IBM **Engineering**

IBM Engineering Lifecycle Management V7.0

2020-03-26

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IBM Offering Management

In the news last month…

Boeing Starliner Flight's Flaws Show 'Fundamental Problem,' NASA Says

A software glitch that could have destroyed the capsule was fixed in orbit, during an uncrewed December test flight that had already gone awry.

https://www.nytimes.com/2020/02/07/science/boeing-starliner-nasa.html

[NASA] is conducting an ongoing review with the company to assess what went wrong. But Douglas Loverro, NASA's associate administrator for human exploration and operations, said that the review had already found multiple failures in Boeing's processes that should have caught the mistakes on the ground.

"It told us that we have a more fundamental problem," he said, not just the flaws that were identified this week.

Boeing **will now review 1 million lines of Starliner software code**. Officials from the company declined to speculate how long that might take. Neither the agency nor the company would set a schedule for when the Starliner capsule would be ready to carry astronauts to space.....

The additional software problem, first publicly reported Thursday during a meeting of NASA's Aerospace Safety Advisory Panel, is the second major flaw known to have marred Starliner's trip in December, the first orbital flight of the spacecraft. During its trip to orbit, **the spacecraft set its clock to the wrong time, causing it to deplete its propellant**. A planned docking at the space station was called off, and the mission was cut short, to two days instead of eight.

Because of the clock problem, Boeing engineers started searching to see if there were other flaws in the software. On the evening before landing, they found one.

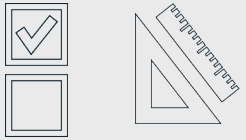
"It is our belief we wouldn't have found it if we hadn't gone looking," said Jim Chilton, senior vice president of the space and launch division at Boeing, which is distinct from its segment that manufactures jet planes.

The newly disclosed flaw, described by Boeing in a statement as "**a valve mapping software issue**," would have bumbled Starliner's preparations for re-entry. Had it not been corrected, **the wrong thrusters would have fired** as Starliner jettisoned its service module, the part of the spacecraft that carries systems that are not needed for the descent through the atmosphere.

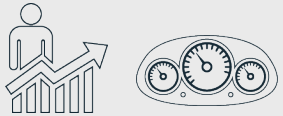
That could have caused the service module to bump into the crew module. The impact could have caused the capsule to tumble, or damaged its heat shield. **Those problems could have destroyed the capsule during re-entry.**

Image: nasa.gov

- Systems engineering
- Requirements management
- Change management
- V&V
- Version management / configuration management
- Reuse / product variants
- Traceability
- Auditability
- Reporting
- Good process
- Good people



Correctness



Efficiency

Introducing insightful engineering at enterprise scale

Systems Engineering

Application Lifecycle Management

Software Engineering

Collaborative Lifecycle Management

Engineering Lifecycle Management

Continuous Engineering

Product Engineering

DevOps

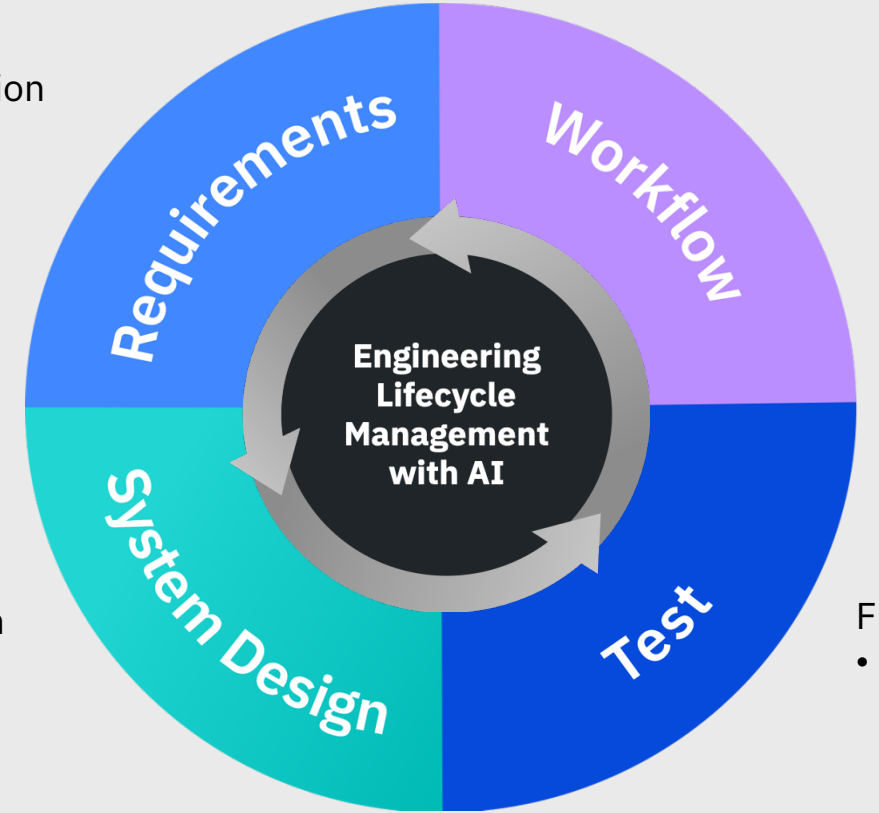
Other Disciplines

IBM Engineering Lifecycle Management

MBSE and Global Configuration Management

Industry Solutions
- Compliance
- SAFe
- Supplier Collaboration

Open Integrations/Ecosystem



Modernization
- UX
- Architecture

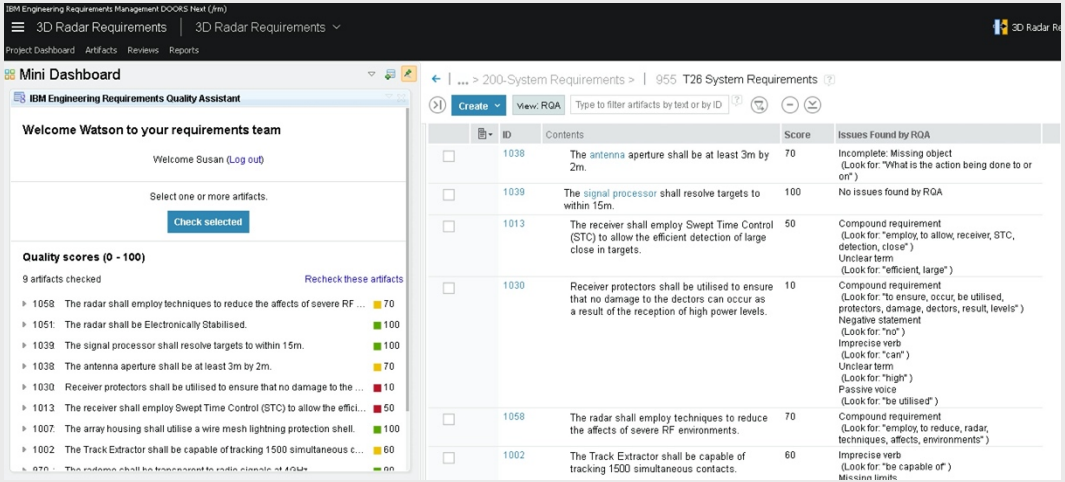
AI for Engineering

Flexible Deployment Models
- OpenShift

IBM Engineering Requirements Quality Assistant

Now available for DOORS Next and DOORS 9

Use AI to assess requirements using criteria consistent with the *INCOSE Guidelines for Writing Good Requirements*



"RQA is an asset to any systems engineer *who manages requirements in DOORS Next, as it provides an augmentation* ***that will save them time, while increasing their requirement quality."***

Dr. Douglas Orellana,
Engineering Solutions Director

SAIC

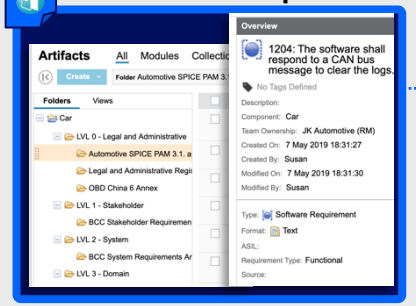
Planned for 2020: ***RQA on OpenShift****: Customer managed on premises, or preferred Cloud provider*

IBM Engineering Lifecycle Management Automotive Compliance v1

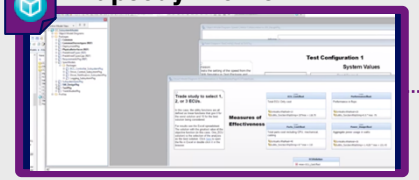
- A single package of six types of deployable assets to tailor ELM for Automotive Industry Compliance

Organization Concept (Agile Process for ASPICE)

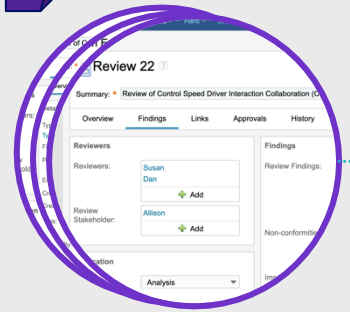
1 **DOORS Next Template**

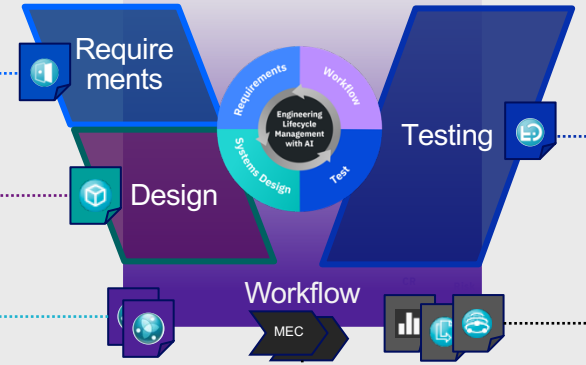


2 **Rhapsody Profile**



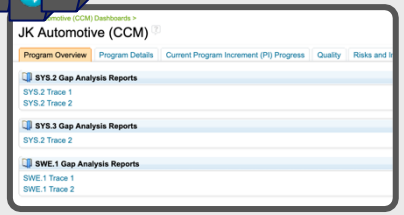
3 **EWM Work Item Types**



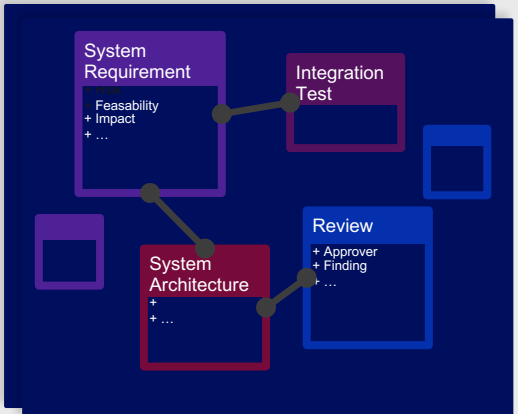


4 **ETM Assets**

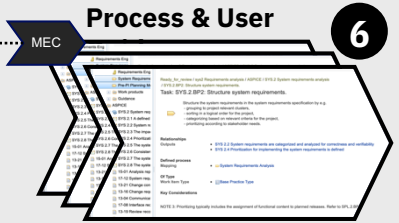
5 **Reports (JRS, PUB, ENI)**



...built on one cross domain Data & Link Model

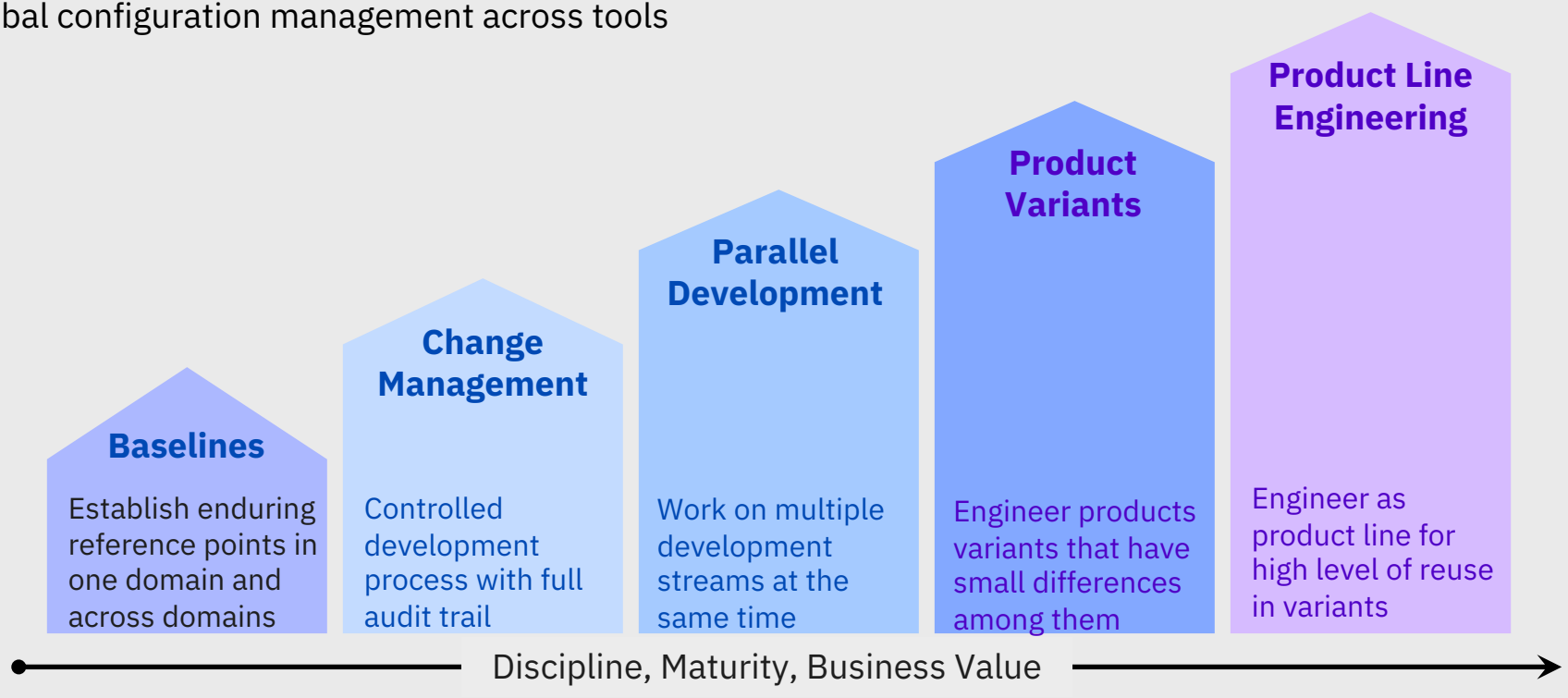


6 **Process & User**



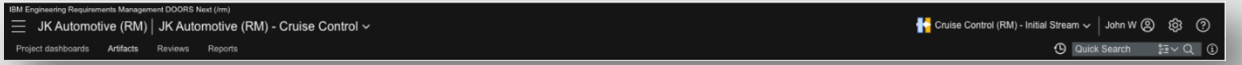
Which is your target?

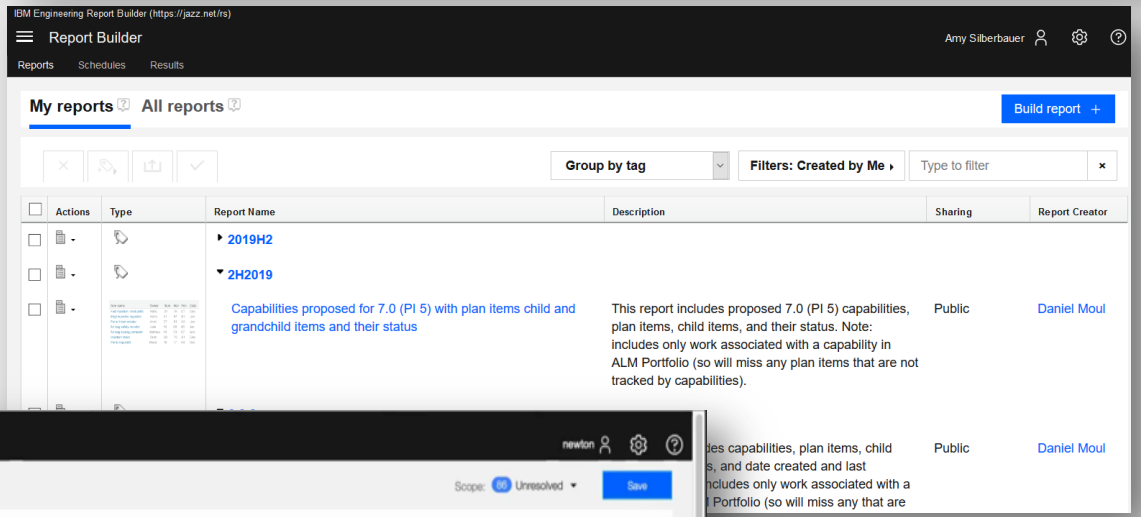
Effectively manage versions and variants
Configuration management built in
Global configuration management across tools

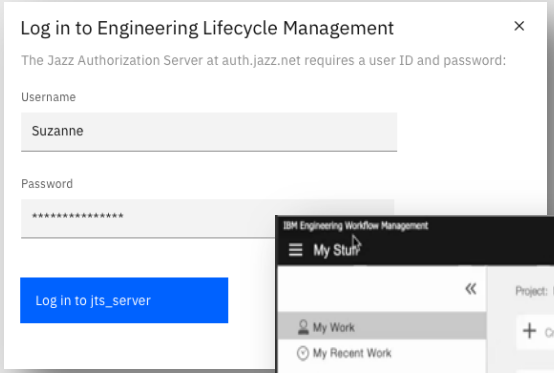


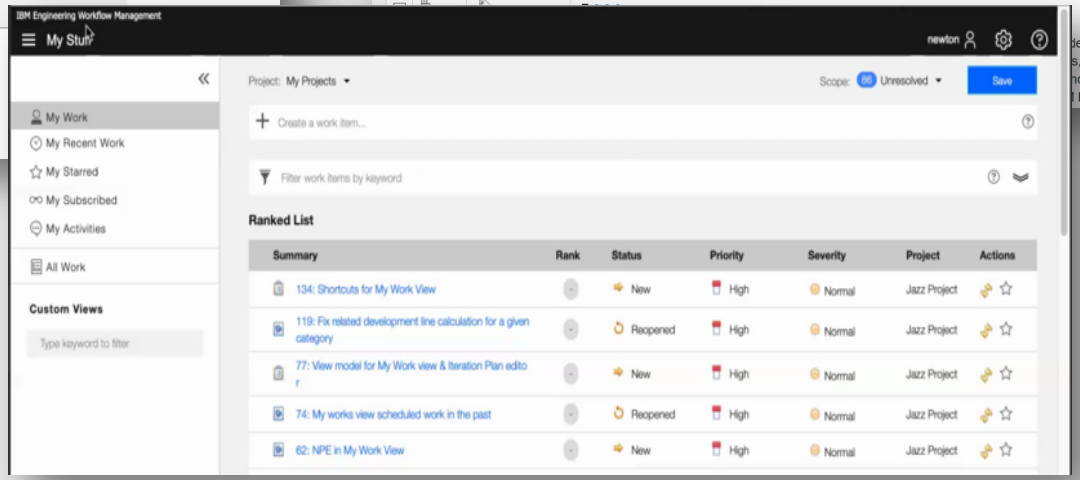
ELM 7.0

Visual refresh (UI style)
Login, Banners, Report Builder, My Stuff



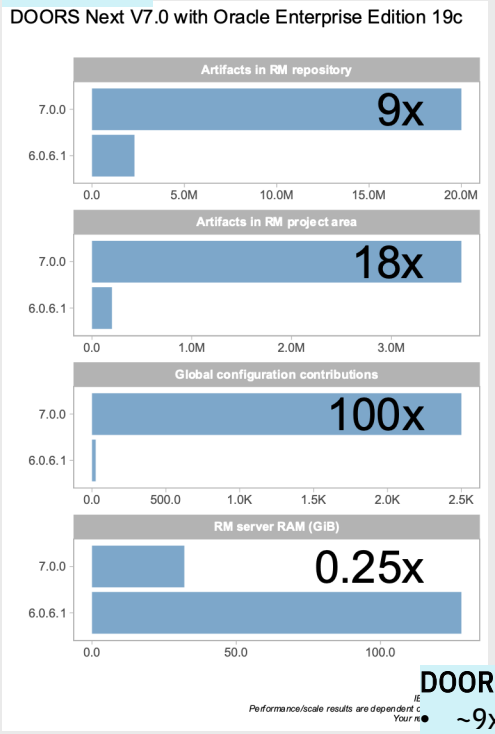






DOORS Next improving scale, performance and robustness

Oracle



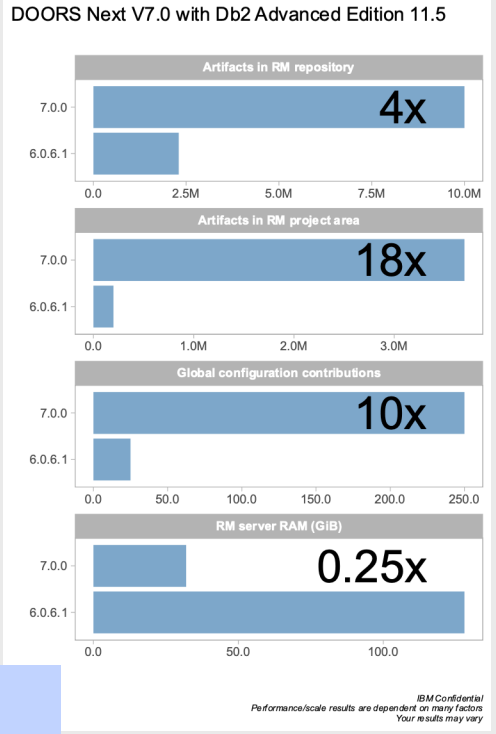
Significant improvements in scale
- Deployment guidelines based on tests more closely reflecting customer shape and size

Performance @ scale
- Performance more predictable

Robustness due to less use of Apache Jena
- Graceful degradation under system load
- Much smaller Jena indices (GBs → MBs)

Opportunity for further optimizations in the future

DB2



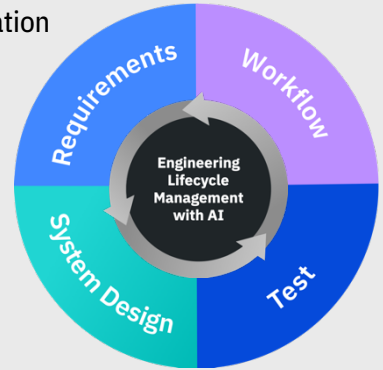
DOORS Next with Oracle
- ~9x in data scale per RM server
- ~18x artifacts in a project area
- 100x GC contributions in tests
- 1/4th the RAM required on RM server

DOORS Next with Db2
- ~4x in data scale per RM server
- ~19x artifacts in a project area
- 10x GC contributions in tests
- 1/4th the RAM required on RM server

Highlights: ELM V7

DOORS Next
- “Replatform”
- Multi-tier supply chain: ReqIF use cases

DOORS 9.7.1
- Link to versioned tests and models in global configuration
- Visibility/reporting over version aware traceability
- User requested usability enhancements



Rhapsody Model Manager
- Combined RMM + EWM server
- Clustering for concurrent user scale
- Tables and matrices in web UI
- Stereotypes and tags, dependencies, and plaintext descriptions: in web UI and reportable REST APIs
- Work with RMM-managed model offline
- [non-GA] Technical demonstrator: Reporting with JRS Report Builder using LQE (external model traceability)

Rhapsody 9.0
- Enhanced HTML model reports (icons, formatting, hotspots on images)
- Further enhancements to direct RTC integration, including “Accept”
- Performance improvements with remote requirements
- Microsoft App Locker compliance (split executables/config files)

ELM Solution-level
- Renaming; UI/UX work underway
- Reporting UX / simplicity, report on link validity
- GCM favorites, config tag tree, additional permissions
- SAFe 4.6
- Additional versioned reporting reliability (TRS/LQE)
- Updated operating environment (databases, etc.)

Engineering Workflow Management

Work items and Planning
- More flexible control over Taskboards and Kanban boards
- Query folders for organizing many queries in WebUI
- Custom attributes in QuickPlanner
- Enhanced security model for work item attachments
- GitHub Enterprise, GitLab, Gerrit enhancements, +BitBucket

Advanced SCM and build
- Reopen or split a completed change set
- Baseline queries and query editor

Method Composer
- Web-Based Authoring in DOORS Next (Phase 1)

Engineering Test Management
- Off-line testing improvements
- Email notification on test artifact state change
- Test results view filtered by TC and TCER categories
- Rich text custom attributes
- Option to include results when reusing test cases in a new test plan (and related reuse scenarios)
- Clustering

Going deeper on ELM V7.0

Jazz.net blog posts

- Get Ready for IBM Engineering Lifecycle Management v7.0
- “What’s new” posts
  - What’s new in IBM ELM V7.0
  - (and others)

“New & Noteworthy” documents

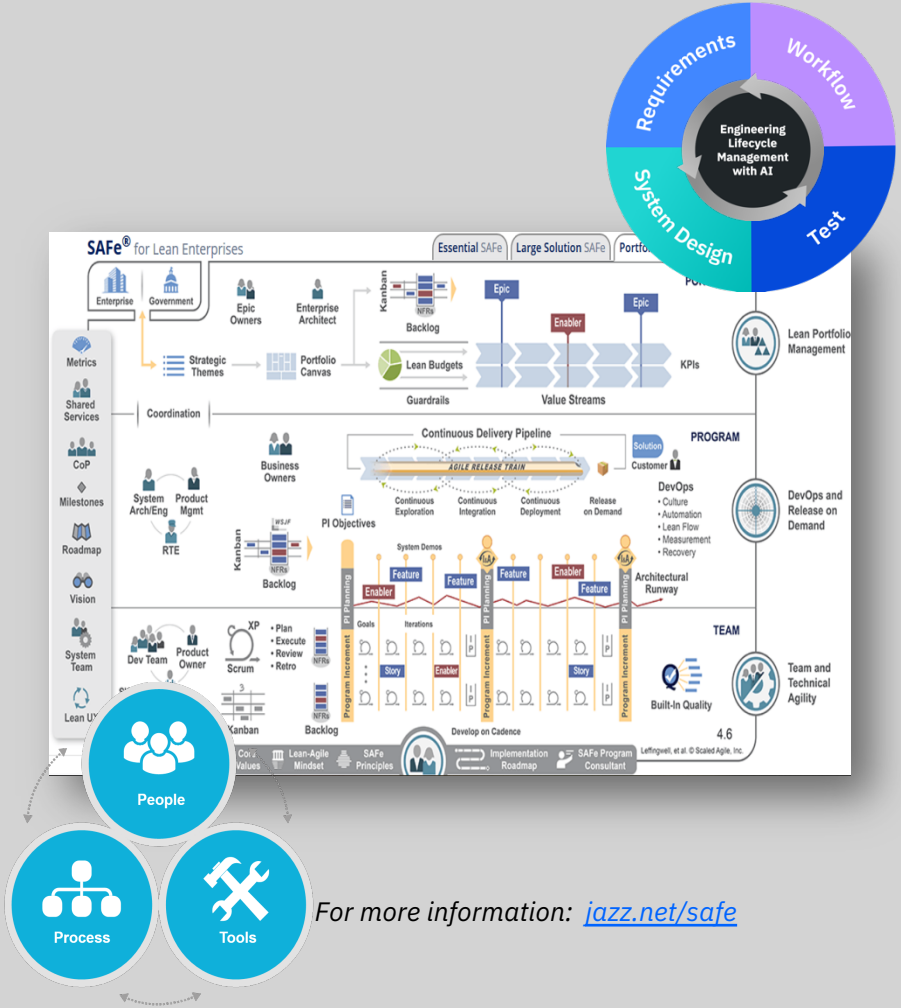
- V7.0-level N&Ns, starting here: https://jazz.net/downloads/elm/releases/7.0?p=news

Insightful engineering at enterprise scale


IBM

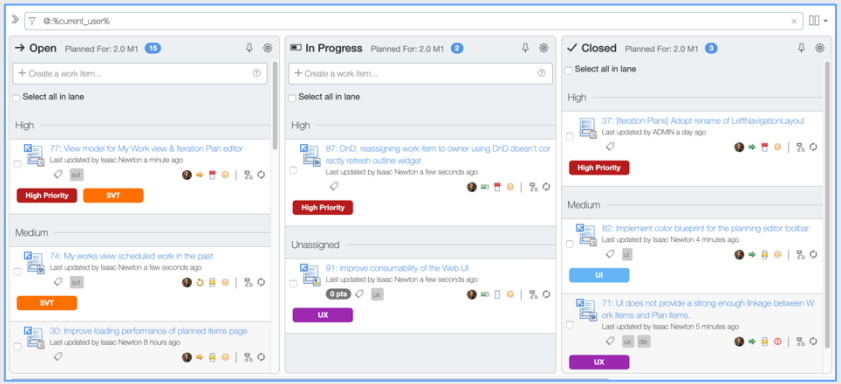
IBM Engineering Lifecycle Management (ELM) for Agility @ Scale

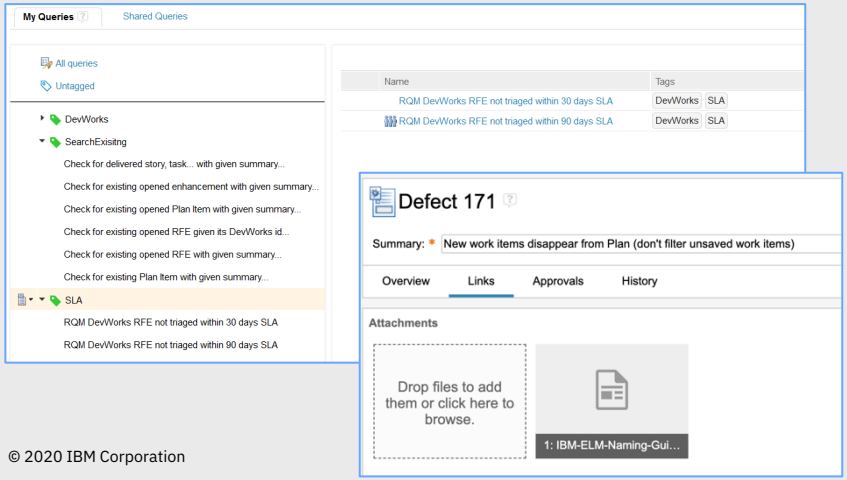
- **Get up and running quickly** with out-of-the-box infrastructure to implement all levels of SAFe
- **Simplify change to culture and process** with quick and easy access to SAFe guidance
- **Improve agility and predictability** with role-based dashboards for visibility to continuously adjust business goals
- **Easily adapt** to fit your specific needs and organization



For more information: jazz.net/safe

V7: IBM Engineering Workflow Management – Tracking & Planning





Planning

Enterprise Agile Planning (SAFe)

- SAFe 4.6
- SAFe Risk Roaming
- Plan save conflict handling is improved
- Taskboard and Kanban boards: more flexible control

Team Based Agile Planning

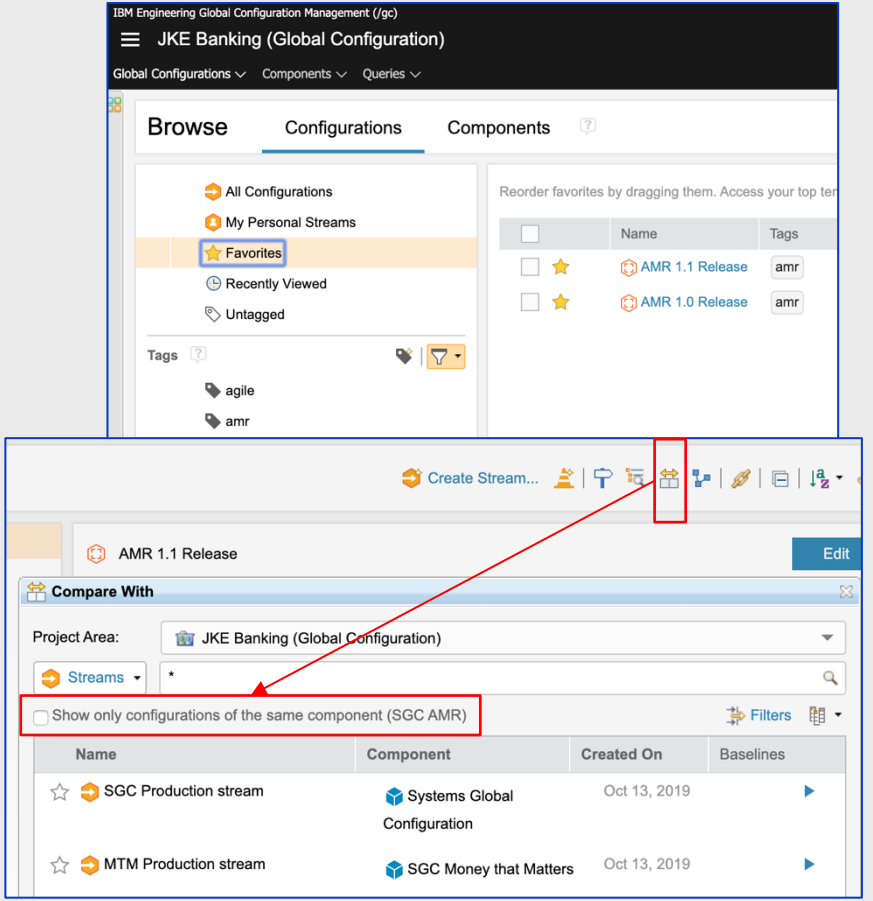
- Quick Planner: color tags, rich text, add custom attributes

Tracking / Work Items

- Organize work item queries in folders using tags
- Consistent access control for WIs and attachments
- Role-based permission to delete work items
- No more Flash in WI dashboard widgets

ELM V7.0 Global Configuration Management

- New menu options in GCM banner
- **New “browse configurations”** works like “browse components”
- Use new “**Favorites**” and “**Recently Used**” to find the GCs you care about … in the GCM app or the configuration switcher in the other apps. Use the new drop-down in the configuration picker in RM, QM, RMM to select a favorite or recently used GC.
- Organize your configurations in a meaningful hierarchy using the **tags tree**--now available for configurations too (not just components).
- Set **new permissions** for creating and renaming tags. There is a new Tag Manager role pre-defined.
- Use **team areas** and **new permissions** to give some users full control over configuration changes (add, remove, move) while restricting others to replacing existing contributions only.
- Specify the **team area in query conditions** and results
- **Compare variant GC trees** in different components
- Improved **system responsiveness** with large GC trees. Tested with 2500 GC contributions in V7.0



V7: IBM Engineering Workflow Management – Source Control

Duplicate Change Set
- Then remove or add changes

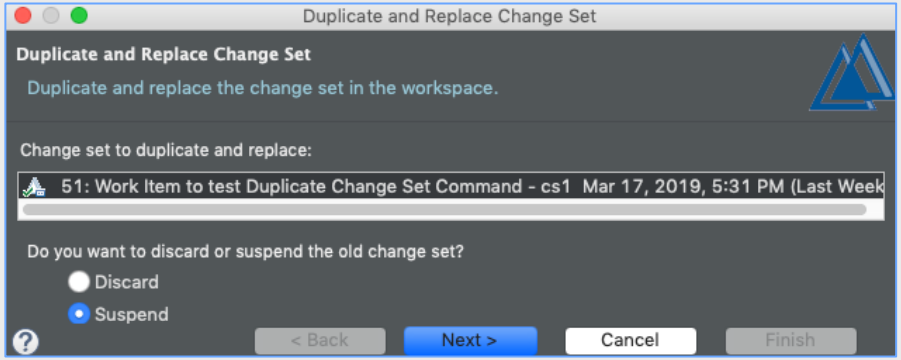
Save-able Baseline Queries
- Add to folders in Team Artifacts view
- Supports custom attributes
- Can be added to locate change sets
- Supports case sensitivity

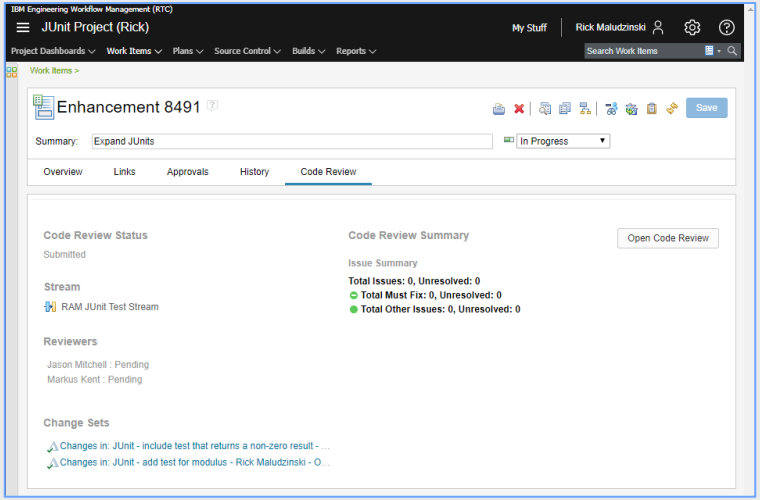
Baseline Editor and SCM web UI
- Supports custom attributes

Faster loading of Pending Changes View
- By selecting only the workspaces you wish to track

Greatly enhanced Code Review

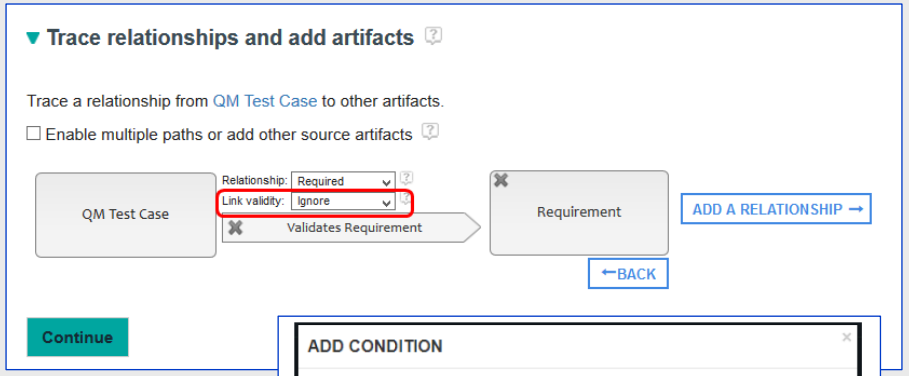
Other smaller enhancements
- Planned For in History view
- Version IDs in Compare Editor
- Confirm prompt on Deliver
- Set context in Change Explorer

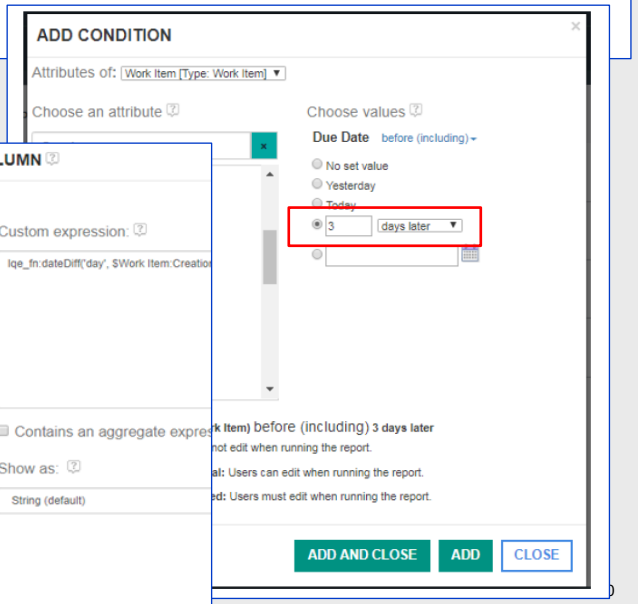


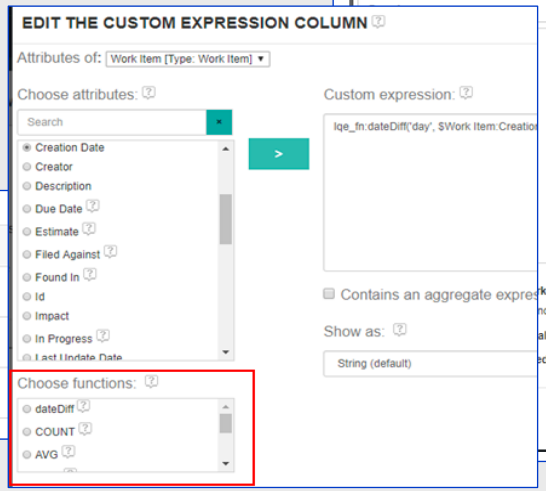


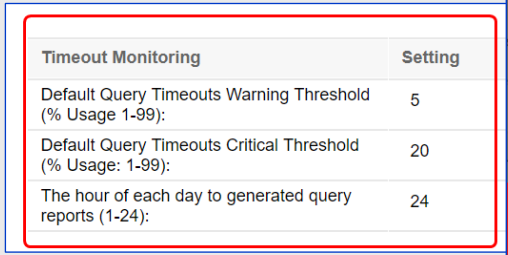
V7: IBM Engineering – Jazz Reporting Service

- Report on link validity without coding
- Dynamic date filtering by future dates
- Choose a database function when creating a custom expression
- Redesigned configuration picker (much faster!)
- Drag and drop reports or folders
- Run Report Builder against the types from a user-specified set of Global Configurations
- View and configure Lifecycle Query Engine (LQE) query load and metrics information









Timeout Monitoring	Setting
Default Query Timeouts Warning Threshold (% Usage 1-99):	5
Default Query Timeouts Critical Threshold (% Usage: 1-99):	20
The hour of each day to generated query reports (1-24):	24

V7: IBM Engineering Test Management

Email notification: more options

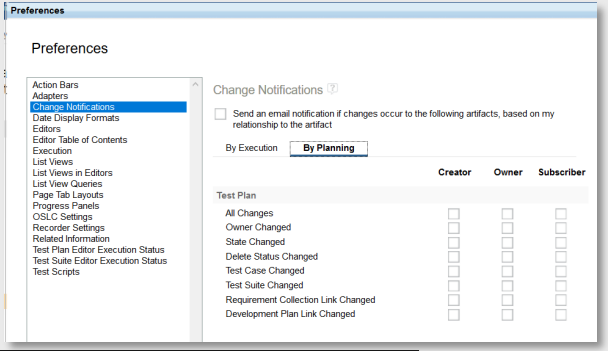
Customization: new custom attribute types

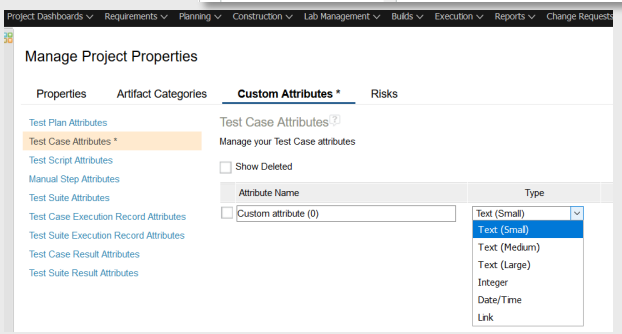
Test Execution
- Show categories and attributes during script-less test execution
- Improve offline test management support

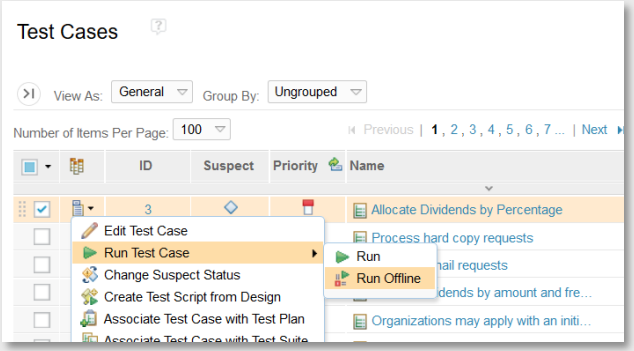
Usability
- Show parent and related artifacts in all artifact editors
- Test results view filtered by TC and TCER categories
- Option to bring over results when reusing test cases in a new test plan

Reporting
- Manage Skipped Resources
- Archived project areas are no longer reported in LQE

Permissions / performance / scale
- New permissions to control export to PDF and CSV
- Optimized execution of automated tests
- Clustering support







Rhapsody 9.0 and RMM 7.0

Make models first-class engineering lifecycle artifacts with configuration management and traceability

Rhapsody

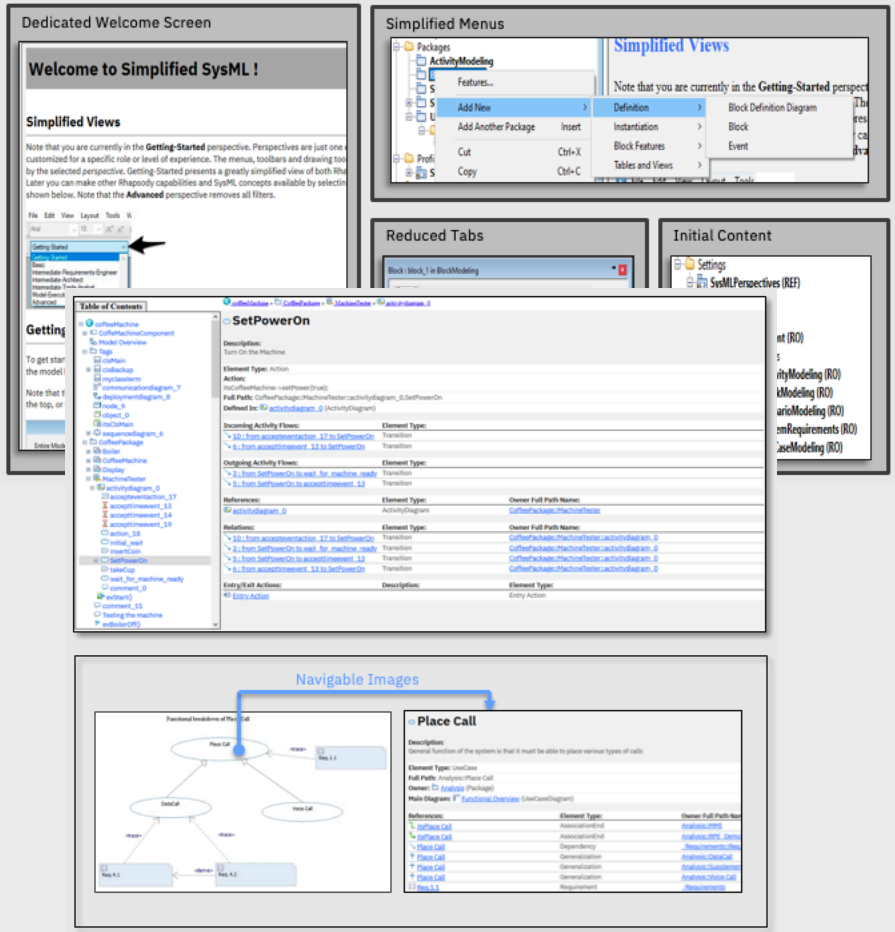
- New “Getting Started” SysML perspective
- HTML “report”
- Config Mgmt: “Accept changes” operation and enhanced “diffmerge” using RMM or Jazz SCM

Rhapsody Model Manager

- Single server: extension to Engineering Workflow Management (aka RTC)
- Display matrices, tables, and elements properties on web and report on them using reportable REST APIs
- Work off-line in Rhapsody with RMM-managed models

Rhapsody Design Manager

- No new release: use RDM 6.0.6.1 with ELM 7.0
- Make plans to move to RMM



V7.0 updates to the specified operating environment (supported software stack)

Databases

- Add Oracle 19c (12.2.0.3) drop 11g, keep 12c R1 and R2
  (large-scale DB partitioning supported in Oracle 19c Enterprise only)
- Add SQL 2017 and drop SQL 2014
  (keep SQL Server 2016)
- Add Db2 11.5 and drop 10.x (keep 11.1)

Application Servers

- Drop Tomcat support completely (will still be used by DOORS DWA)
- Support WAS 9.0.x and forward (9.0.5 or later) drop 8.5.5.x. Include Liberty 19.0.0.6.
- Continue to build and bundle with Java 8; plan to support Java 11 LTS in follow-on release

Browsers

- Support new Firefox 68 ESR and latest three Chrome releases, add Safari 13 and drop Safari 11

Clients and Server OS

- Drop Windows 7
- Add Windows Server 2019 and drop Win Server 2012 (keep: Windows Server 2012 R2 and 2016)
- Drop RedHat 6.x and add RedHat 8.x Server (Keep 7.x)
- Drop SUSE 11 (Keep SUSE 12 on x86) SUSE 15 is available, but wait to add support until after 4Q19 release

V7.0 updates to the specified operating environment (supported software stack)

- **EWM/RTC 7.0 Specific Platform Summary**
- Add Eclipse 4.11 IDE (no drops, only impacts EWM only) (Keep 4.4-4.8)
- Drop Visual Studio 2012 and 2013 IDE, Keep (VS 2015, VS 2017, VS2019)
- Add (EWM only) Ubuntu Client 18.0.4 and keep 16.0.4 (for IES 4.6 compatibility)
- **Git Integrations for ELM v7.0**
- GitHub 2.16.x, GitLab v9.x - v11.x, Git 2.10 - 2.20
- Gerrit v2.14 - v2.16
- Bitbucket (on prem)
- Drop older Git integration architectures on Apache and OpenSSH and keep Node.js architecture 10.x

Jenkins Version Support:

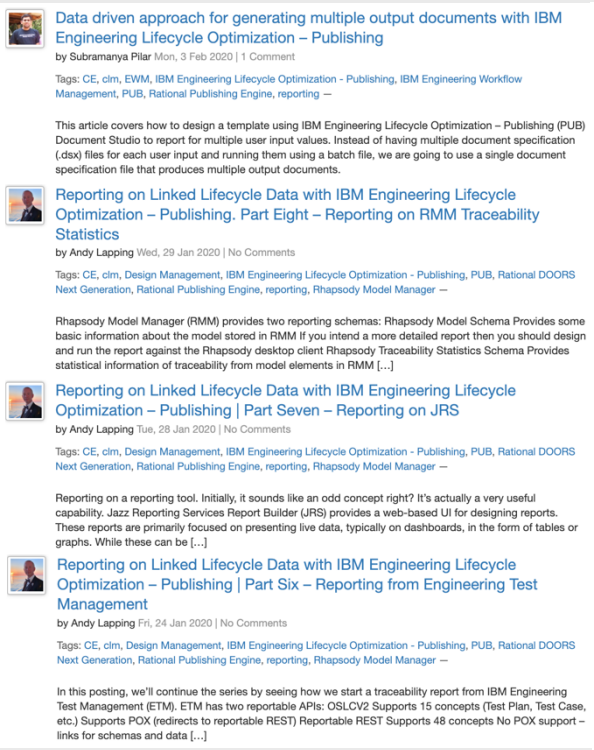
- Jenkins LTS 2.60.x through Jenkins LTS 2.164.x

Visual Studio Build Integration

- Visual Studio 2015, 2017 and 2019

Going deeper on reporting … recent instructional jazz.net blog posts

Publishing (aka RPE)



Data driven approach for generating multiple output documents with IBM Engineering Lifecycle Optimization – Publishing

by Subramanya Pilar Mon, 3 Feb 2020 | 1 Comment

Tags: CE, clm, EWM, IBM Engineering Lifecycle Optimization - Publishing, IBM Engineering Workflow Management, PUB, Rational Publishing Engine, reporting —

This article covers how to design a template using IBM Engineering Lifecycle Optimization – Publishing (PUB) Document Studio to report for multiple user input values. Instead of having multiple document specification (.dsx) files for each user input and running them using a batch file, we are going to use a single document specification file that produces multiple output documents.

Reporting on Linked Lifecycle Data with IBM Engineering Lifecycle Optimization – Publishing. Part Eight – Reporting on RMM Traceability Statistics

by Andy Lapping Wed, 29 Jan 2020 | No Comments

Tags: CE, clm, Design Management, IBM Engineering Lifecycle Optimization - Publishing, PUB, Rational DOORS Next Generation, Rational Publishing Engine, reporting, Rhapsody Model Manager —

Rhapsody Model Manager (RMM) provides two reporting schemas: Rhapsody Model Schema Provides some basic information about the model stored in RMM If you intend a more detailed report then you should design and run the report against the Rhapsody desktop client Rhapsody Traceability Statistics Schema Provides statistical information of traceability from model elements in RMM […]

Reporting on Linked Lifecycle Data with IBM Engineering Lifecycle Optimization – Publishing | Part Seven – Reporting on JRS

by Andy Lapping Tue, 28 Jan 2020 | No Comments

Tags: CE, clm, Design Management, IBM Engineering Lifecycle Optimization - Publishing, PUB, Rational DOORS Next Generation, Rational Publishing Engine, reporting, Rhapsody Model Manager —

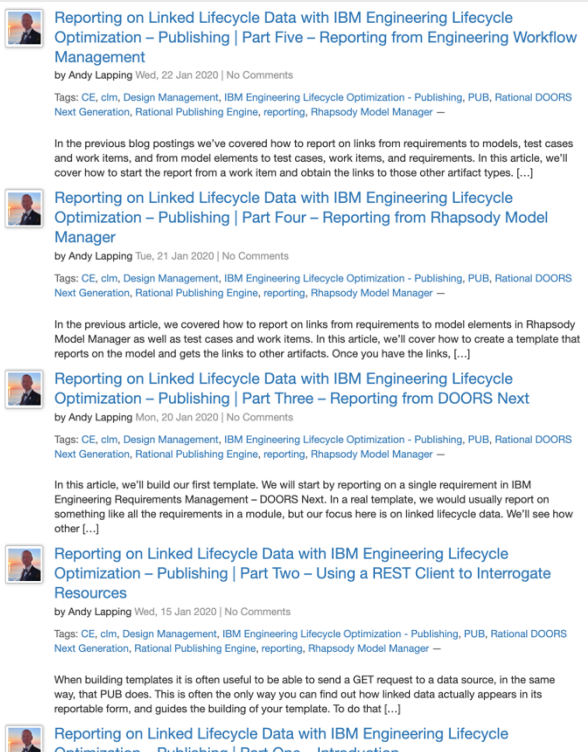
Reporting on a reporting tool. Initially, it sounds like an odd concept right? It's actually a very useful capability. Jazz Reporting Services Report Builder (JRS) provides a web-based UI for designing reports. These reports are primarily focused on presenting live data, typically on dashboards, in the form of tables or graphs. While these can be […]

Reporting on Linked Lifecycle Data with IBM Engineering Lifecycle Optimization – Publishing | Part Six – Reporting from Engineering Test Management

by Andy Lapping Fri, 24 Jan 2020 | No Comments

Tags: CE, clm, Design Management, IBM Engineering Lifecycle Optimization - Publishing, PUB, Rational DOORS Next Generation, Rational Publishing Engine, reporting, Rhapsody Model Manager —

In this posting, we'll continue the series by seeing how we start a traceability report from IBM Engineering Test Management (ETM). ETM has two reportable APIs: OSLCV2 Supports 15 concepts (Test Plan, Test Case, etc.) Supports POX (redirects to reportable REST) Reportable REST Supports 48 concepts No POX support – links for schemas and data […]



Reporting on Linked Lifecycle Data with IBM Engineering Lifecycle Optimization – Publishing | Part Five – Reporting from Engineering Workflow Management

by Andy Lapping Wed, 22 Jan 2020 | No Comments

Tags: CE, clm, Design Management, IBM Engineering Lifecycle Optimization - Publishing, PUB, Rational DOORS Next Generation, Rational Publishing Engine, reporting, Rhapsody Model Manager —

In the previous blog postings we've covered how to report on links from requirements to models, test cases and work items, and from model elements to test cases, work items, and requirements. In this article, we'll cover how to start the report from a work item and obtain the links to those other artifact types. […]

Reporting on Linked Lifecycle Data with IBM Engineering Lifecycle Optimization – Publishing | Part Four – Reporting from Rhapsody Model Manager

by Andy Lapping Tue, 21 Jan 2020 | No Comments

Tags: CE, clm, Design Management, IBM Engineering Lifecycle Optimization - Publishing, PUB, Rational DOORS Next Generation, Rational Publishing Engine, reporting, Rhapsody Model Manager —

In the previous article, we covered how to report on links from requirements to model elements in Rhapsody Model Manager as well as test cases and work items. In this article, we'll cover how to create a template that reports on the model and gets the links to other artifacts. Once you have the links, […]

Reporting on Linked Lifecycle Data with IBM Engineering Lifecycle Optimization – Publishing | Part Three – Reporting from DOORS Next

by Andy Lapping Mon, 20 Jan 2020 | No Comments

Tags: CE, clm, Design Management, IBM Engineering Lifecycle Optimization - Publishing, PUB, Rational DOORS Next Generation, Rational Publishing Engine, reporting, Rhapsody Model Manager —

In this article, we'll build our first template. We will start by reporting on a single requirement in IBM Engineering Requirements Management – DOORS Next. In a real template, we would usually report on something like all the requirements in a module, but our focus here is on linked lifecycle data. We'll see how other […]

Reporting on Linked Lifecycle Data with IBM Engineering Lifecycle Optimization – Publishing | Part Two – Using a REST Client to Interrogate Resources

by Andy Lapping Wed, 15 Jan 2020 | No Comments

Tags: CE, clm, Design Management, IBM Engineering Lifecycle Optimization - Publishing, PUB, Rational DOORS Next Generation, Rational Publishing Engine, reporting, Rhapsody Model Manager —

When building templates it is often useful to be able to send a GET request to a data source, in the same way, that PUB does. This is often the only way you can find out how linked data actually appears in its reportable form, and guides the building of your template. To do that […]

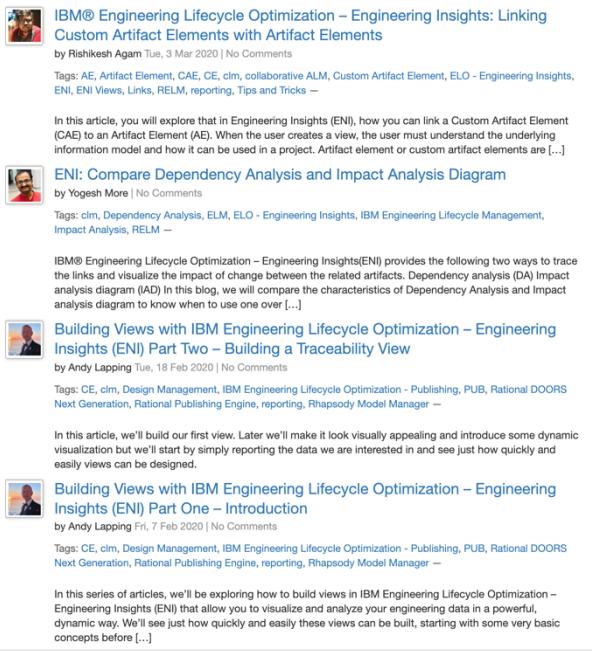
Reporting on Linked Lifecycle Data with IBM Engineering Lifecycle Optimization – Publishing | Part One – Introduction

by Andy Lapping Thu, 9 Jan 2020 | No Comments

Tags: CE, clm, Design Management, IBM Engineering Lifecycle Optimization - Publishing, PUB, Rational DOORS Next Generation, Rational Publishing Engine, reporting, Rhapsody Model Manager —

This is the first of a series of articles covering how to author reports in IBM Engineering Lifecycle Optimization – Publishing (PUB) Document Studio that report specifically on linked data, for example, requirements

Engineering Insights (aka RELM)



IBM® Engineering Lifecycle Optimization – Engineering Insights: Linking Custom Artifact Elements with Artifact Elements

by Rishikesh Agam Tue, 3 Mar 2020 | No Comments

Tags: AE, Artifact Element, CAE, CE, clm, collaborative ALM, Custom Artifact Element, ELO - Engineering Insights, ENI, ENI Views, Links, RELM, reporting, Tips and Tricks —

In this article, you will explore that in Engineering Insights (ENI), how you can link a Custom Artifact Element (CAE) to an Artifact Element (AE). When the user creates a view, the user must understand the underlying information model and how it can be used in a project. Artifact element or custom artifact elements are […]

ENI: Compare Dependency Analysis and Impact Analysis Diagram

by Yogesh More | No Comments

Tags: clm, Dependency Analysis, ELM, ELO - Engineering Insights, IBM Engineering Lifecycle Management, Impact Analysis, RELM —

IBM® Engineering Lifecycle Optimization – Engineering Insights(ENI) provides the following two ways to trace the links and visualize the impact of change between the related artifacts. Dependency analysis (DA) Impact analysis diagram (IAD) In this blog, we will compare the characteristics of Dependency Analysis and Impact analysis diagram to know when to use one over […]

Building Views with IBM Engineering Lifecycle Optimization – Engineering Insights (ENI) Part Two – Building a Traceability View

by Andy Lapping Tue, 18 Feb 2020 | No Comments

Tags: CE, clm, Design Management, IBM Engineering Lifecycle Optimization - Publishing, PUB, Rational DOORS Next Generation, Rational Publishing Engine, reporting, Rhapsody Model Manager —

In this article, we'll build our first view. Later we'll make it look visually appealing and introduce some dynamic visualization but we'll start by simply reporting the data we are interested in and see just how quickly and easily views can be designed.

Building Views with IBM Engineering Lifecycle Optimization – Engineering Insights (ENI) Part One – Introduction

by Andy Lapping Fri, 7 Feb 2020 | No Comments

Tags: CE, clm, Design Management, IBM Engineering Lifecycle Optimization - Publishing, PUB, Rational DOORS Next Generation, Rational Publishing Engine, reporting, Rhapsody Model Manager —

In this series of articles, we'll be exploring how to build views in IBM Engineering Lifecycle Optimization – Engineering Insights (ENI) that allow you to visualize and analyze your engineering data in a powerful, dynamic way. We'll see just how quickly and easily these views can be built, starting with some very basic concepts before […]

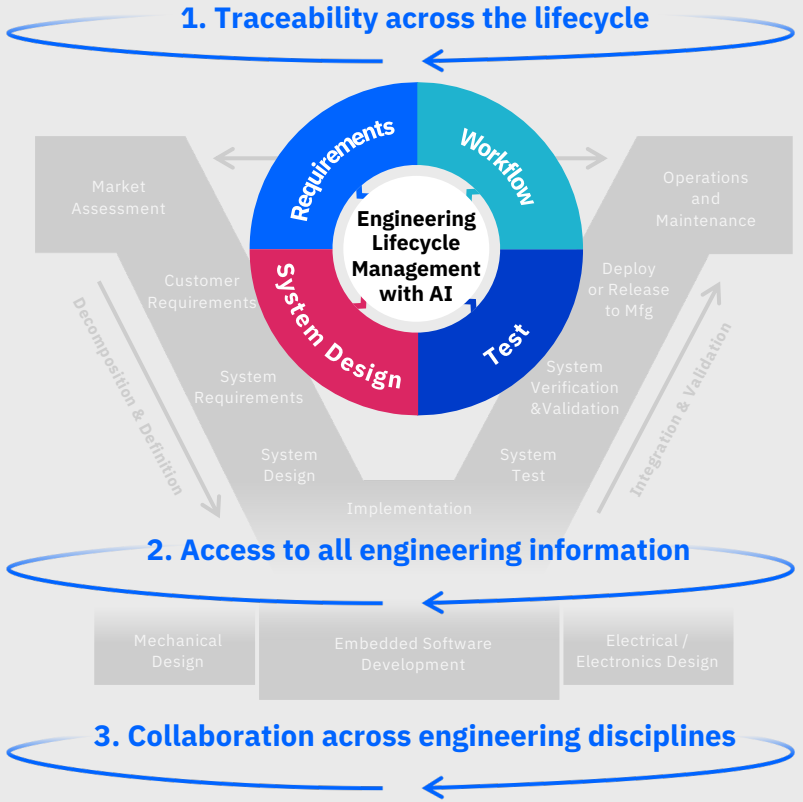
Name Updates

V6 Offering Name	V7 Offering Name
IBM Continuous Engineering solution, IBM solution for Collaborative Lifecycle Management	IBM Engineering Lifecycle Management
IBM Rational DOORS	IBM Engineering Requirements Management DOORS V9.7.1
IBM Rational DOORS Next Generation	IBM Engineering Requirements Management DOORS Next
IBM Requirements Quality Assistant	IBM Engineering Requirements Quality Assistant
IBM Rational Team Concert	IBM Engineering Workflow Management
IBM Rational Quality Manager	IBM Engineering Test Management
IBM Rational Rhapsody	IBM Engineering Systems Design Rhapsody V9
IBM Rational Rhapsody Model Manager	IBM Engineering Systems Design Rhapsody - Model Manager
IBM Rational Rhapsody Design Manager	IBM Engineering Systems Design Rhapsody - Design Manager
IBM Rational Engineering Lifecycle Manager	IBM Engineering Lifecycle Optimization - Engineering Insights
Rational Publishing Engine	IBM Engineering Lifecycle Optimization - Publishing
Method Composer	IBM Engineering Lifecycle Optimization - Method Composer V7.6
IBM IoT Collaborative Lifecycle Management on Cloud	IBM Engineering Lifecycle Management Base SaaS
IBM IoT Continuous Engineering on Cloud	IBM Engineering Lifecycle Management Extended SaaS

IBM Engineering Lifecycle Management (ELM) Benefits

Insightful engineering at enterprise scale

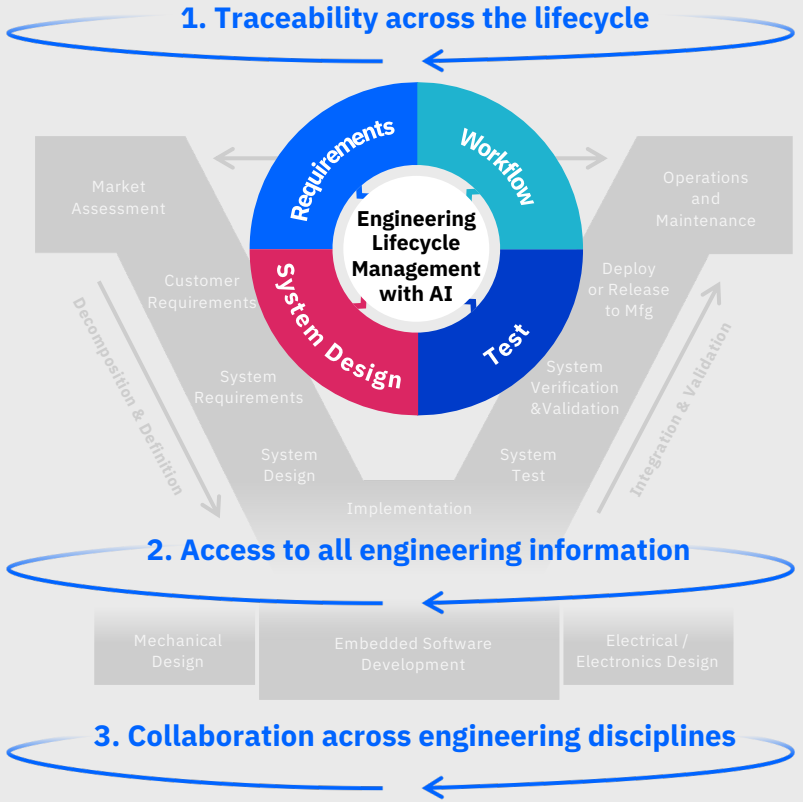
- More effective requirements management establishing single-source of truth and traceability offering higher product quality
- Automatically create system specifications, interface design documents, test cases, and track progress of work items to drive constant process improvement
- Continuous risk-based testing with prioritization, assessment, and automation improving product quality
- Enhance productivity and product quality by infusing AI throughout workflows
- Improved decision making through visualization, prototyping, simulation, and analysis
- Optimize engineering productivity through reuse and variant management



IBM Engineering Lifecycle Management (ELM) Benefits (cont.)

Insightful engineering at enterprise scale

- Fully integrated regulatory, compliance, process, reporting & audit to meet design plan and safety-critical requirements
- Address increasing engineering complexity enabling systems of systems design, geo-dispersed teams, growing multi-tiered value chains
- Enhanced enablement through integrated agile, SAFe, or custom processes to systems engineering practices
- Actively embrace open standards enhancing integration, enabling broad ecosystem, and individual customization
- Single point access to all engineering information




IBM

Please note

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.