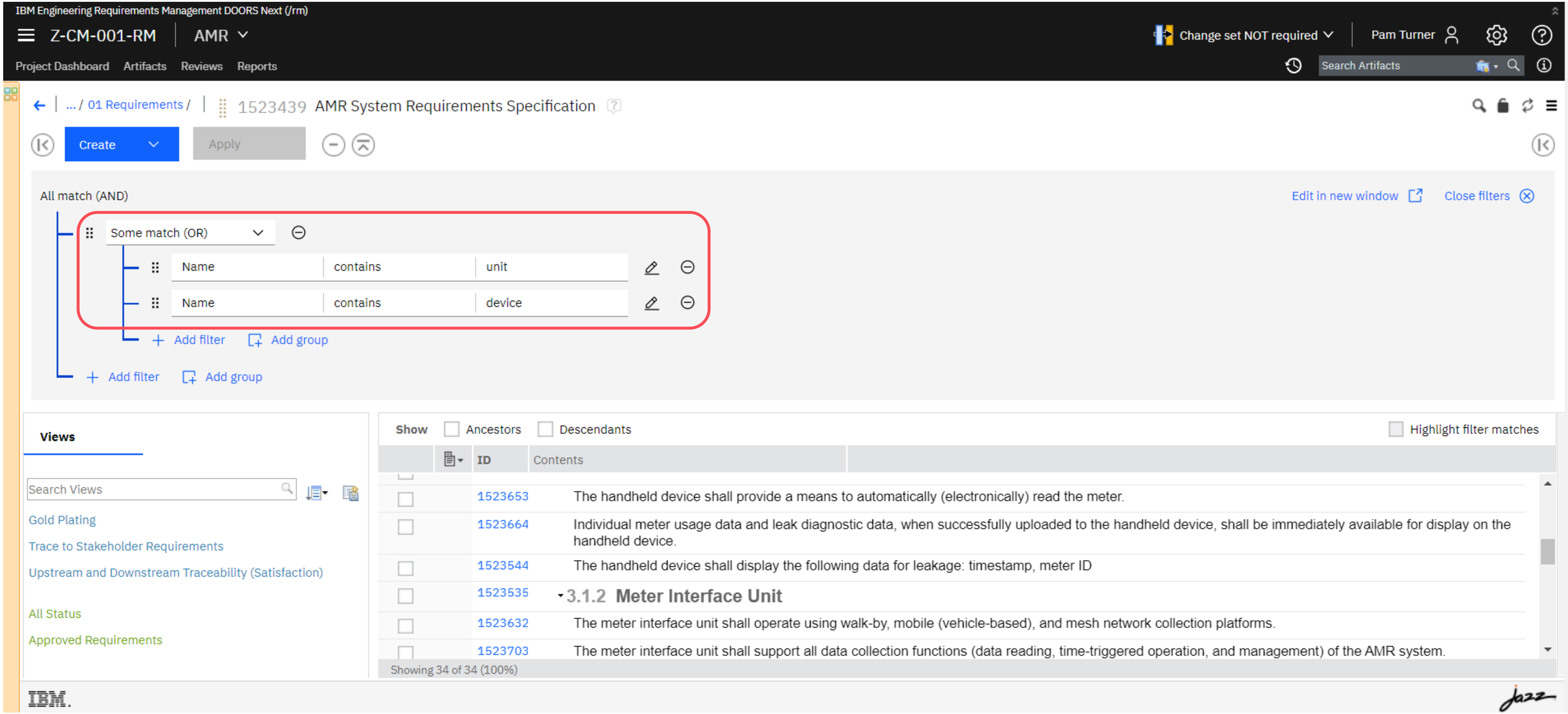
Complex Expressions with AND/OR Boolean Operators



Complex Expressions with AND/OR Boolean Operators



Complex Expressions with AND/OR Boolean Operators



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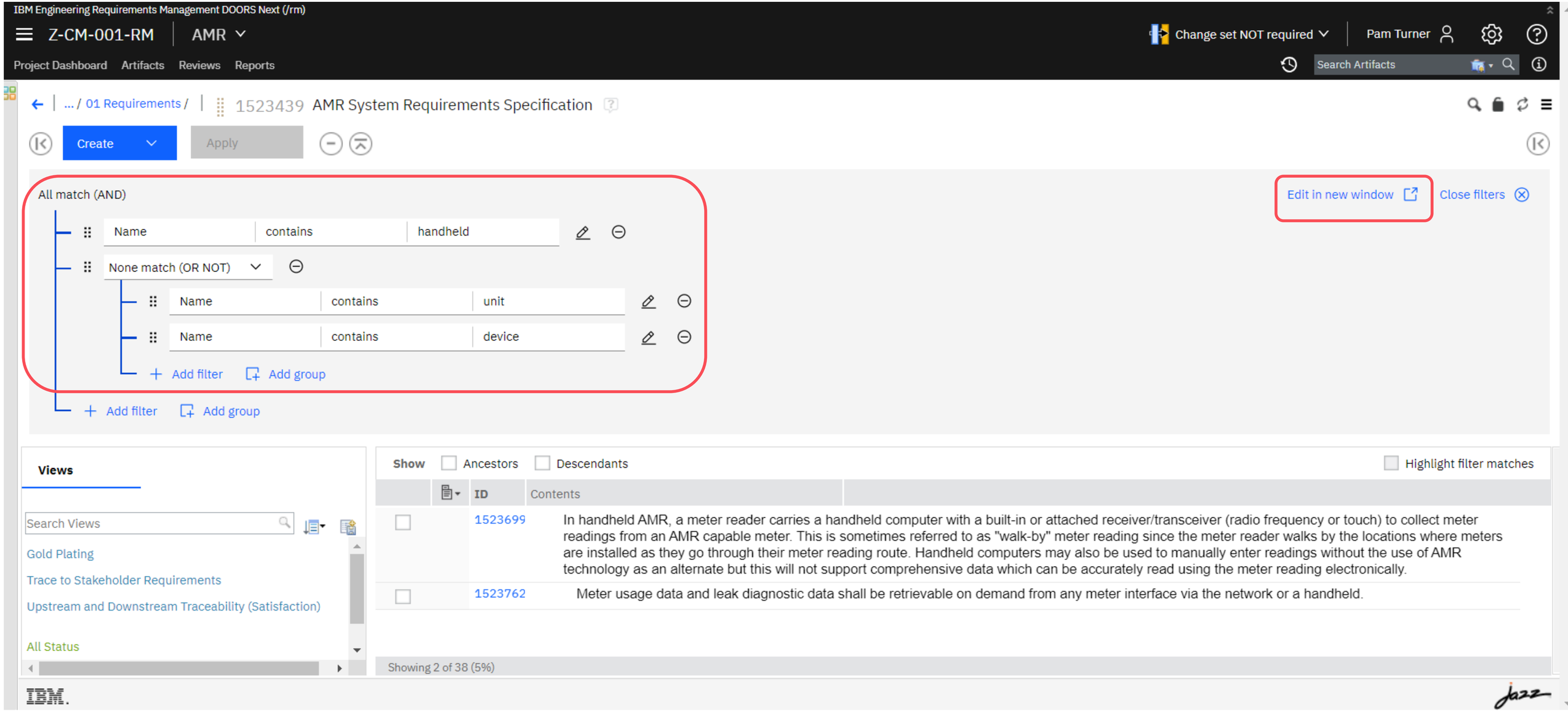

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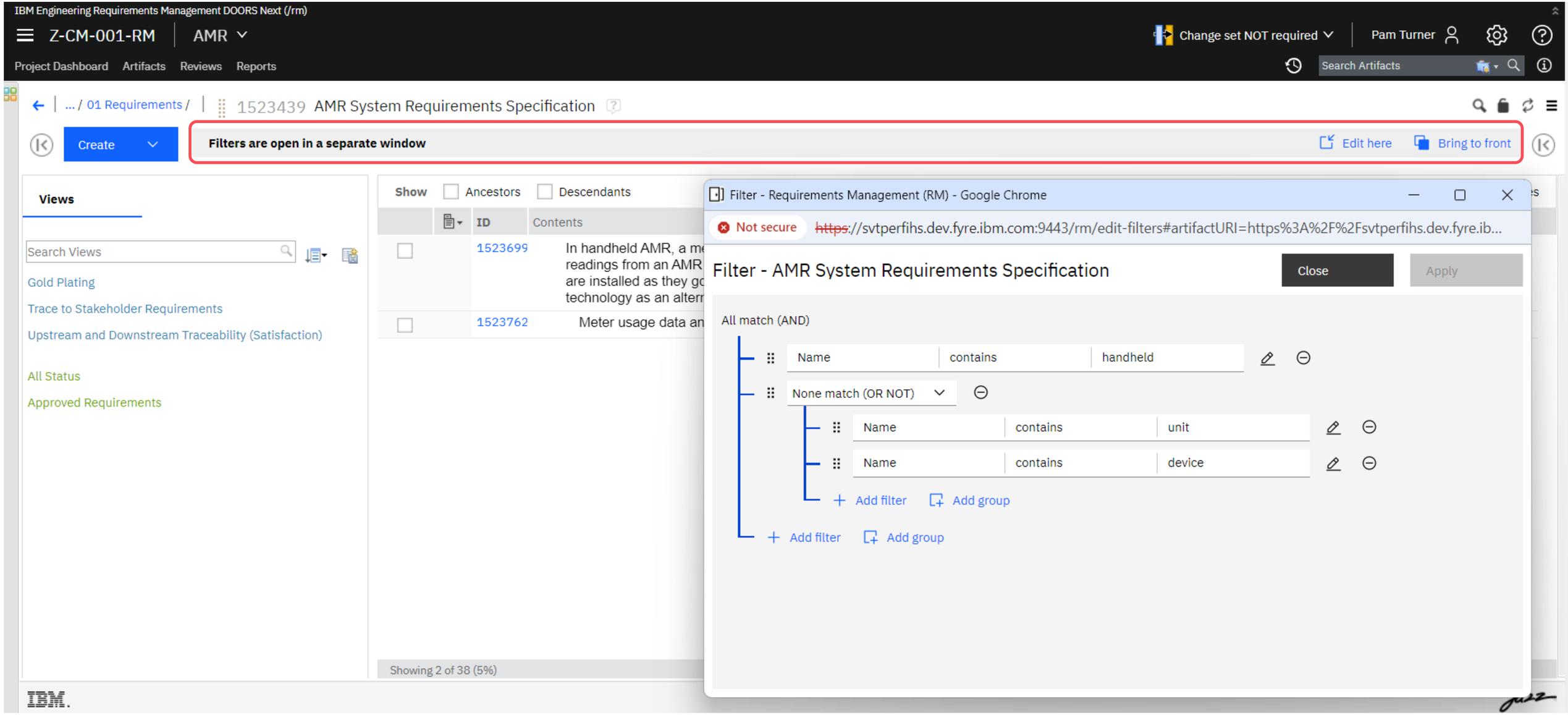
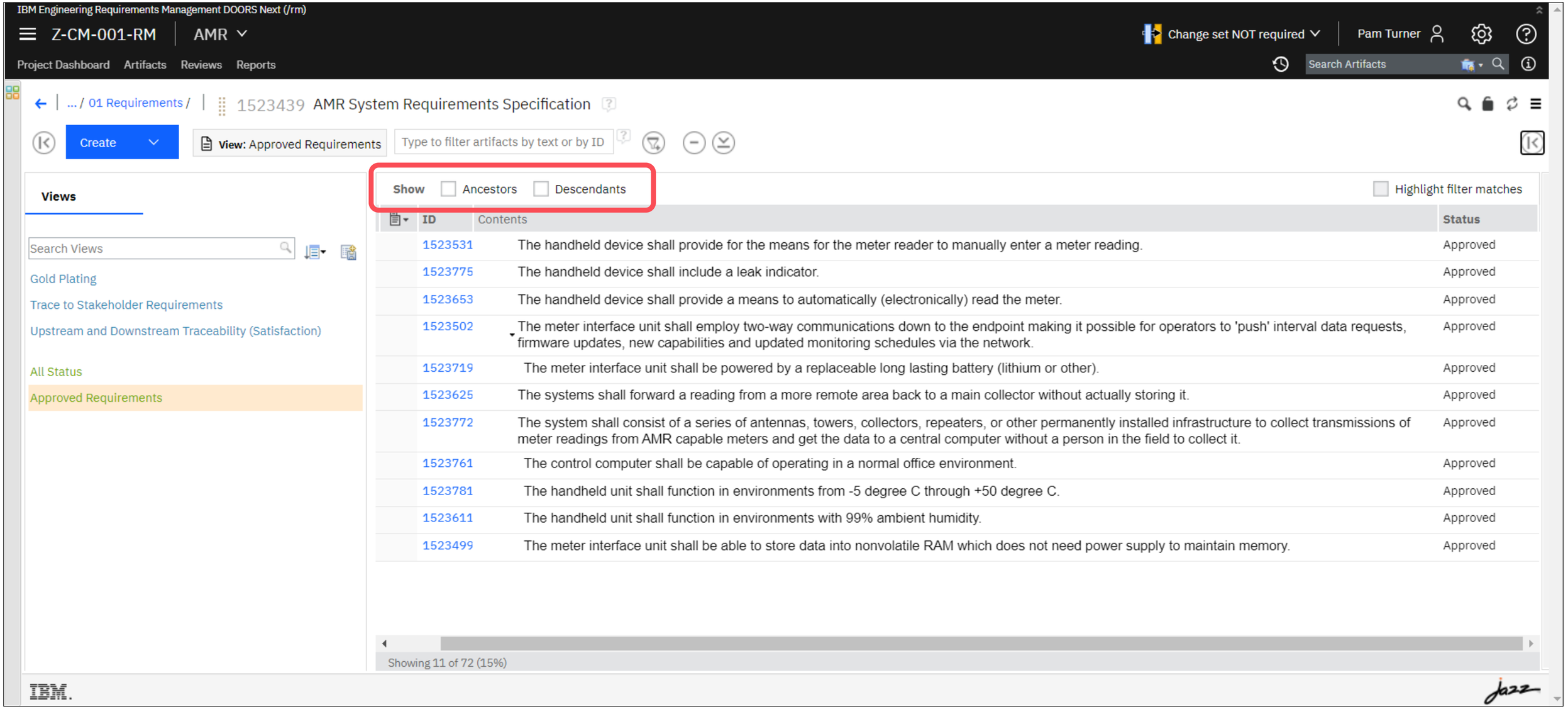


Show Ancestors/Descendants



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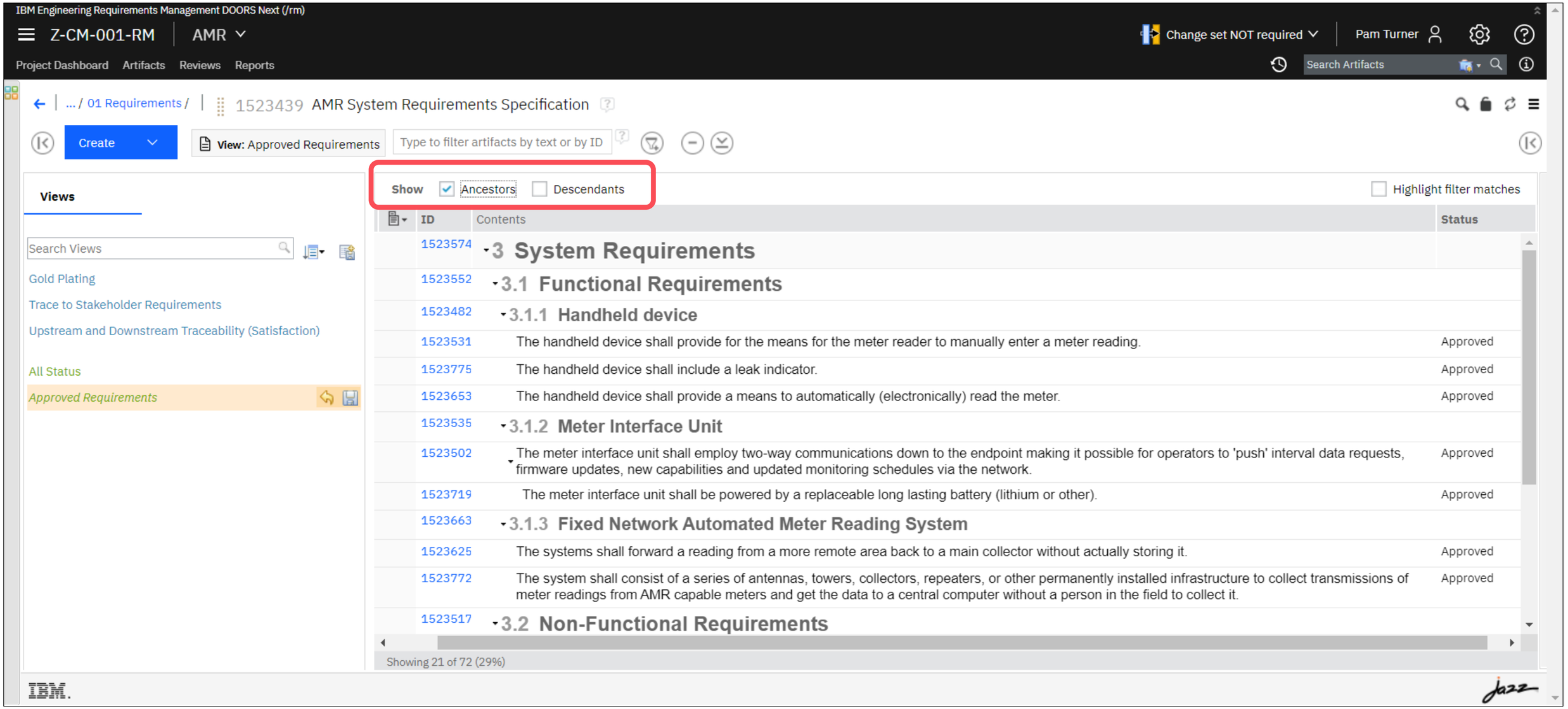

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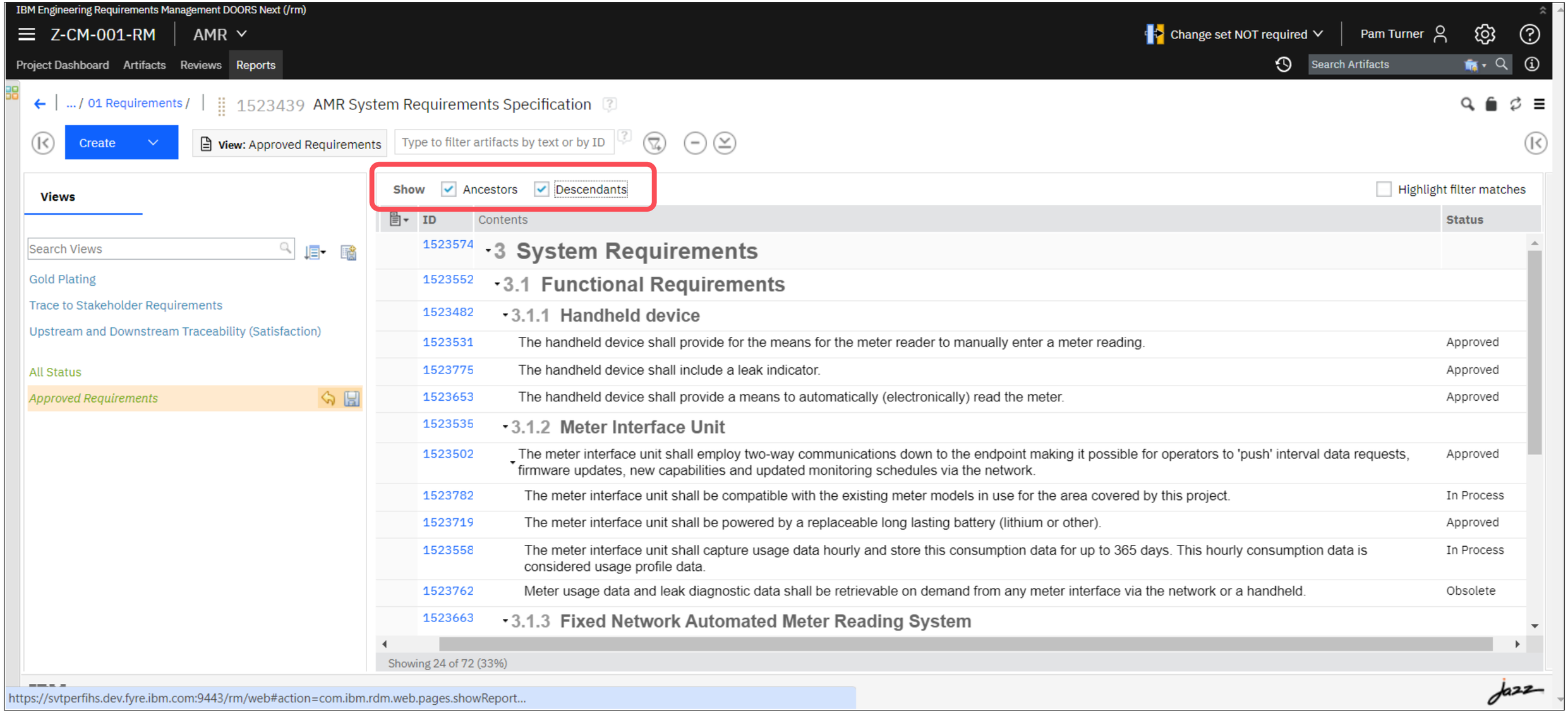

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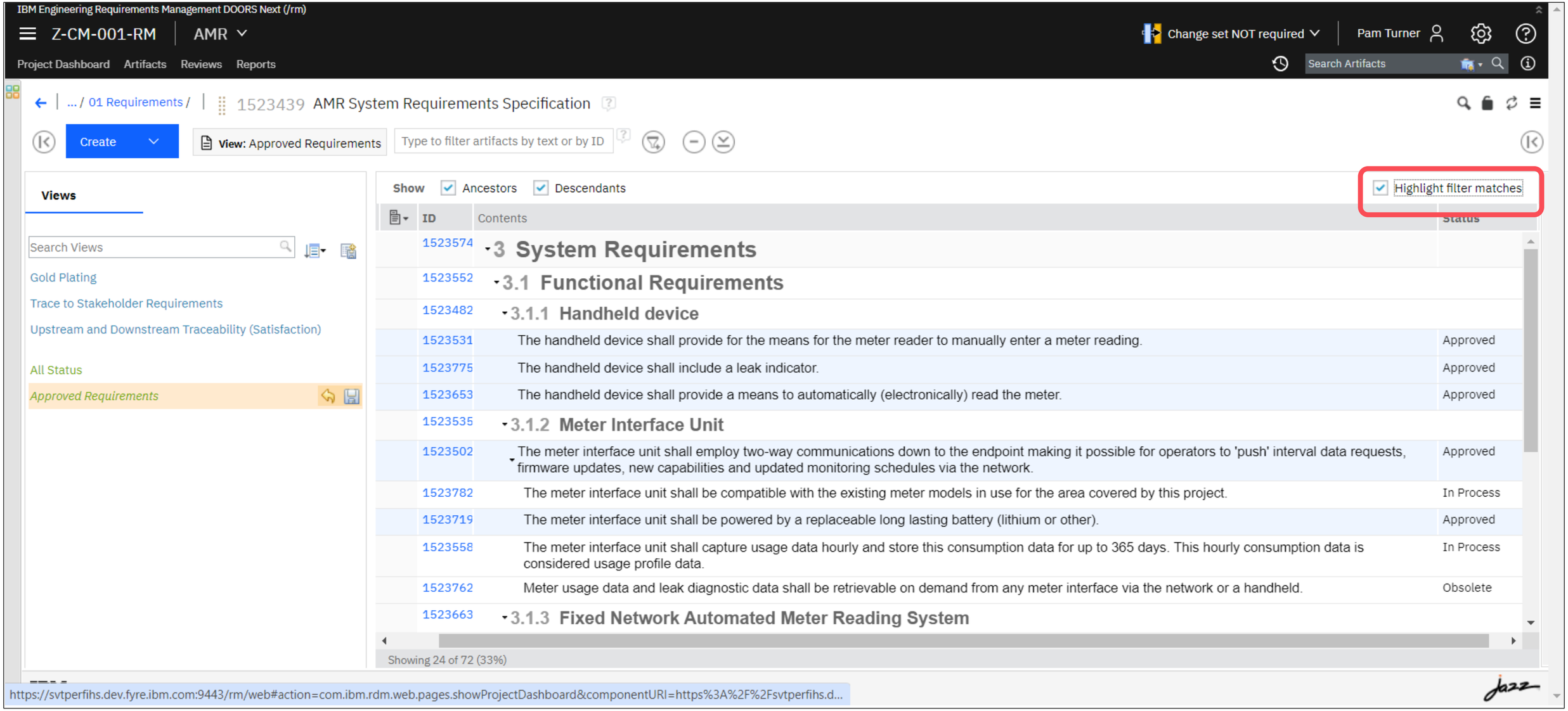
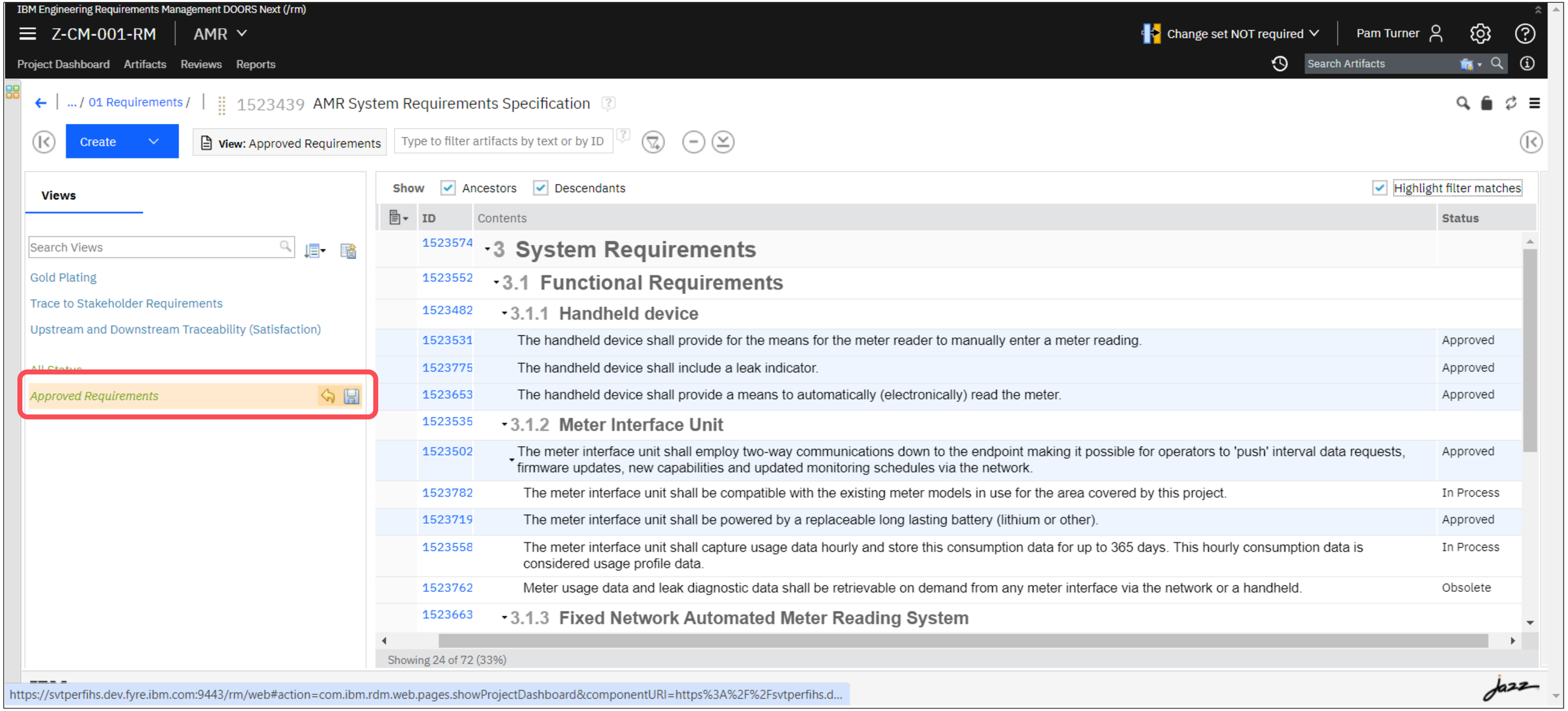
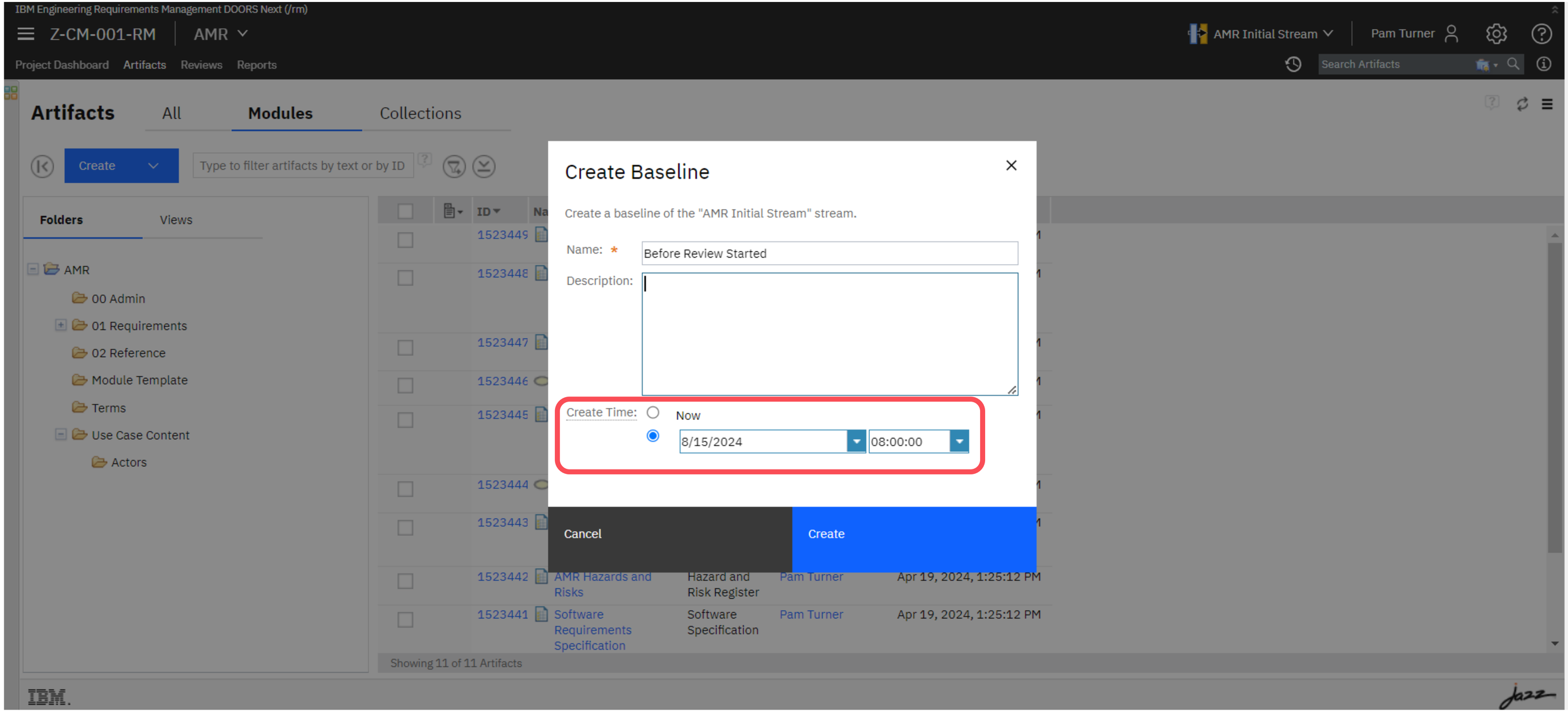


Show Ancestors/Descendants



Create a historical baseline



Improved DOORS Next TRS

The DOORS Next Tracked Resource Set (TRS) service is now **more resilient** to unplanned server outages and heavy server load.

It provides data to (1) LQE for reporting (Report Builder, Engineering Insights) and (2) LDX for versioned link information when using global configurations.

The improved **log-based TRS** replaces the previous **event-based TRS**.

New installations: New DOORS Next v7.1 server deployments use the new, improved log-based TRS

Upgrading to 7.1: Switching to log-based TRS required* as part of the upgrade process. This includes a DOORS Next TRS rebase operation and LQE reindex of the DOORS Next TRS data

For additional details, see the interactive upgrade guide.

** If not already configured in 7.0.2 or 7.0.3.*

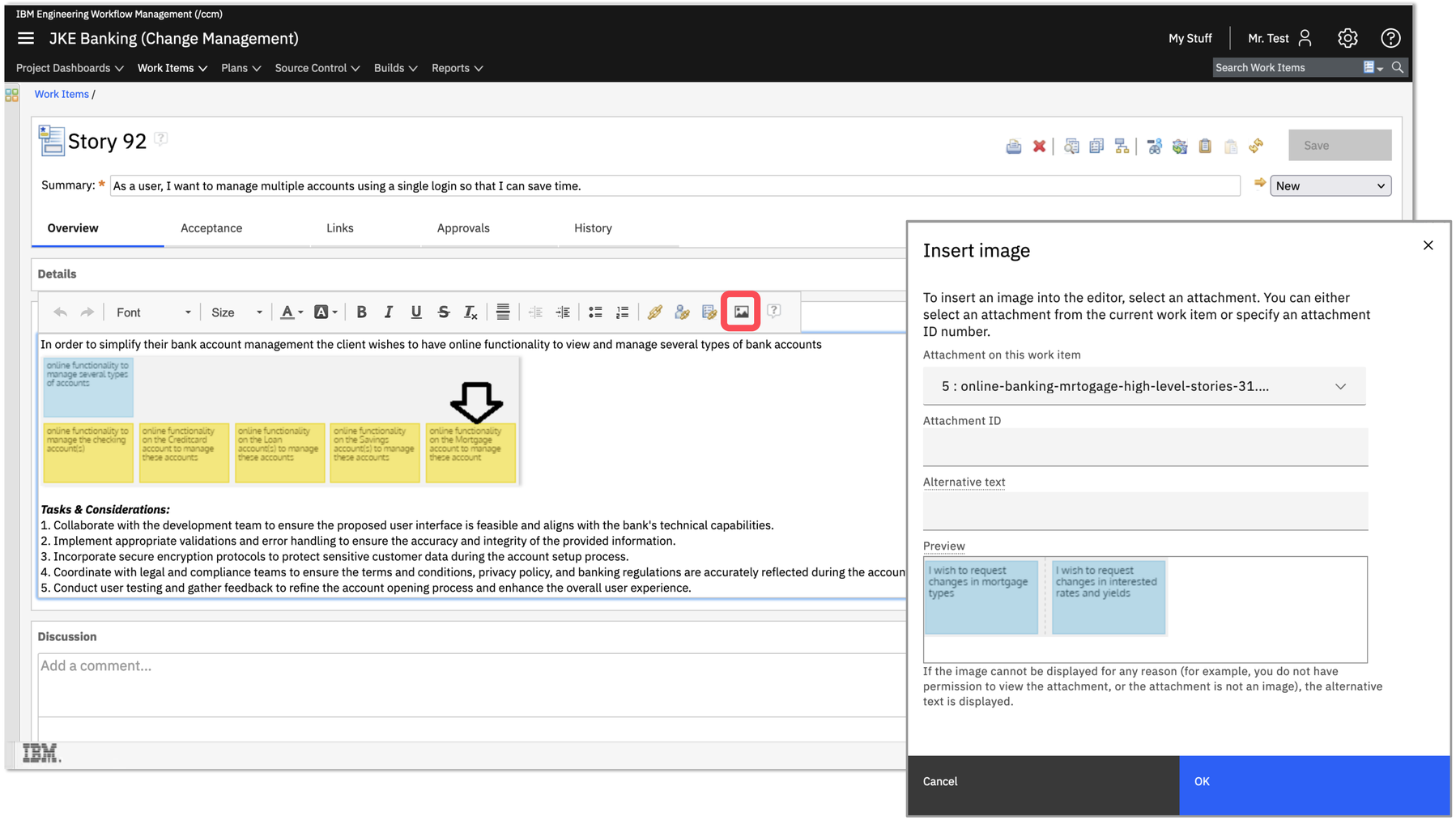
Workflow Management

Add images inline to work item description and large html attributes

Image types
jpeg, gif, png, and bmp

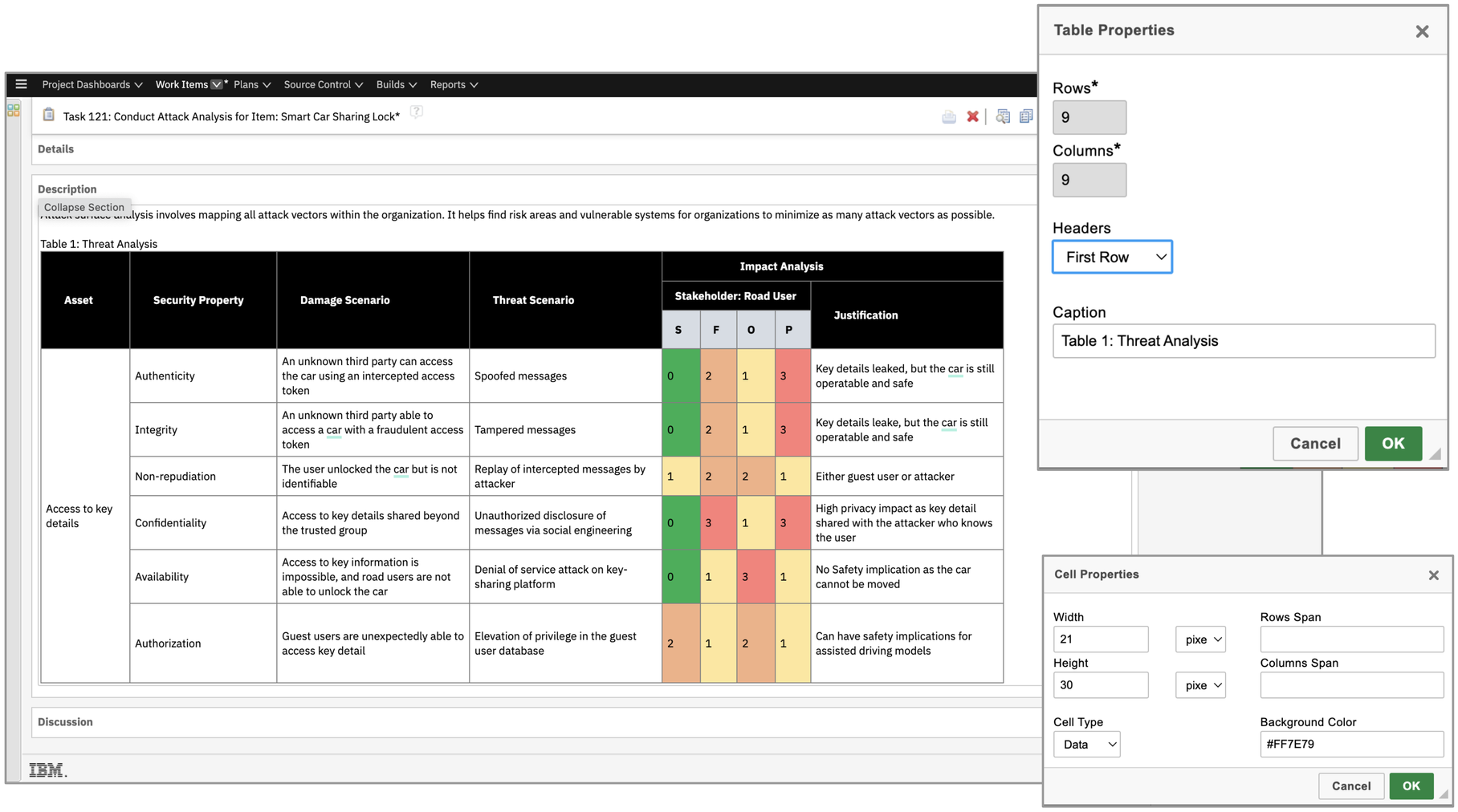
Copy-paste image from the clipboard or file explorer

Or use existing image attachments from current or different work item



Add tables inline to work item description and large html attributes

- Use common html table features
- Copy-paste table from MS Word and MS Excel



Jazz Reporting Service + Link Index Provider

For practitioners

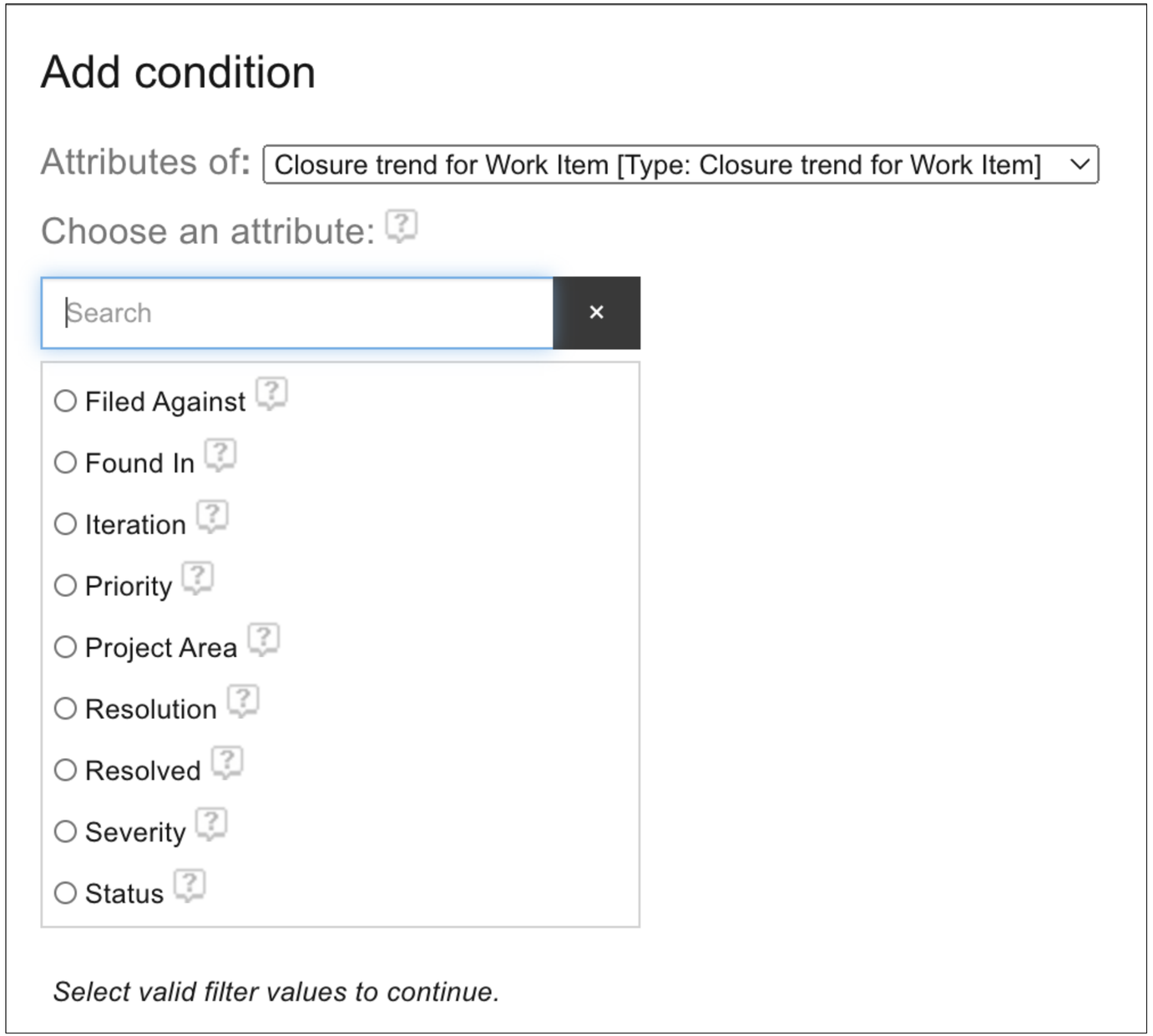
Report on additional LQE historical metrics

You can report on these additional dimensions using Lifecycle Query Engine **historical metrics**

Work Item **Closure**
- Filed Against
- Resolved
- Resolution
- Team Area

Work Item **Creation**
- Found In
- Resolved
- Resolution

Work Item **Totals**
- Found in
- Priority
- Resolved
- Resolution
- Severity
- Team Area

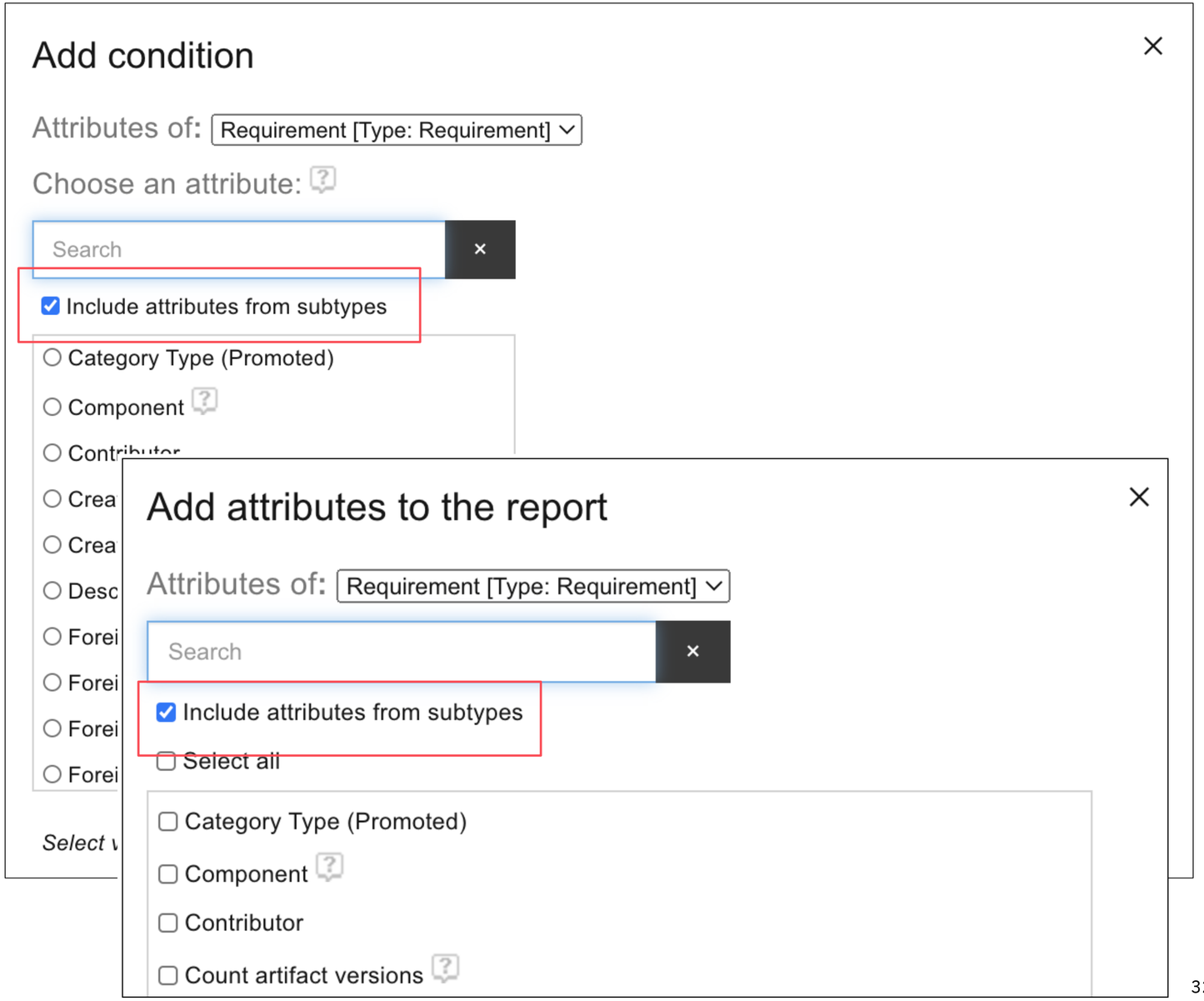


Creating simpler reports across subtypes in reports with LQE data source

When reporting across multiple child types that shared a common parent type such as Work Item or Requirement using an LQE data source, you would previously create a report using the merge or append of multiple report branches, that could lead to repeating traceability paths in each branch making the report more complex to maintain and slower to perform.

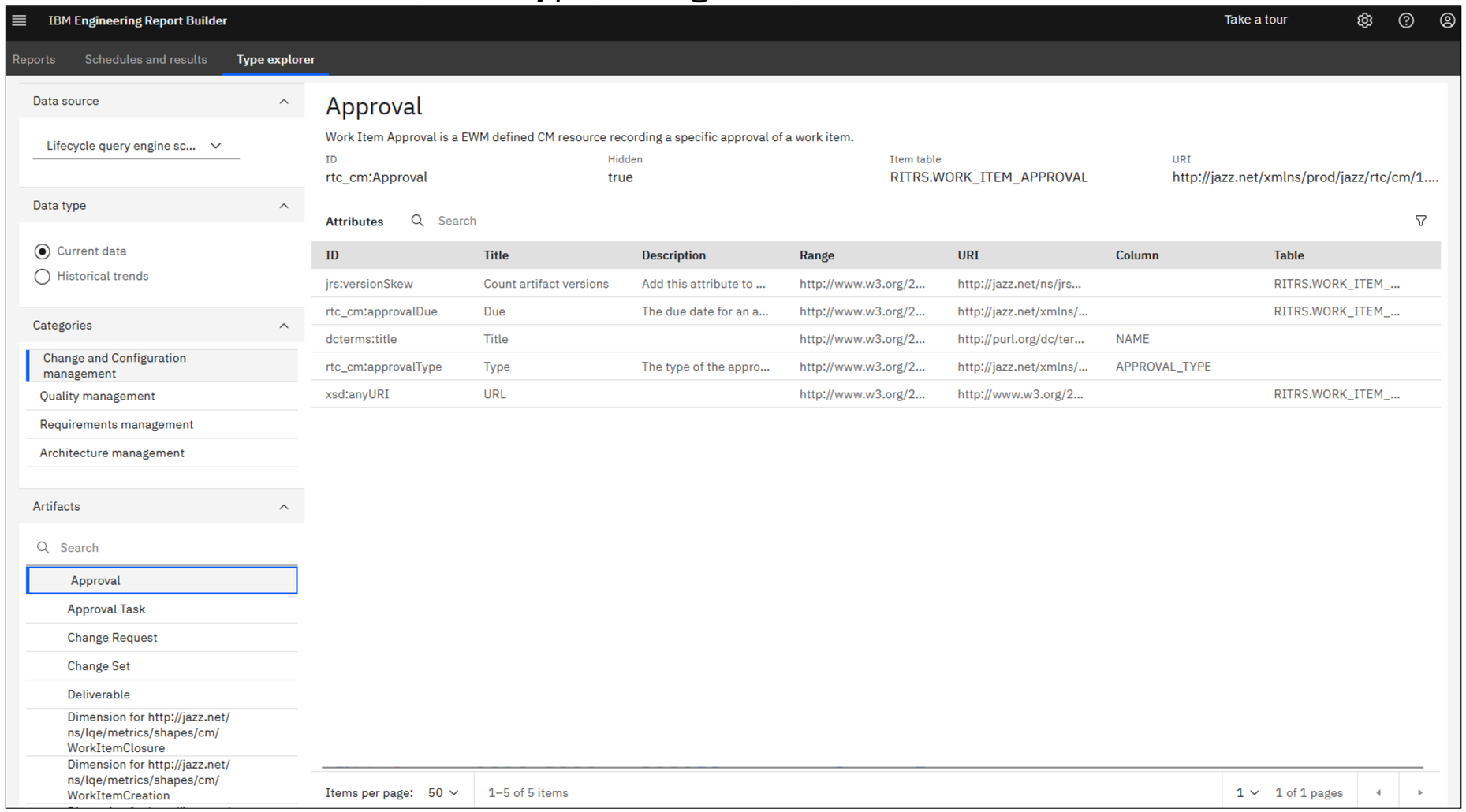
Now you can use external URIs to promote them into the parent type and create single branch reports with LQE data source that can return and filter on those promoted properties including common filtering across sub-types from the same parent type.

To distinguish subtype attributes, after attribute in the brackets, the word **Promoted** is added. The end result should be simplified report creation and most likely improved report performance when there is a large number of subtypes.



A help when writing advanced queries: RB Type explorer documents data schemas

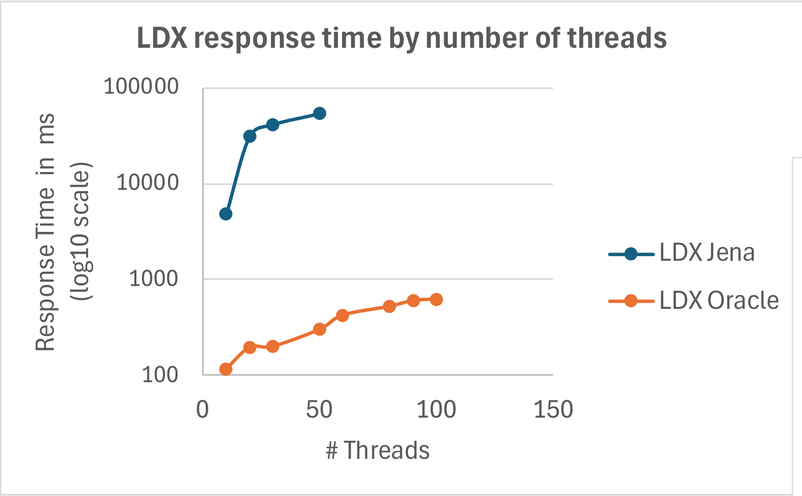
- You can view data source schema details for all data sources (LQE rs, LQE Jena and DW) and use it to develop reports in Report Builder (RB). From the **Help** menu in RB, click **Type explorer** to view data source schema details. Filter the details based on data source, data type, categories, and artifacts.
- Use this information to understand the structure and dependencies of the data source schema. By using the detailed insights about the data source schema, you can create custom SQL queries and develop reports in RB.

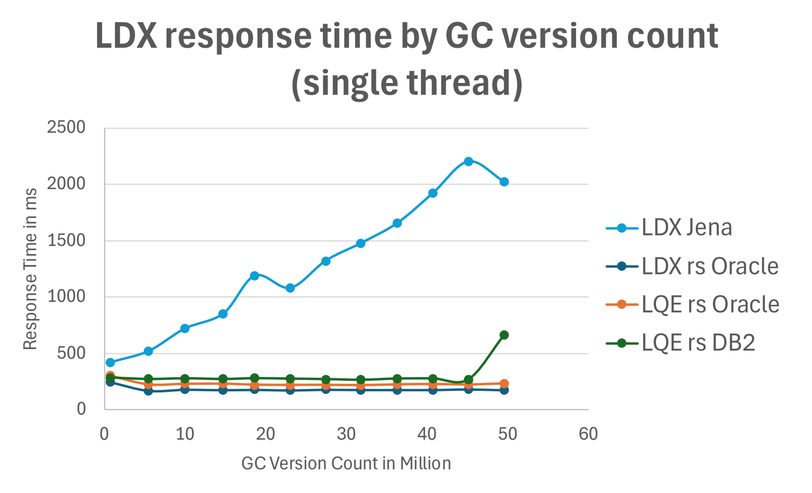


For administrators

Major improvements using Lifecycle Query Engine relational store (LQE rs and LDX)

- LQE rs is the default installation for new JRS deployments
- It offers significantly better performance and availability than LQE Jena: Generally faster queries, higher concurrency, less RAM required.
- Improvements are so good* that we now recommend using LQE rs for Link Index Provider (LDX) as well. [LDX rs 7.1 performance report].

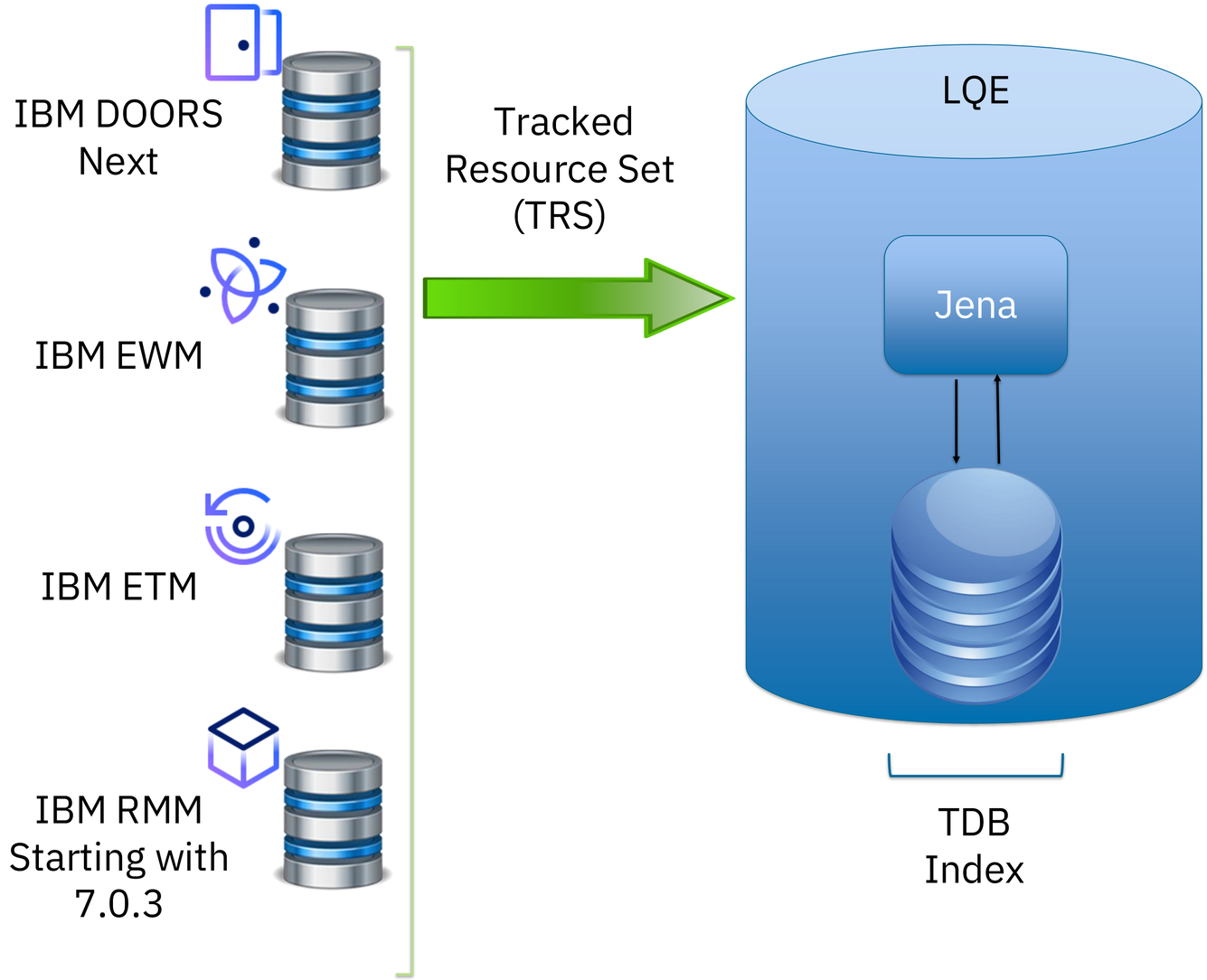




- Enable LQE rs during JTS setup. Report Builder detects whether LQE relational store is enabled. If so, then Report Builder enables LQE rs for reports.
- When LQE Jena is not installed or disabled, only SQL query language is supported, and query language options are not visible
- During the time that ELM 7.1 is deployed in your organization, plan to convert all remaining RB SPARQL reports to SQL. ELM 7.1 is the last version that will include LQE Jena.

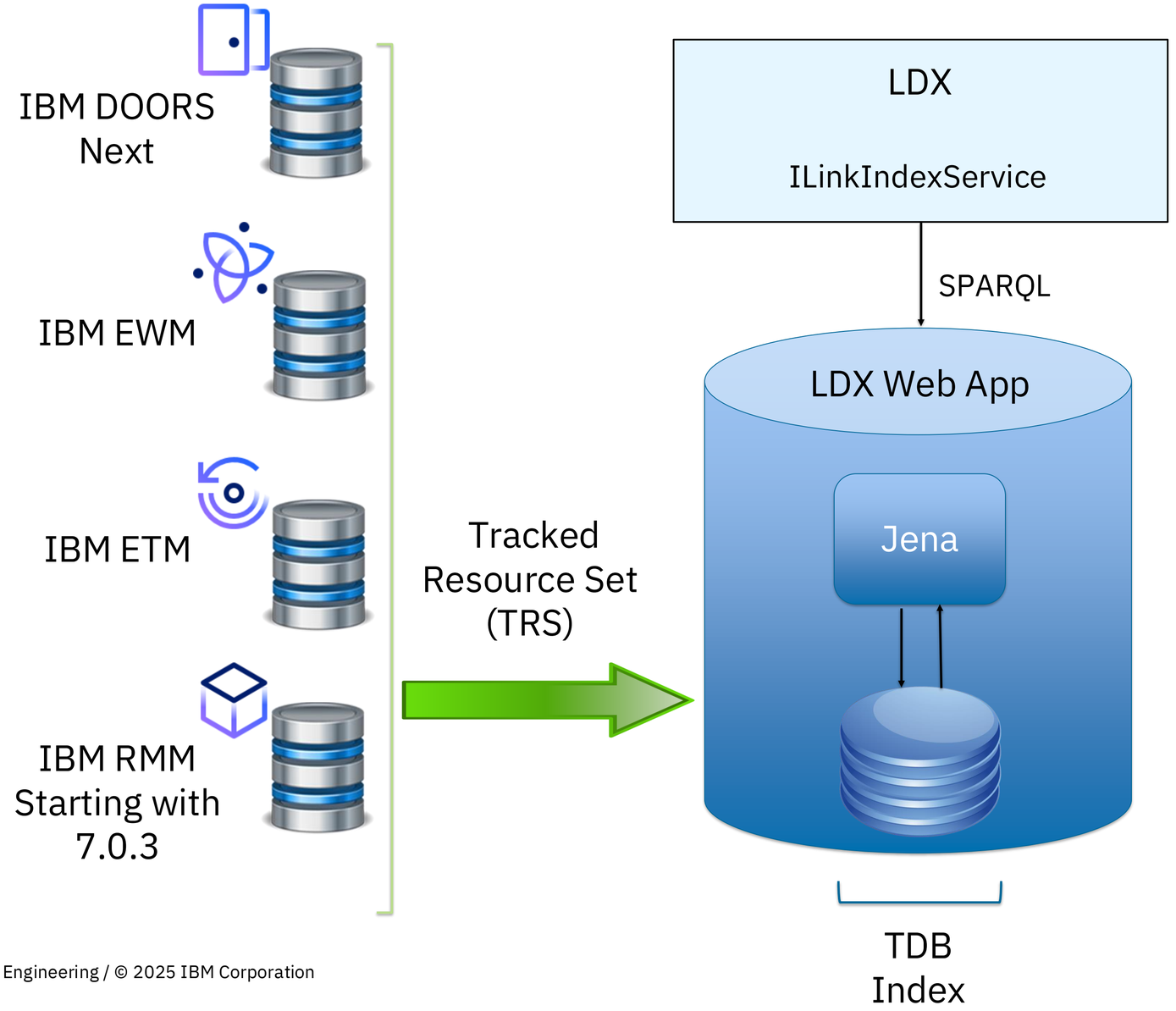
** Tested in IBM lab; your performance may vary*

LQE Jena architecture prior to the ELM 7.0.3



- LQE is well structured as a TRS indexer and query endpoint provider
- Has a storage interface that currently writes to Jena
- Jena limited by scale that can be achieved on one machine (no clustering support)
  - Data needs to be local to Jena (local filesystem)
  - Jena creates multiple index files that handle various ?s ?p ?o patterns – performs best when memory mapped

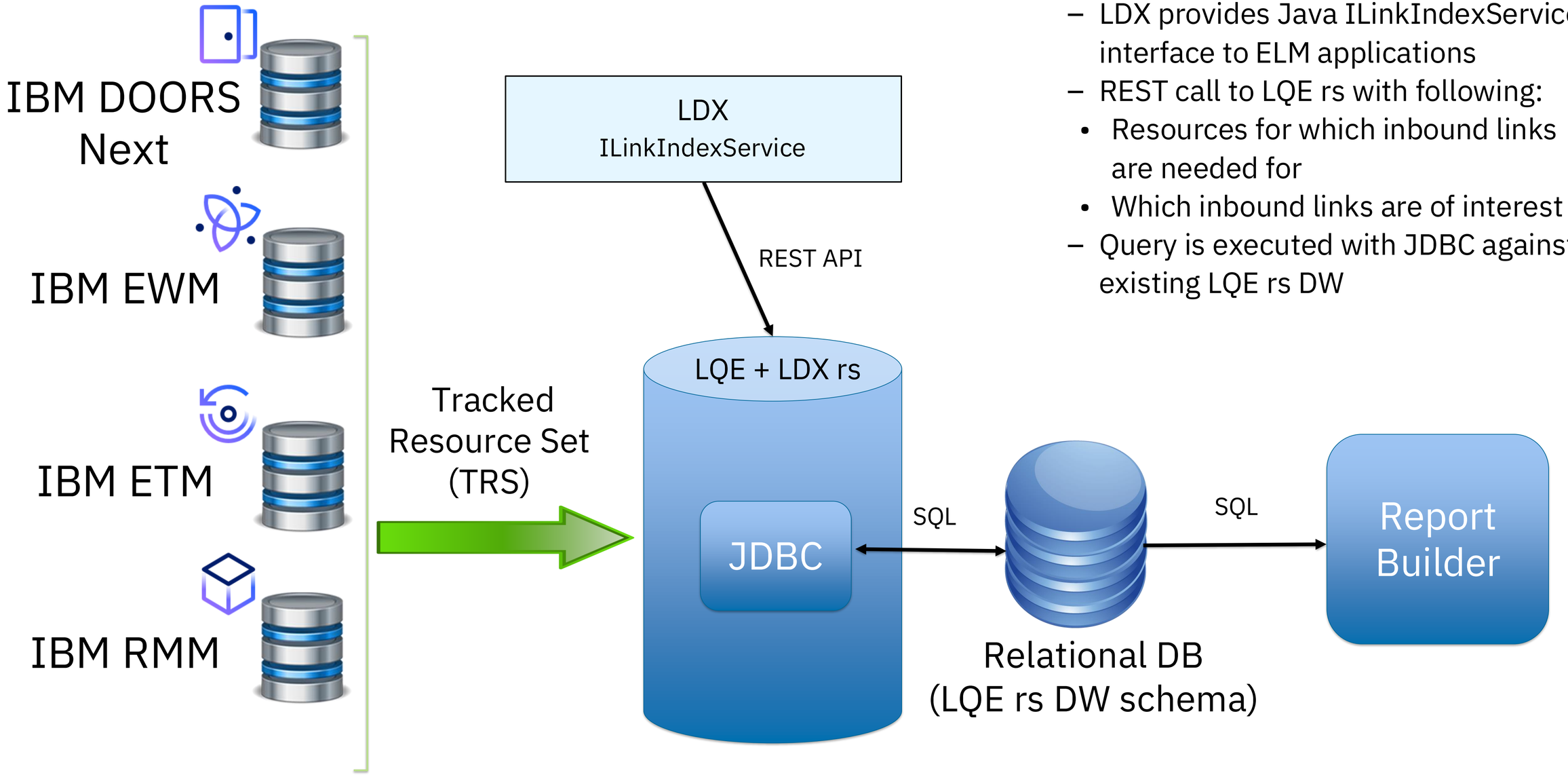
LDX in 7.0.3 and earlier was a separate application (a special case of LQE)



- Link Index Provider (LDX) provides Java ILinkIndexService interface to ELM applications
- The interface utilizes a parameterized SPARQL query
  - Resources for which inbound links are needed for
  - Which inbound links are of interest
- Query is executed against the custom LQE at /ldx

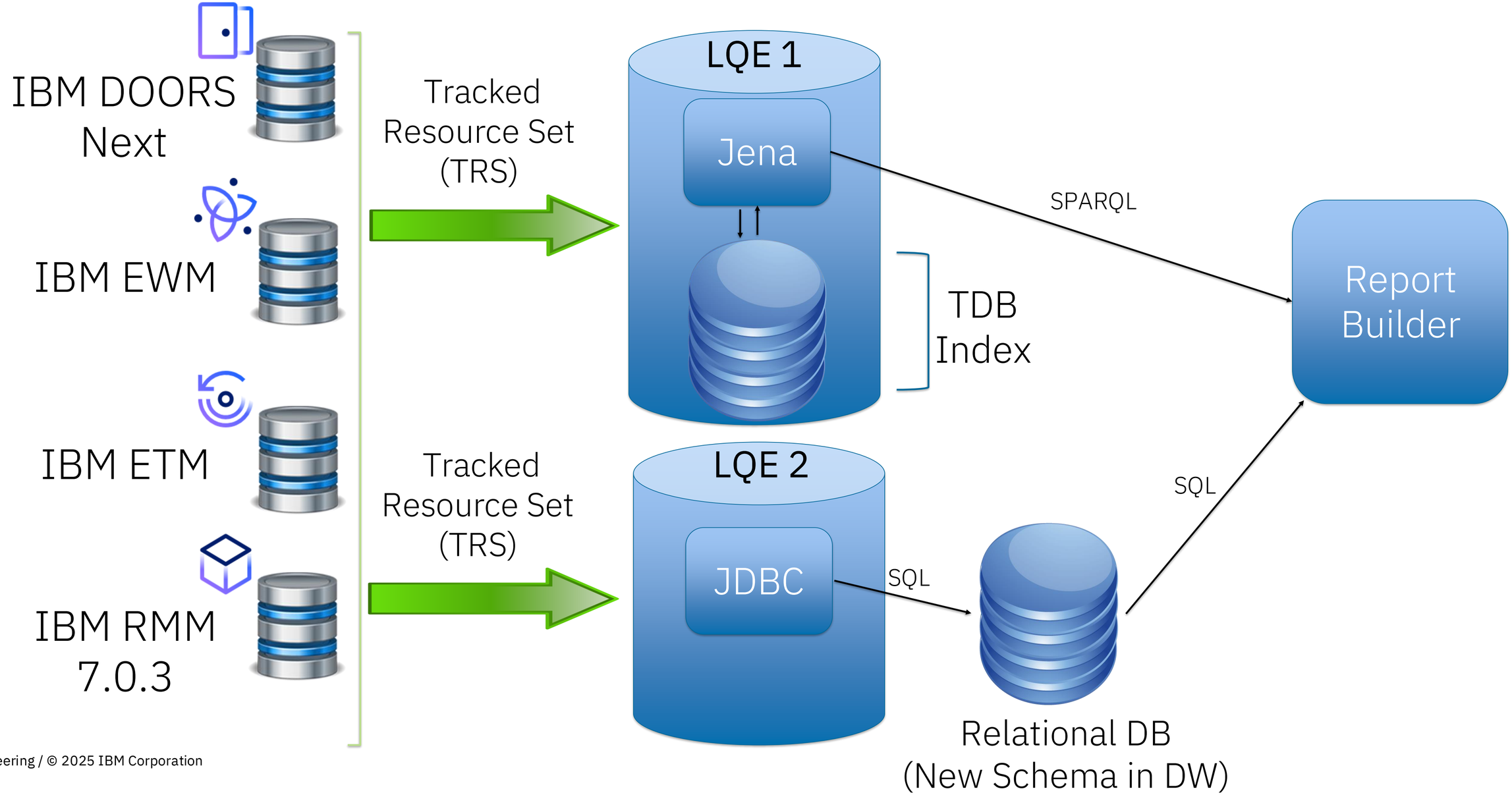
- Customized LQE as /ldx web app
- Adjusted to store only link info from resources, as well as Global Configuration (GC), Local Configuration (LC) for scoping details
- Setup to index a subset of ELM data providers
  - Only the ones that own the storage for links between 2 domains
  - If cross DN to DN server links are created, those DN TRS feeds added as data providers

LQE rs can service LDX and it is the default for 7.1 and recommended for all customers



- LDX provides Java ILinkIndexService interface to ELM applications
- REST call to LQE rs with following:
  - Resources for which inbound links are needed for
  - Which inbound links are of interest
- Query is executed with JDBC against existing LQE rs DW

LQE rs architecture for existing ELM customers – Topology 1



LQE rs architecture for existing ELM customers – Topology 1

When to consider:

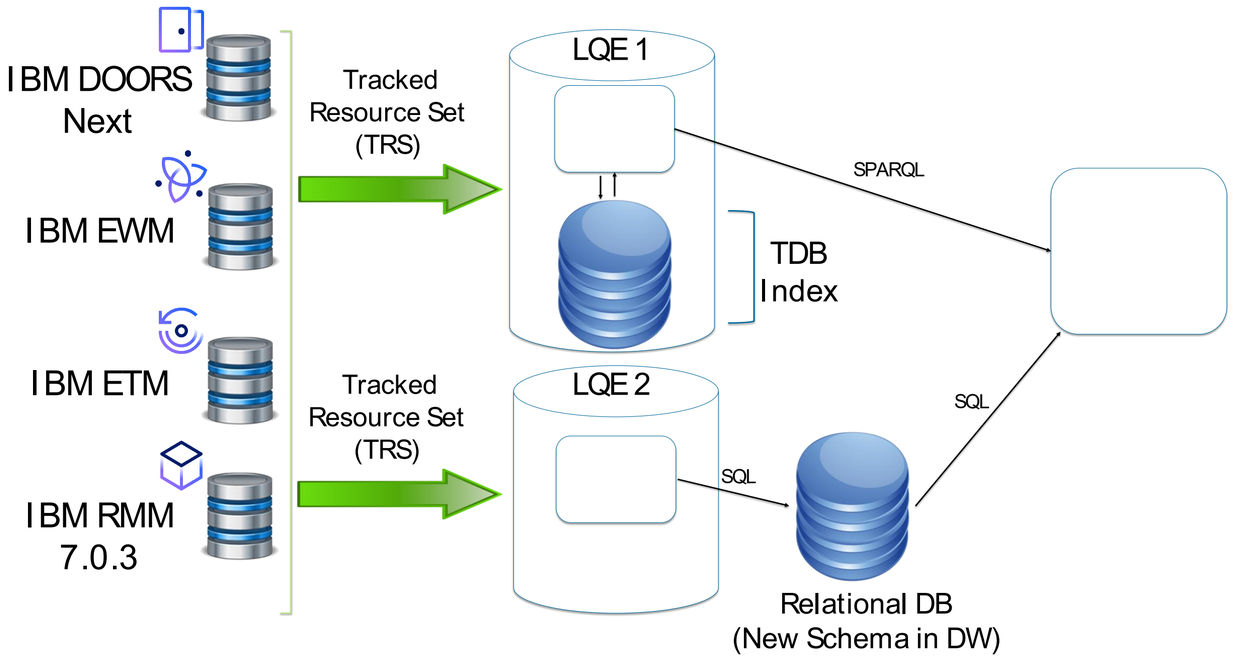
➢ The current LQE has a large index and is under heavy load

Pros:

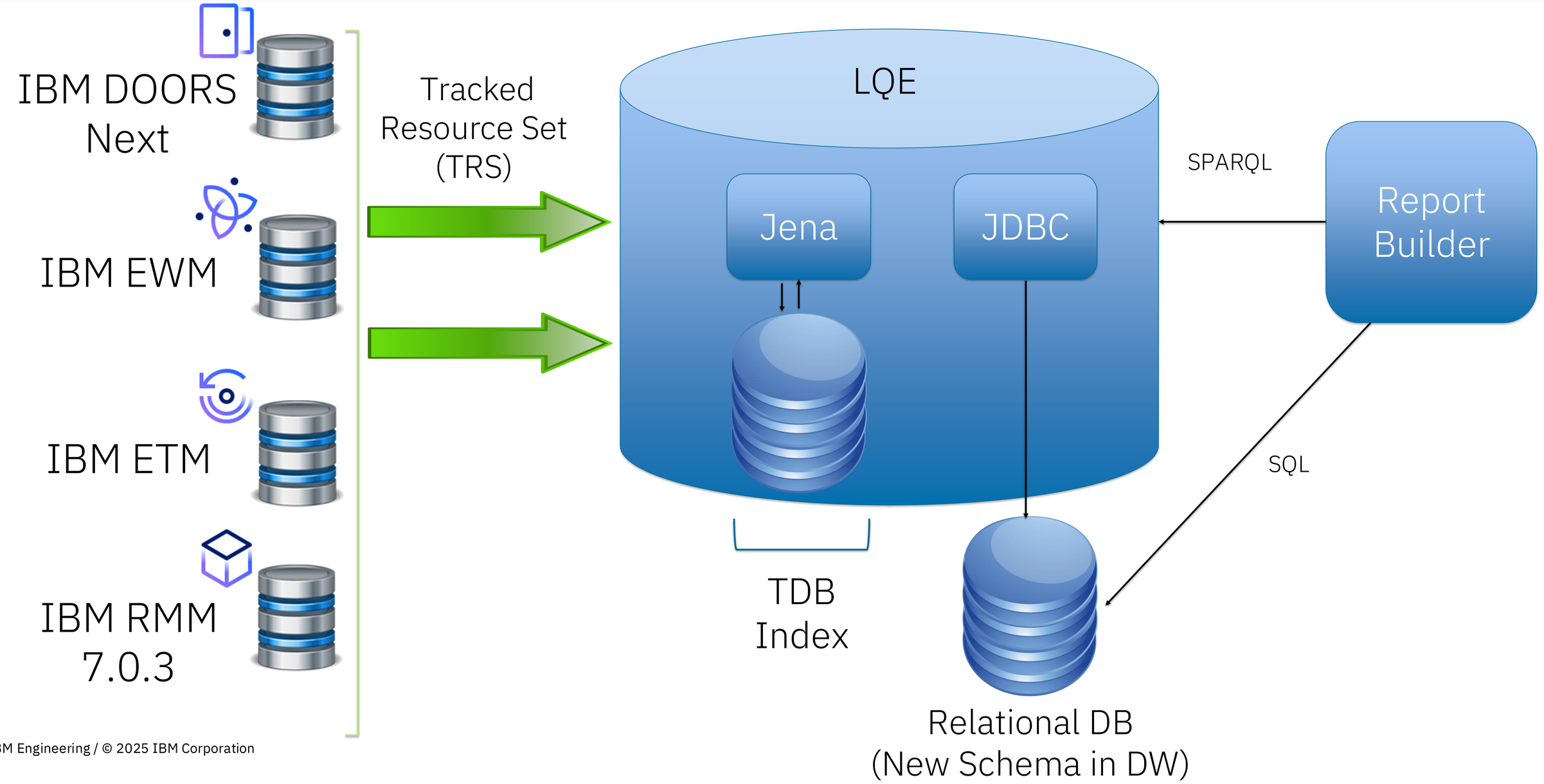
✓ LQE rs will not be impacted by the LQE Jena's performance

Cons:

❖ Additional installation work
❖ More data sources to manage in Report Builder
❖ More physical server to maintain



LQE rs architecture for existing ELM customers – Topology 2



LQE rs architecture for existing ELM customers – Topology 2

When to consider:

➢ The LQE Jena server does not have much data and is not under heavy load.

Pros:

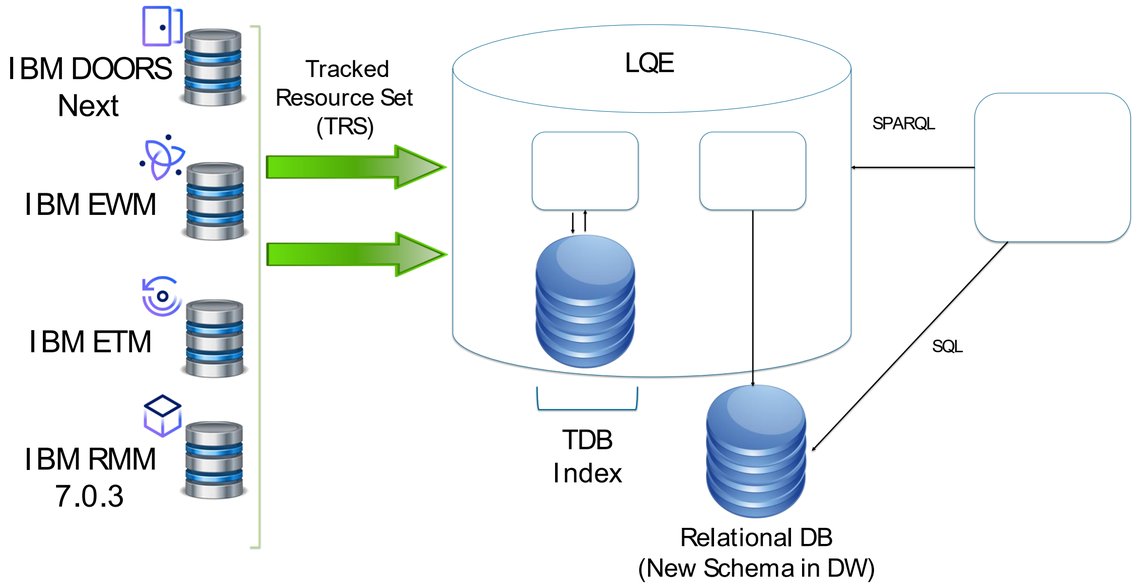
✓ Minimal additional installation work

✓ Less Report Builder data sources to manage

✓ Less maintenance work on additional physical server

Con:

❖ Server rename is needed if decide to move LQE to a server with less resources



What should you expect when adopting LQE rs?

Detailed LQE rs performance report can be found at LQE rs performance report, as well as LQE rs database sizing.

Improved scalability and resilience

– LQE rs handles concurrent report execution more efficiently, and a single long report will no longer impact the entire LQE server
  - Tested up to 5000 simulated users (83 reports/sec)
  - LQE Jena could only handle 25 simulated users for the set of reports used in IBM testing

Equivalent or better report performance

– A minority of reports may run longer. New user-selectable database hints will optimize report performance.

Reduced resource requirements

– A database server with 128GB of RAM can handle a reporting workload that required 1.5TB of RAM on an LQE Jena server: less than 1/10th the RAM
– Disk size of LQE rs database is roughly half the Jena data store

Incremental indexing times should be similar to LQE Jena

– Full reindexing should be equivalent but may take longer depending on the load on the database server hosting LQE rs

Automated the LQE server rename for LQE with relational store removes the need to reindex

- LQE server rename for LQE rs is now automated in Report Builder: **no need to reindex!**
- To rename the LQE server, all you need to do is generate and replace the mapping.txt file into the JTS LQE location and restart the Jazz Team Server.
- Previously, whenever the LQE server renaming process was triggered, you had to first unregister LQE from JTS, manually rename the server, and register the LQE again, and then reindex all data sources.

Removal of Lifecycle Query Engine Jena support

- Starting with IBM Engineering 7.2, the Lifecycle Query Engine (LQE) Jena is no longer supported. The LQE relational store will be the only supported storage mechanism. This change improves performance and simplifies maintenance by standardizing on a single storage mechanism.

  Note: Before you upgrade to IBM Engineering 7.2, you must migrate your SPARQL reports from LQE Jena to the LQE relational store as upgrading will disable LQE Jena support entirely.

The ELM release cadence continues…

In recent years we released ELM twice each year (in addition to normal maintenance):

- Minor release of features in 2Q / early 3Q (in iFix)
- Major release in 4Q

For ELM 7.0.1 and 7.0.2 we released SR1 in 2Q / early 3Q to replace outdated and vulnerable components (notably: log4j v1). [post]

For ELM 7.0.2 iFix18 we added low-risk features and serviceability items [post]

For ELM 7.0.3 iFix07 we added low-risk features and serviceability items [post]

A Service Release (SR) provides a way to remove old components from the deployed system

The ELM patch service is additive: a simple way to deploy that can update components; it has no way to remove old component versions.

A service release is installed using an updated installer and/or updated IBM Installation Manager repositories. It provides a way to remove old component versions.

- Upgrades and new installs will use an updated installer
- Where 7.1 is already installed, a side-by-side installation will be done with an updated installer

This is the same pattern as used in ELM 7.0.2 SR1 [Technote 6588059]

ELM 7.1 Service Release (SR) is planned for early Q3, 2025

Update Java runtime to Java 17
(IBM Semeru Runtime Certified Edition V17)

Update various component versions, including Java and IBM Eclipse SDK (IES)

Include selected high-value, low-risk features

Include serviceability improvements

Include fixes to product issues identified by customers (normal iFix content)

ELM 7.1 SR1 interim fix 4 will be the prerequisite for future ELM 7.1 iFixes

The ELM 7.1 SR1 will serve the purpose of 7.1 iFix04.

The ELM 7.1 SR1 interim fix 4 release will become the basis for future incremental maintenance (iFix05+, debug patches, etc.)

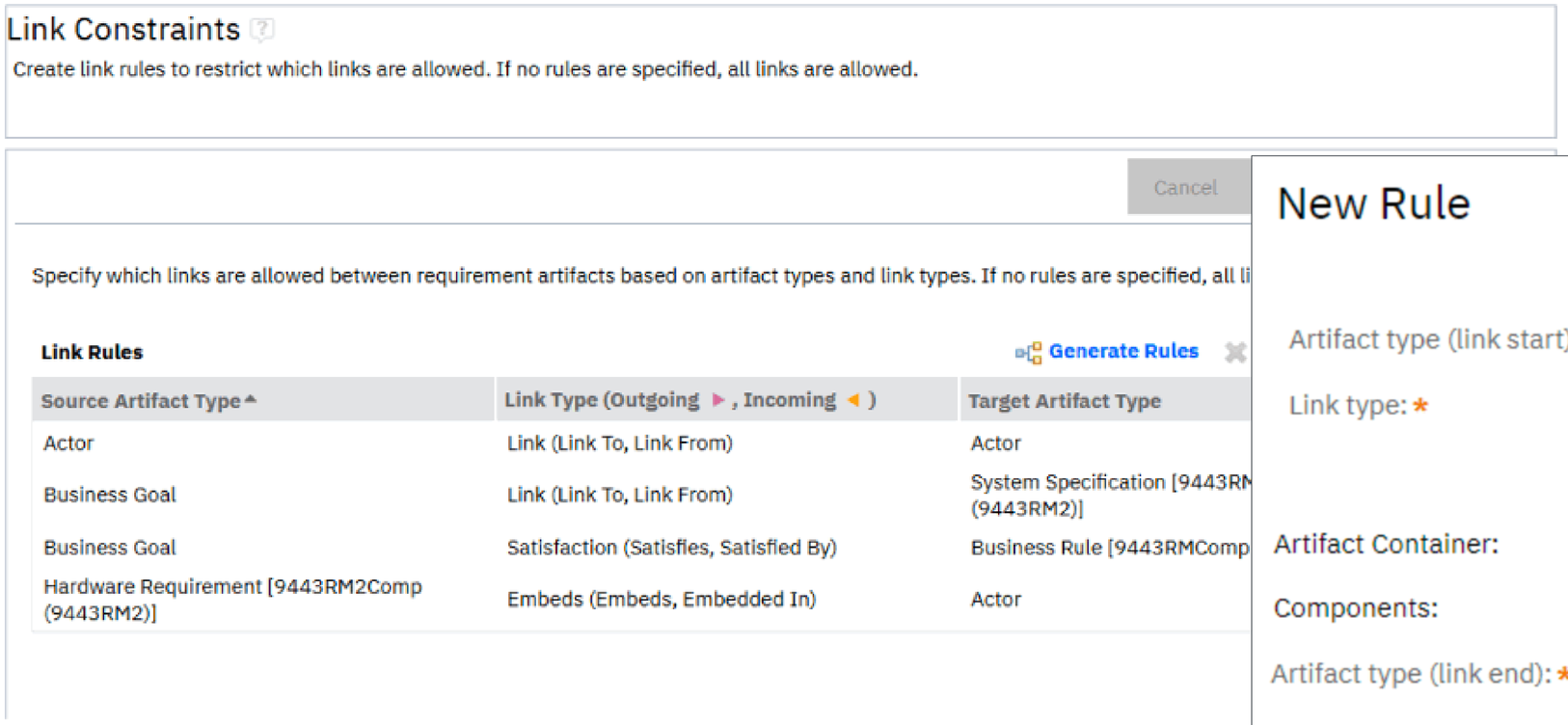
This is the same pattern as ELM 7.0.2 SR1 [Technote 6588059]

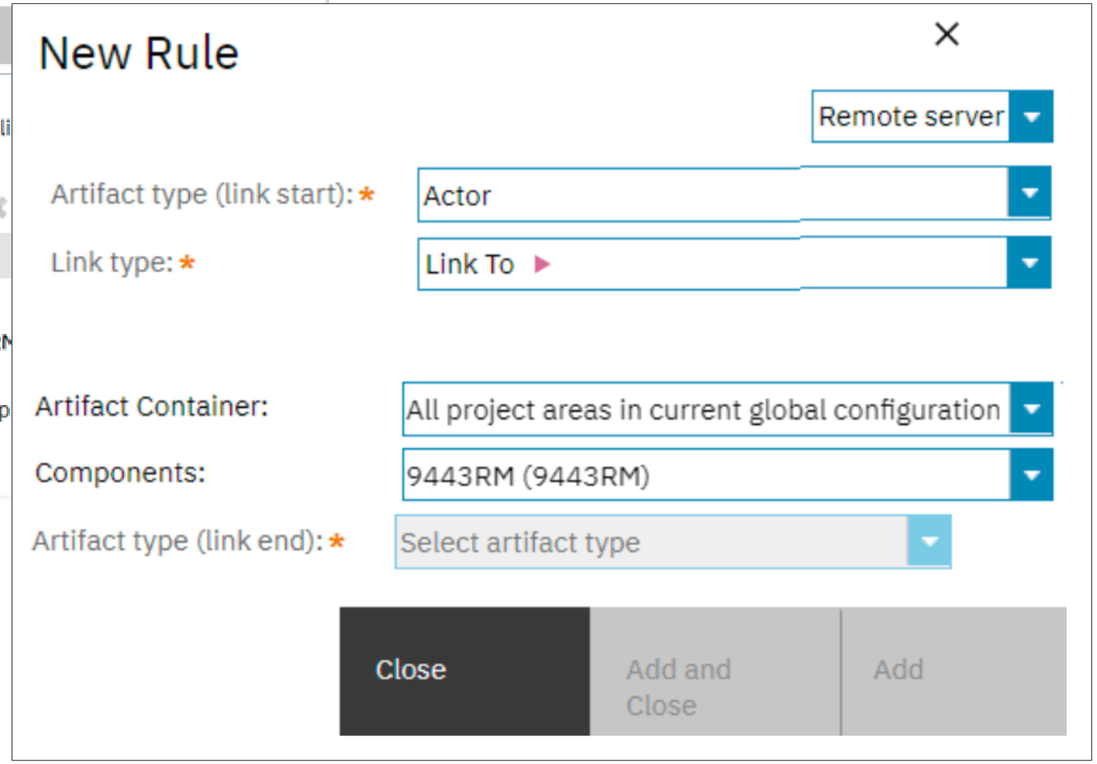
Planned content of ELM 7.1 SR1 interim fix 4 – more detail

Category	Rationale	Detail
Runtime environments	Keeping the specified operating environment current	• Java 17, Liberty 25.0.0.3
Security	Meet IT Security operational requirements	• JRS Excel reports with live data can use application passwords for authentication/authorization • JRS, LQE, LDX can participate in single sign-out when using Jazz Authorization Server (JAS) using the new advanced property “Jazz logout” • Updated components
Digital Thread	Ensure accurate information model when using multiple DOORS Next servers	• Custom link constraints between artifacts managed in multiple DOORS Next servers
Requirements type system management	Simplify effort to make type systems changes consistently	• Create your own automations for type system management across many project areas, components, and configurations using new DOORS Next public APIs to find, create, read, and delete artifact types
Scale, performance, reliability, monitoring, serviceability	System reliance / ease of admin	• Improve the speed and reliability of work item post-save operations during periods of high activity (including full text indexing, attachment visibility, TRS change log, MBean updates) • DOORS Next change set delivery: additional integrity checks and improved logging • JRS: provide more event data to LQE administrators; for data sources: provide separate retry interval settings for TRS document and individual items • ETM avoid TRS validation false positives due to user activity while validation check is running • Provide Engineering Insights sample views using LQE relational store, simplifying adoption of LQE rs

DOORS Next: Link constraints across RM servers

- Ability to enforce linking rules when RM artifacts are spread over 2 or more RM servers
- Link constraint rules can now use artifact types defined on another RM server (remote server)
- URI can be used to create rules that apply both to linking to artifact on the same and on another server

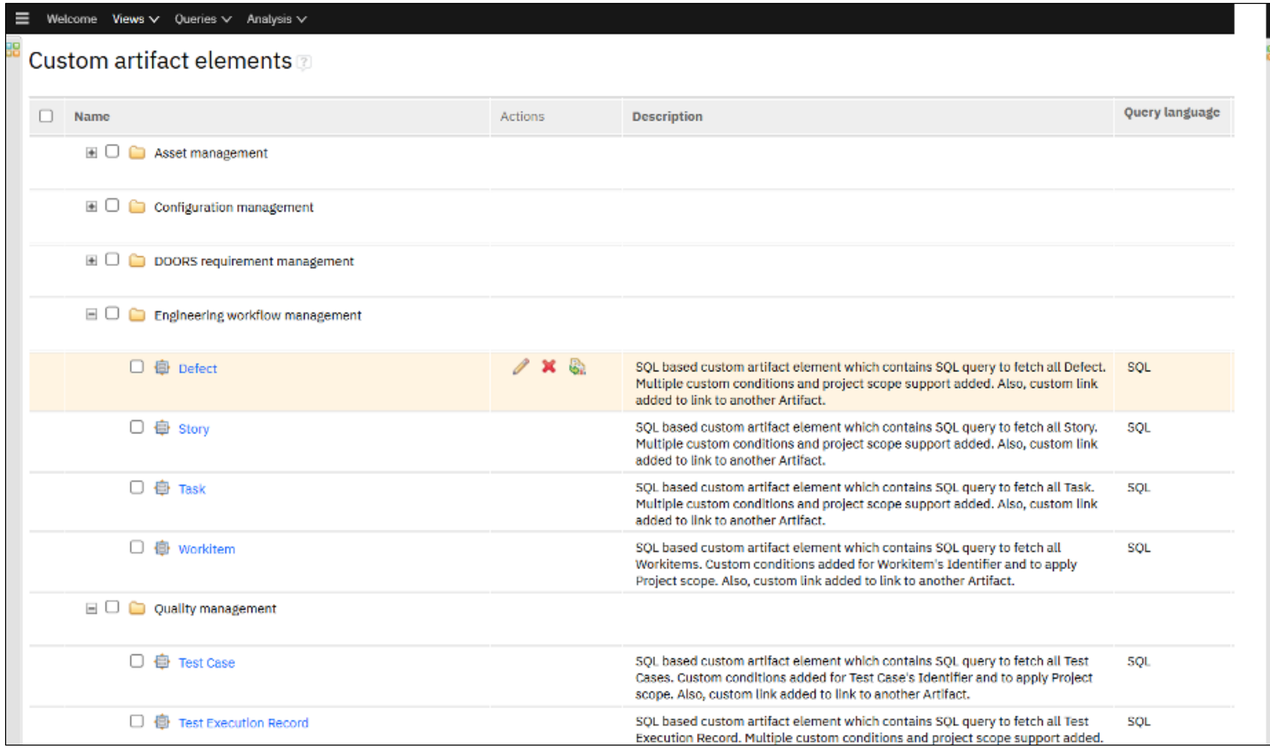


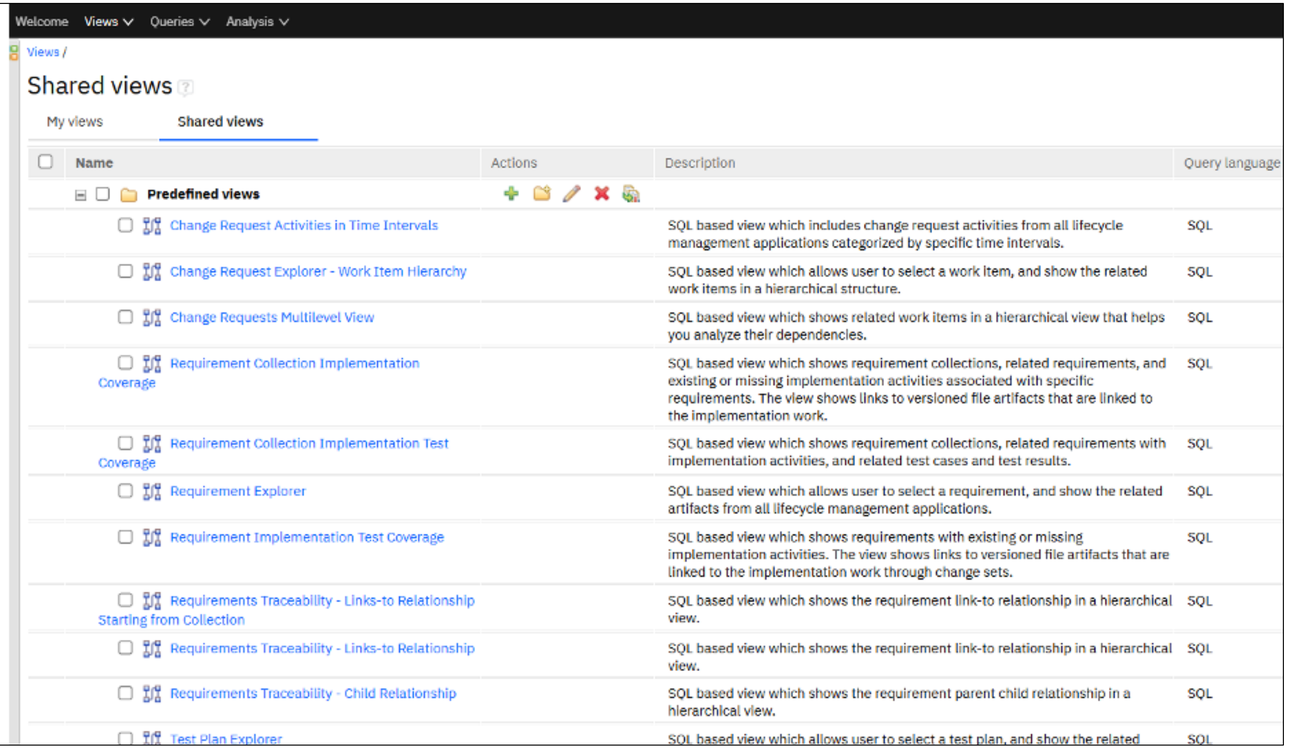


ENI predefined content when using LQE relational store (LQE rs)

LQE rs based sample views and Custom Artifact Elements are included in the following folders:

- Predefined custom artifact elements
- Predefined views





Q/A