National Aeronautics and Space Administration



QUALITY
LEADERSHIP FORUM
— VIRTUAL SERIES —

COSMIC — Unify Work Authorization, Nonconformance Reporting and Inventory Management Across NASA

Thursday, Aug. 20, 2026 | 1:00 – 2:00 p.m. Eastern

Presenters

Nicholas Holaday – Quality Engineer, Johnson Space Center

Tyson Tucker – Project Manager, MRI Technologies, Johnson Space Center

COSMIC Docs

Unifying Work Authorization, Nonconformance Reporting, & Inventory Management Across NASA Centers

20 August 2026

Nick Holaday

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JSC - Quality & Flight Equipment Division (NT)

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COSMIC Team Introductions

Project Team

- Nicholas Holaday (NT), *JSC-SMA Directorate Champion & COSMIC Docs Responsible NASA Official*
- Teresa Shurtz (EC), *JSC-Engineering Directorate Champion*
- Tyson Tucker, *COSMIC Project Manager (MRI Technologies)*

MRI Developer & Support Team

- Mike Fielden
- Bethany Fields
- Richard Kronick
- Rudis Muiznieks
- Nick Raimondi
- Makenzie Rutledge
- Blake Watson

Working Group

- 140+ personnel from JSC and other NASA Centers have met bi-weekly since March 2025 to drive the development of the new tool.
- Cross-Organization participation builds end-user buy-in and ensures all unique needs and wants are heard. Get involved!

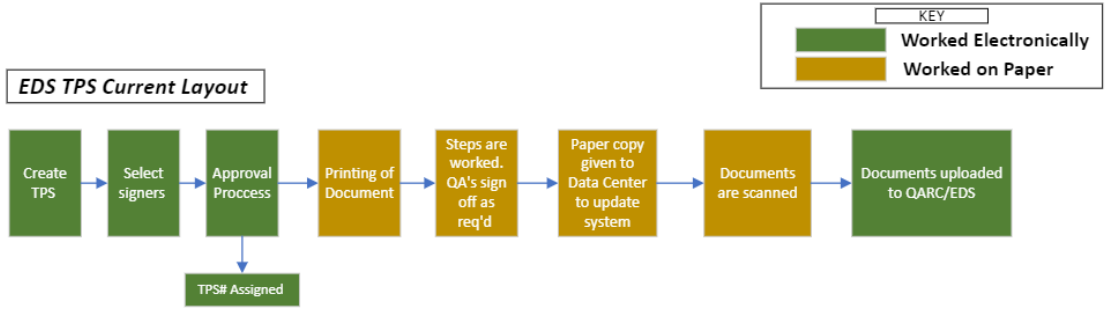
COSMIC Docs – Executive Summary

- The Task Performance Sheet (TPS) and Discrepancy/Nonconformance Report (DR/NCR) workflows are critical components of JSC's Quality Management System (QMS), and Controlled and Uncontrolled Government Furnished Equipment (GFE) development.
- Since 2012, these workflows were housed in the Electronic Document System (EDS) and involve manual, paper-based processes that are time-intensive, prone to human error, and limit traceability.
- A trade study of tools used by other NASA centers, as well as COTS solutions, concluded there was no NASA or commercial option that met JSC's desire for a licensing fee-less, fully-customizable, part-centric work authorization tool.
- Quality partnered with the COSMIC team, which built an Inventory Management tool for JSC's Crew & Thermal Systems Div., to define requirements for a robust, user-friendly platform to build, route, work, and close work authorization documents, fully-electronically.
- The collaborative effort between key stakeholders from JSC's Directorates and Programs ensured buy-in from working-level users through Center Management. Development funding secured by showing high ROI and on-time execution of deliverables and scope.
- Development of COSMIC Docs began in February 2025 with a user Working Group established in March 2025.
- Successfully released COSMIC Docs' Production environment to test user groups, on-time, on October 1, 2025.
- Over the following several months, Quality led the training, on-boarding, and transitioning of 1,400+ JSC users to COSMIC Docs.
- **JSC successfully transitioned from using the Electronic Document System (EDS) to COSMIC Docs for Task Performance Sheets (TPS) and Nonconformance Reports (NCR) on Monday, August 3rd. Over 1,100 WADs have been electronically worked since.**
- FY27 development goals focus on integrating fully electronic Procedures into COSMIC, continuous improvement of the TPS and NCR processes based on user feedback, connecting to critical JSC & NASA source of truth data sets, and exploring AI integration.

Identifying the Need.
Finding a Solution.
Taking Action.

Background - **Electronic Document System (EDS)**

- JSC's Electronic Document System (EDS) was released in 2012 by SMA to create, release, and store Task Performance Sheets (TPS) and Discrepancy Reports (DR).
- Transition turned a fully-paper process into one that was routed electronically but still worked on paper. Lack of funding put fully-electronic effort on hold.
- For JSC's average of 10,000 WADs a year, work and buy-offs were captured on paperwork that was walked between buildings and susceptible to inefficiencies and document traceability risks.
- Key technical and administrative data, such as torque values, test results, elapsed time between approvals, etc., weren't searchable or available for data analysis. Discrepancies only focused on remedial action.
- Slowing processing time and continued use of paper led major JSC Projects such as VIPER to request waivers to use alternate WAD systems, damaging JSC's QMS.
- Frequent rework due to paperwork errors. Long wait times between final acceptance, dropping off finalized paperwork, and the record centers scanning closed items in.



Example of Defining ROI - Kickbacks

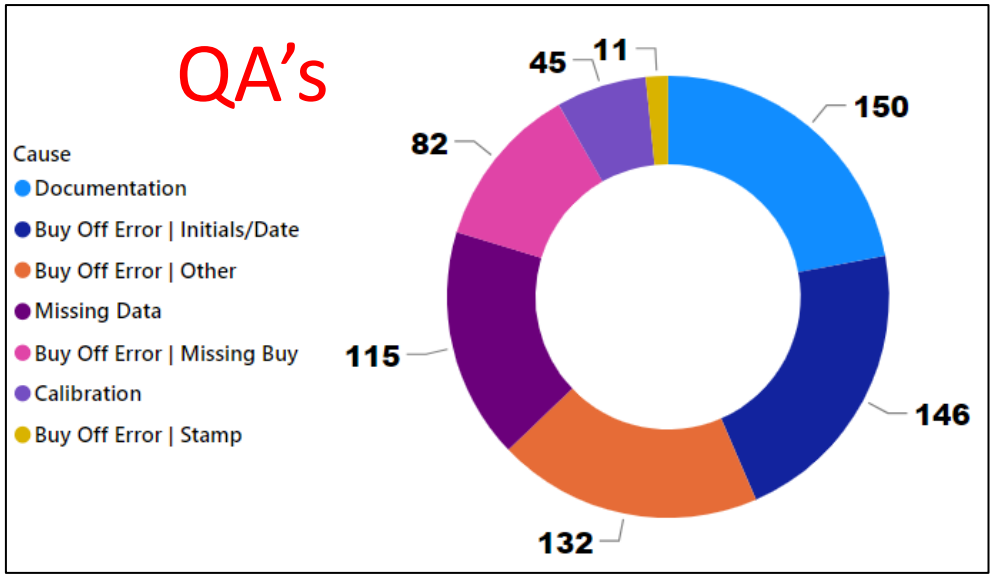
Kickback

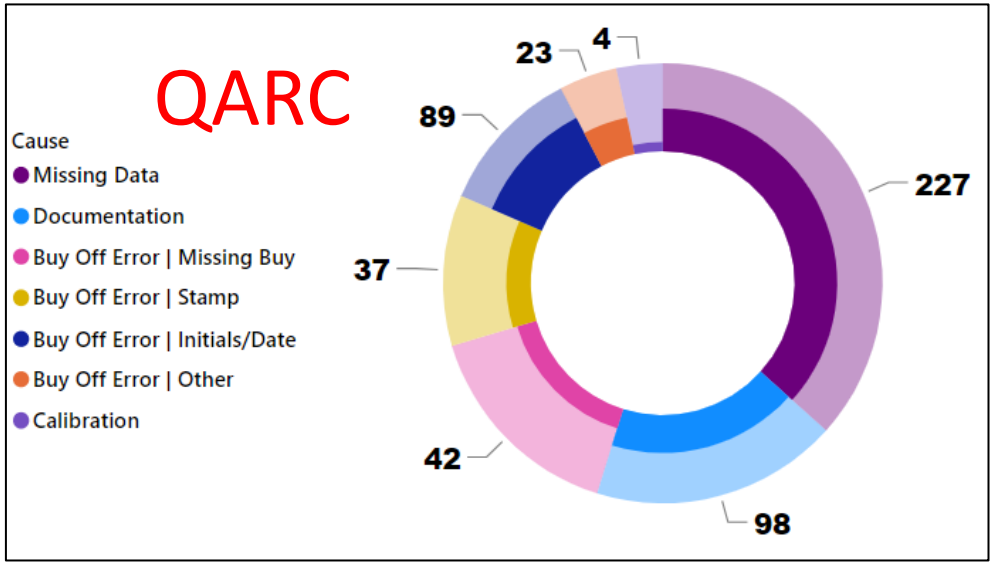
- When an issue was noticed with paperwork during QA or Record Center final review and required resolution prior to closure
- Required the finder to notify the responsible party, teams to walk back and forth to pick up, correct, and return the paper
- [1,764 Kickbacks] x [180 mins each] = 5,292 hrs. of lost time a year

Causes

- *Documentation*: missing attachments, dispositions, and defect codes
- *Calibration*: missing tool info and attachments
- *Buy Off Errors*: illegible stamps or initials, and wrong dates
- **95% of kickbacks eliminated with an electronic system**

Calculating quantifiable ROI like Kickbacks, and extrapolating findings to data-less parts of the process, identified a clear need for change!





Then and Now

From SMA's Software of the Year Award Presentation in 2012







What SMA in 2012 hoped JSC's WAD process would look like, today



Then and Now

From SMA's Software of the Year Award Presentation in 2012







JSC-B20 Today







Finding the Right Solution for JSC

- Due to projected on-premise infrastructure improvement costs, SMA was unable to upgrade EDS to include electronic buy-offs
- Led a cross-organization, multi-day Kaizen Event to ID current bottlenecks, map out an ideal state, and define an actionable future state
- SMA & Engineering tiger team began searching across NASA & commercially available replacement options
- Collaborated with GSFC's Technical Data Management System (TDMS) and WSTF's webPAPER teams to establish JSC Projects in their systems
  - Built flight hardware using those fully electronic systems thanks to GSFC and WSTF's willingness to work together
  - Gathered priceless insight into those tools and defined future JSC requirements via feedback from users on pain-points or beloved capabilities
- Trade study and test user group experiences led to high-priority requirements for a new tool
  - Customization capabilities to align future work order and nonconformance process to JSC's current nomenclature and flow. No cost/user licensing
  - Integration opportunities with the Agency's Bond SAP system, calibrated tools, engineering drawing, requirement certification tools, etc.



Cross-Organization Kaizen Event



The Team's Future State with Steps in Yellow & Actions in Pink

COSMIC – A One-Stop Shop for JSC's Needs

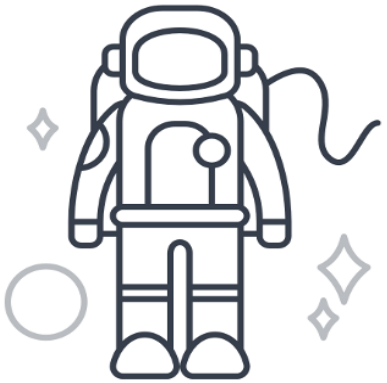
COSMIC provides comprehensive life-cycle tracking and property management by merging data from multiple NASA systems into a coherent and consolidated data set. COSMIC gives teams access to the hardware data necessary to ensure quality, safety and flight readiness.

ENGINEERING

- Configuration Management
- Assembly Management
- As-Built Configuration Management
- Calibrations Tracking
- Limited Life Tracking

DOCUMENTS

- Discrepancy Reports
- Task Performance Sheet
- Failure Investigation Action Report
- Engineering Change
- Easy Transfer
- Problem Reporting and Corrective Action
- Failure Reporting Analysis and Corrective Action System
- WAIVER
- Yellow Tag Notice



ACTIVITIES

- Cycle
- Pressurization
- Maintenance
- Service
- And More

LOGISTICS

- Shipping
- Receiving
- Issues
- Receipts
- Transfers
- Purchase Requests
- Inventory Tracking
- Inventory Audits
- Inventory Management

EVENT PLANNING

- Launch
- Return
- Disposal
- EVA Activities
- Chamber Runs
- NBL Runs
- Long Range Planning
- Operations Planning
- Limited Life Tracking

- NASA developed software already in-use for Inventory Management
- Built on cloud-based infrastructure
- Fully customizable to JSC's nomenclature and process
- No crippling licensing costs
- Scalable to any number of users without reducing performance
- In house dashboards and metric reports to promote process improvement
- Streamlined user expereince to reduce training time and resource waste on manual entry errors

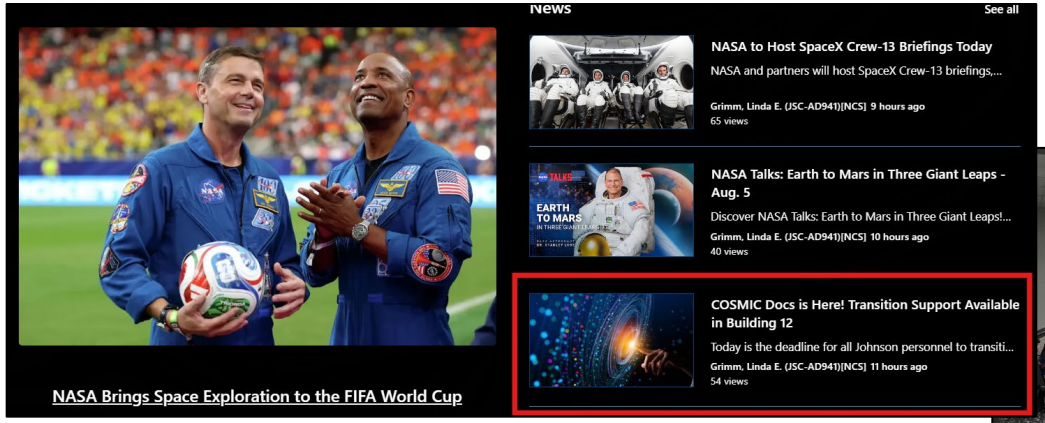
Enabling a Successful Transition

Over the 18 months of development & roll-out, the COSMIC Docs team was committed to maximizing transition success by prioritizing user feedback into the product.

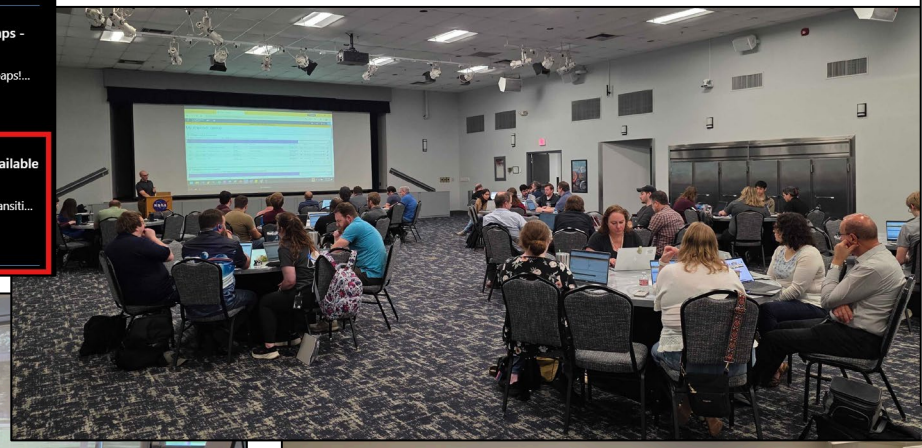
Collaboration led to cross-organizational buy-in and transition advocates at every level.

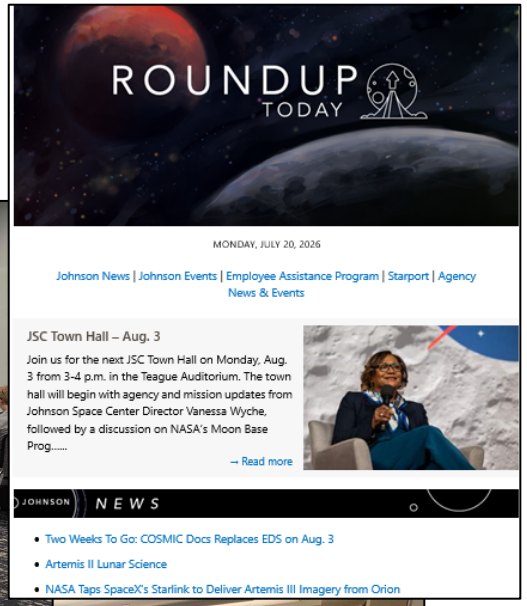
- Met with JSC Directorate & Center Mgmt. to ensure top-down ownership
- 1,400+ users on-boarded via NAMS workflow
- Provided 22+ in-person and online user trainings since May
- Led 32 COSMIC Working Groups. Discussed and dispositioned process and tool decisions as a unified team
- Commissioned 12 JSC Round-Up articles featuring information about the transition and training resources
- Users submitted 541 support tickets in Staging, and 336 tickets in Production, showing extreme levels of buy-in and desire to better the tool and JSC's products
- Partnered with high-volume, high-complexity groups to develop specialty record types or capabilities
- Led procurement of 85 tablets for Engineering teams & labs. Successfully implemented in the field

Spreading the Word

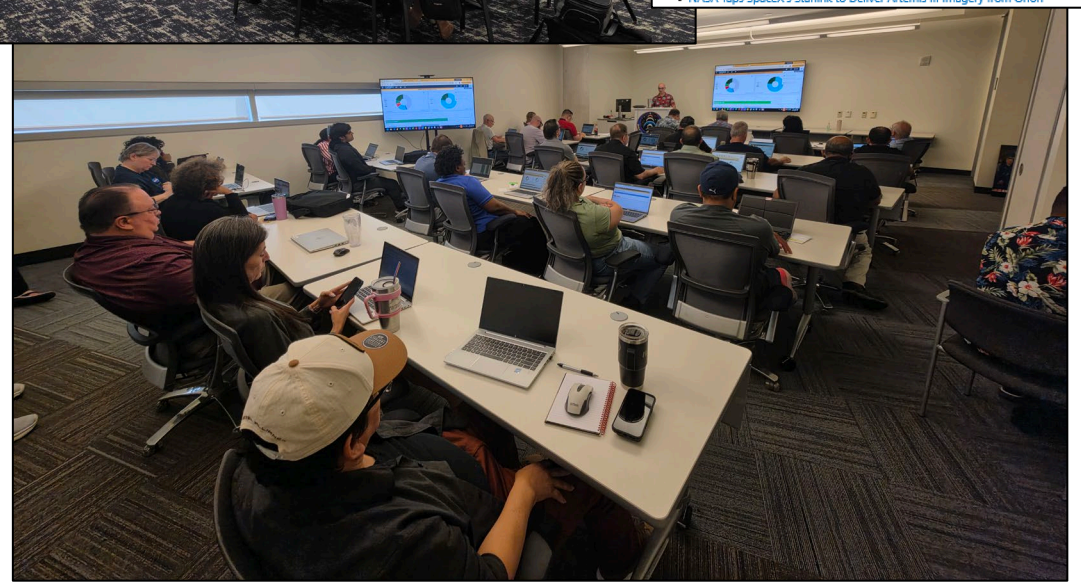












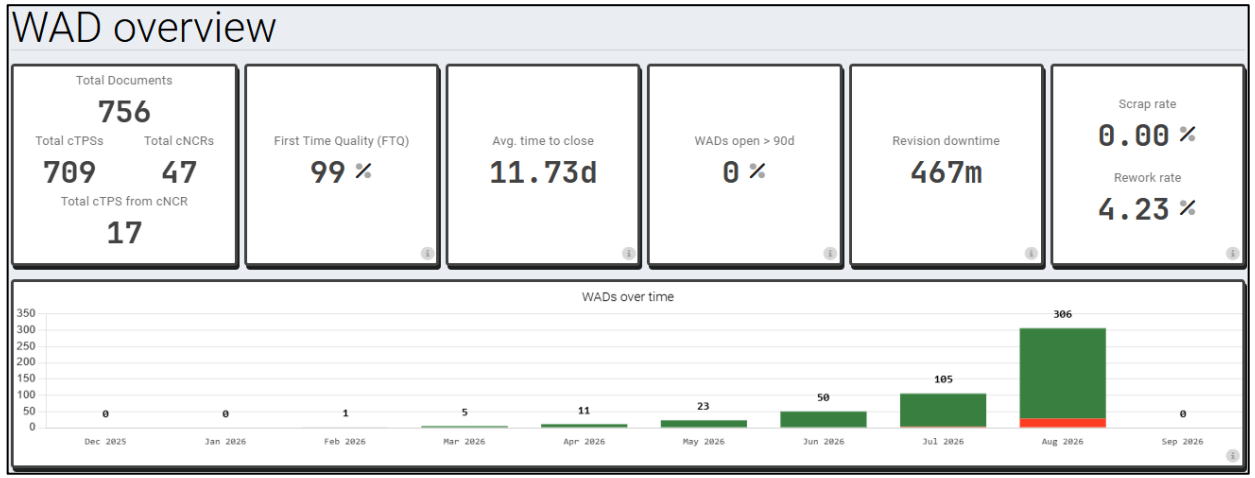
Transition Outcome

- **The COSMIC Developers and cross-organization Working Group stakeholders enabled the fully-electronic Work Order, Nonconformance, and Inventory Management tool to be fully released to and used by all JSC users by August 3rd**
- Platform continues to meet performance expectations as user count and daily usage continues to grow
- Minimal records created in the old tool, showing a successful user awareness and training campaign
- 1,500+ JSC users building complex Flight Hardware/Software, Space Food, and one-time engineering development units, in a fully-electronic, reliable tool that improves product quality and Crew safety
- JSC has a platform it can leverage to absorb previously siloed processes, reduce duplication of effort from receiving through delivery, and focus resources on the things that matter to NASA's success

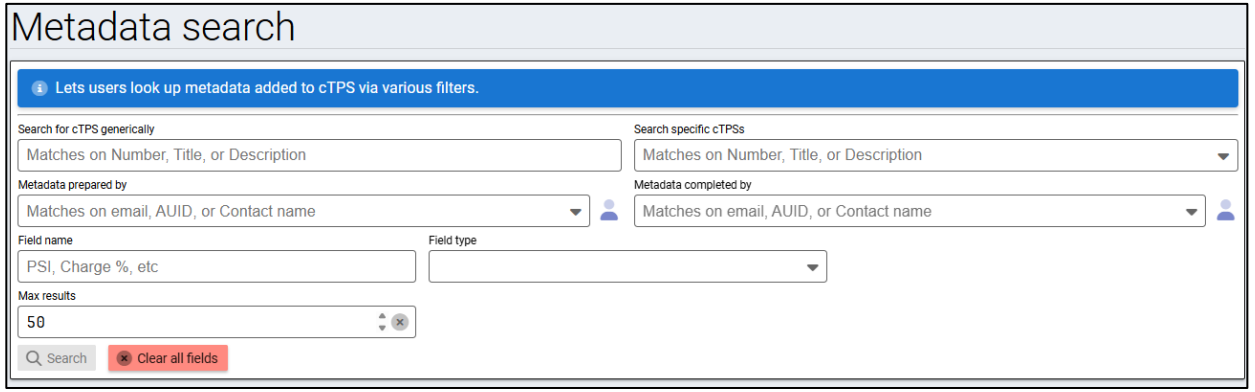
Immediate ROI for JSC

- In EDS, in-line data was captured by hand, relied on physical stamp control, prone to human error, and was not searchable or actionable after closure
  - COSMIC's fully-electronic, structured data-capture is highlighting unseen process gaps, enabling Projects to leverage data they capture, and shifting our paper-based paradigm
- For the 1,200+ WADs already in COSMIC:
  - Eliminated the time and resource cost of record centers scanning & closing paperwork
  - System controls eliminated closure kickbacks related to illegible stamps, missing buy-offs, etc.
  - Electronic buy-offs have already exposed teams not previously following requirements
  - Mitigates past audit findings related to lost paperwork and out-of-calibration tool reports
  - New Nonconformance Report (NCR) process allows JSC to focus on Root Cause Investigation, Recurrence Control, and Preventative Actions, holding ourselves to a new, higher standard
  - Quantifiable metrics become instantly available for users and management alike
  - Tracked history and signatures tied to PIVs ensures personnel accountability and revision control

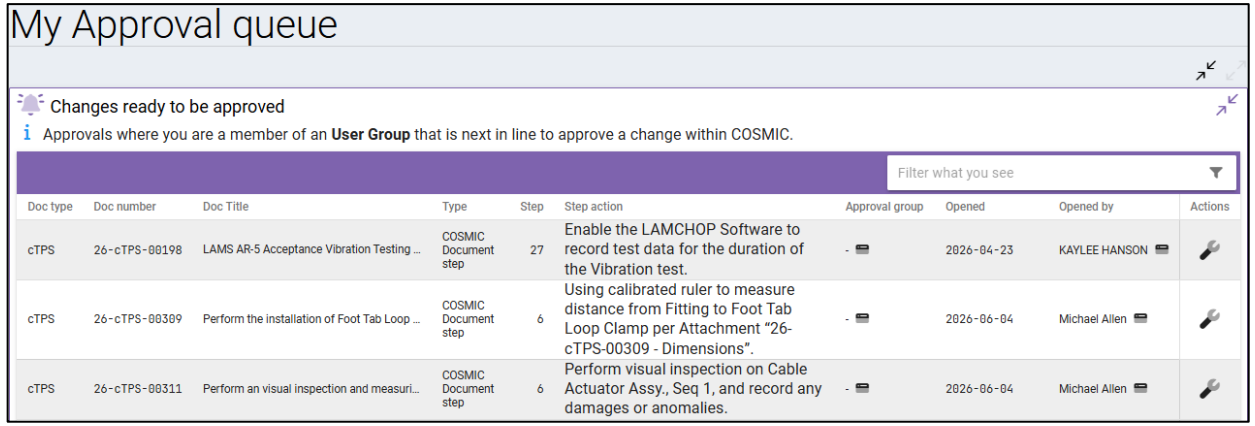
Enabling a Data-Driven QMS



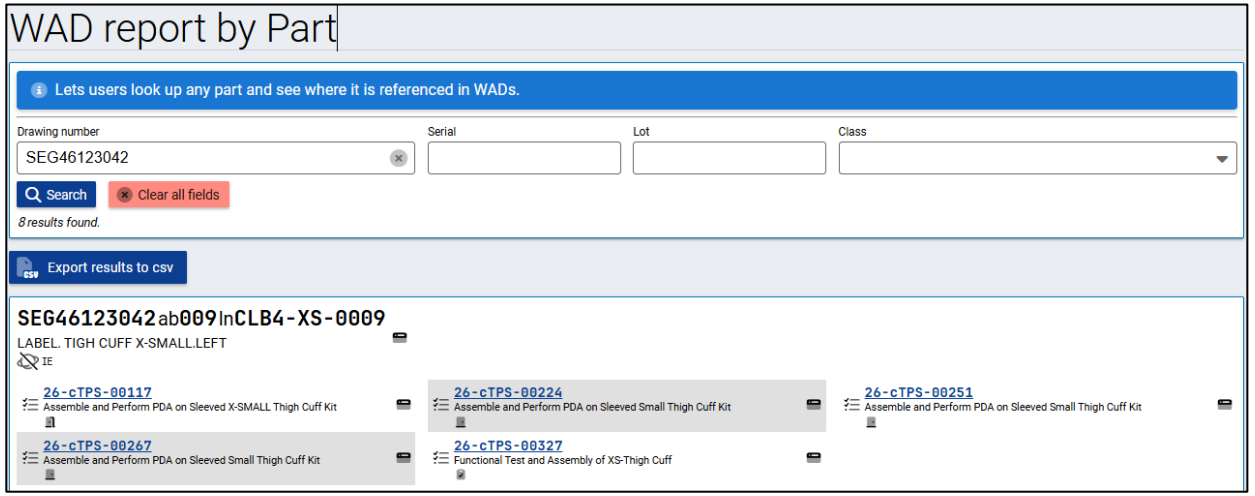
Performance & Quality Metrics



Export & Trend User-Captured Data Across WADs

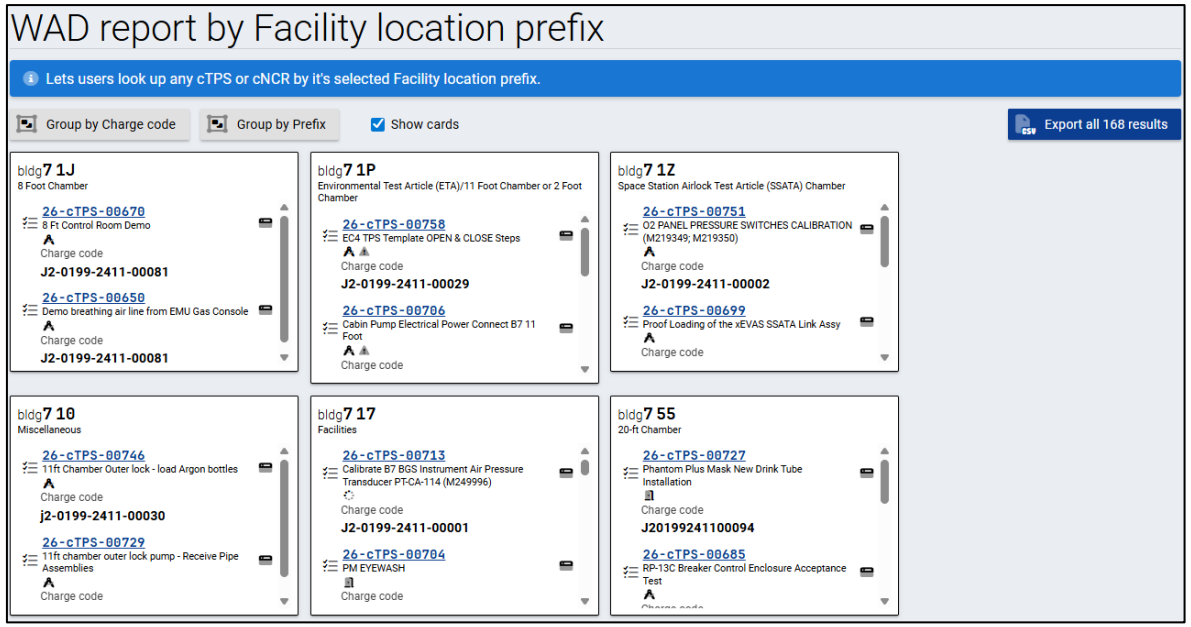


Real-Time Awareness of Your Open Actions

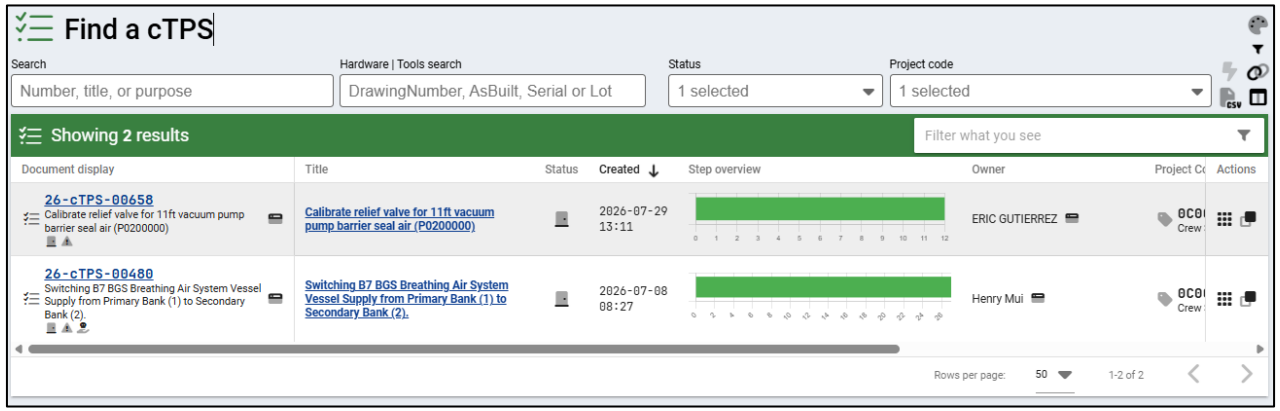


Instantaneous Where-Used & Open-Records Search

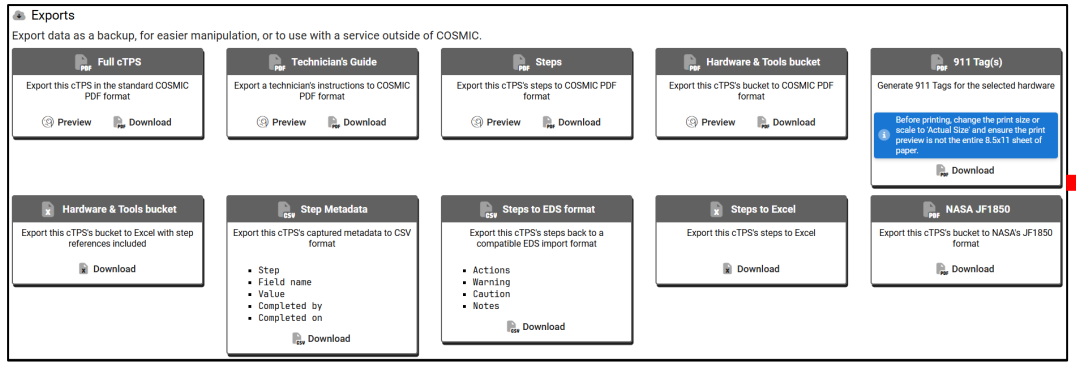
Enabling a Data-Driven QMS

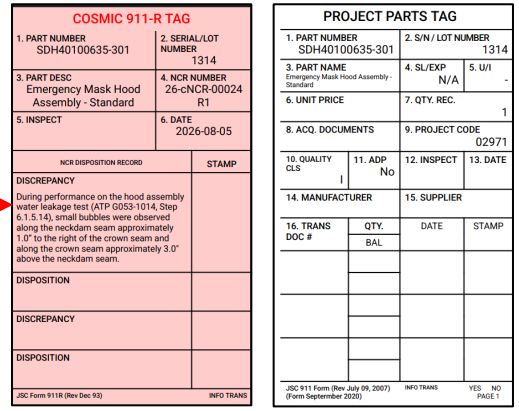


Open Item Reviews by Building



Customizable, Shareable, & Exportable





Electronically Generated JSC Forms

Bye-bye expensive parts tags!

Enabling a Data-Driven QMS



- Visualize resource and facility demand vs. availability
- Bond room & controlled storage inventory locations tracked from receiving to delivery
- Inventory movement shifts from reactive to proactive
- Calibrated tool availability and usage history a click away
- Nonconformance trending by location, activity, and Project
- Trend turnaround time & inspection failures, assess cost of poor quality, and drive corrective actions
- Much, much more….

AI Generated Image

Cross-Agency & Commercial Users

Just as GSFC and WSTF helped JSC best define our requirements for COSMIC, we want to help any other NASA team that could benefit from leveraging COSMIC for work orders, nonconformances, or inventory management.

COSMIC offers a scalable foundation, unique part-centric capabilities, with a proven adoption across JSC's complex flight hardware and software teams. This is an opportunity for NASA Centers to work together and smartly combine investment into a tool we can all leverage and grow.

- **Langley Research Center (LaRC)** – ECD Spring 2027
  - Engineering & SMA Directorate tiger team formed to develop ROM & test JSC's tool
  - Initial effort involves the export, transfer, and loading of LaRC's current inventory data into COSMIC
- **White Sands Test Facility (WSTF)** – ECD February 2028
  - Tiger Team developing a ROM to replace current inventory management, work order, and nonconformance tools
  - 10+ WSTF users testing COSMIC. Several supporting the JSC Working Group and dedicated bi-weekly tag
- **Amentum**
  - Using COSMIC to replace their internal nonconformance tool for non-NASA work
  - Created user-restricted context and provided off-site, in-person training to Amentum personnel
- **KBR**
  - To replace KBR's inventory management, work order, and nonconformance tools with COSMIC
  - Usage pending final approval of Space Act Agreement (SAA) by JSC-Legal

Could your center benefit from using COSMIC? Reach out to Nick Holaday to talk more!

FY27 – Development Objectives

- Prioritize weekly enhancements based on criticality of feedback and impact to users.
- Reduce clicks, clutter, and confusion.
- Integrate COSMIC with critical JSC applications (i.e., Engineering Drawings in JEDII, Project requirements in Jama, Cal Lab, Bond Room SAP, etc.) to ensure seamless data flow and reduce duplication of effort.
- Develop ability to create, approve, configuration manage, and call electronic Procedures into a TPS.
- Automate inventory transactions (class changes, moves, assemblies) directly from TPS step completion to eliminate duplicate manual entry.
- Develop features to help Project Teams migrate open-work from EDS to COSMIC.
- Establish connection between NAMs and SATERN courses to leverage training-based user approval and account provisioning.
- Build custom visualization dashboards and reports based on user feedback and management needs.
- Release an electronic JSC Form (JF)-911 Parts Tag & other forms to reduce manual duplication of effort.
- Development of JWI's corresponding with the new COSMIC Docs process for TPS' & NCR's.
- Much more…

Conclusion

- COSMIC Docs is a robust, user-friendly electronic system that integrates siloed data sources, automates quality processes to limit duplication of effort, and provides management and users real-time data insights
- By streamlining processes and fostering collaboration across stakeholders, this project supports operational goals and long-term strategic objectives for JSC, commercial partners, and opens the door to align NASA's centers around one tool
- This digital transformation effort aligns with the Administrator's goals of enhancing employee efficiency and directly improves the Quality of JSC's products, user satisfaction, Crew safety, and Mission Assurance
- The team achieved a successful transition to COSMIC Docs by our aggressive NLT date of August 3, 2026
- User feedback was critical to developing a tool that was easily adoptable and empowers the end-user while giving Quality more insight and confidence than ever before
- FY27's development objectives involve complex processes and capabilities, but will ensure a lasting impact and maximum ROI to JSC's personnel and the products they deliver
- **COSMIC Docs is the critical first step towards digitally transforming our NASA-internal processes. Cross-Center support will empower NASA teams to take the next steps towards an ideal state**

Enough yapping, let's show you how we can help you, today…

Demo Time!

Thank you.

From the NASA Digital Transformation SharePoint Site:

"It is not necessary to change. Survival is not mandatory."

– W. Edwards Deming Institute, 2019

POC Contact Info

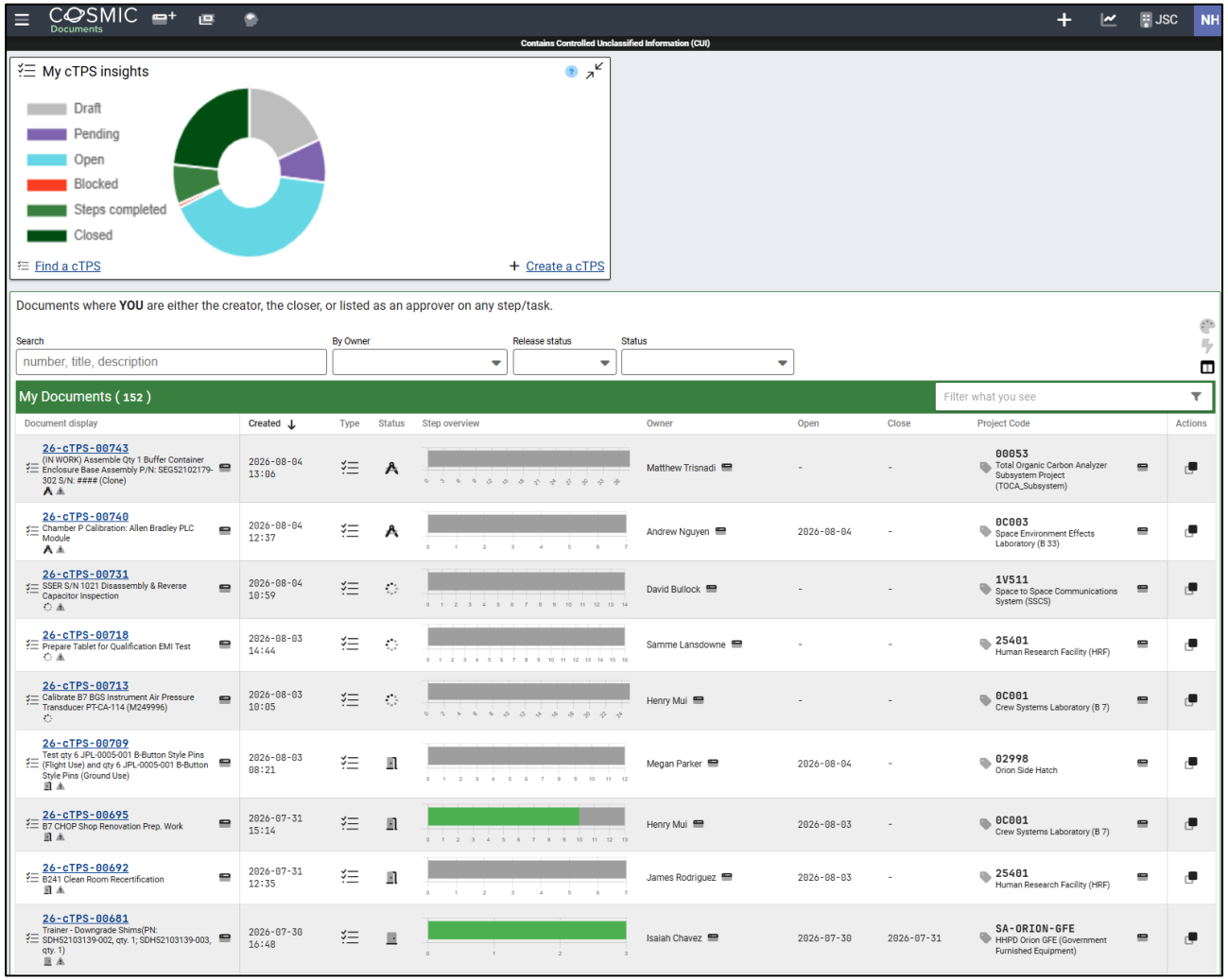
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Back-Up

See What All the Hub-bub is About!

Links & Resources

- ***Want Access?*** Submit a NAMs for COSMIC Docs (ID 272118)
- **COSMIC Docs – Written Training Material:** https://knowledge.cosmic.staging.luna.nasa.gov/
- **COSMIC Docs – Staging Environment:** https://docs.cosmic.staging.luna.nasa.gov/?ctx=JSC_CTX
- **COSMIC Docs – Production Environment:** https://docs.cosmic.luna.nasa.gov/?ctx=JSC_CTX



COSMIC Docs: a JSC Innovation Ready for Your Center

Accomplishments

- **Center-wide transition to COSMIC Docs completed on August 3, 2026**
- 1,100+ TPS' & NCR's have already been created, executed, and closed
- Trained and on-boarded over 1,400+ users
- Secured remaining FY26 development funding
- Released comprehensive written training material & recorded demos
- Partnered with the JSC RoundUp & EA Training Academy to advertise the transition and reach all users, from Div mgmt. to the working-level
- Created contexts for JSC's commercial partner's including Amentum and KBR, reducing resources required to train new users, aligning processes

Hot Topics / Items of Interest

- **Secure FY27 funding from applicable Programs & Directorates**
- Partnering with Projects given transition extensions to ensure a timely and successful transition
- Developing capability to create, execute, and configuration control fully-electronic Procedures into COSMIC Docs. Create initial import functionality
- Re-writing JSC Work Instructions (JWI) 8730.4/.6 to detail our new processes
- Developing a plan to close or migrate open-work in EDS to COSMIC
- Move remaining EDS document types (P-Cards), into COSMIC. Re-vamp process
- Define Calibrated Tool inventory system requirements and scope level of effort vs. return on investment

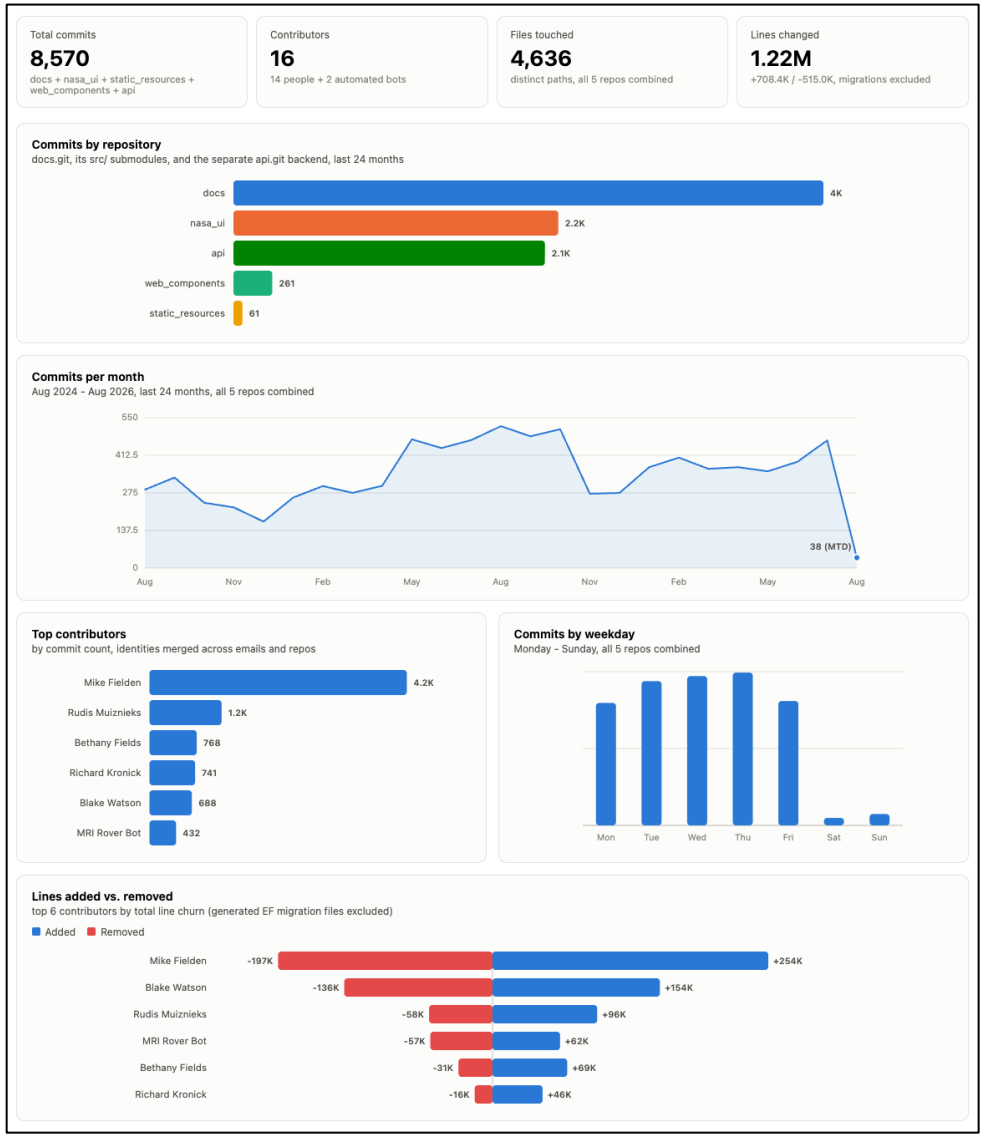
Current Activities / Milestones

- **Partnering with WSTF and LaRC POCs to transition their Centers to COSMIC for Inventory Management and WADs NLT 2028**
- Delivering new-user trainings through December 2026
- Defining hardware and software project lifecycle sources of truth with EA and SA Digital Engineering Leads. Aim to mitigate duplication of effort and resource waste by defining a single path for JSC teams

Key Upcoming Milestones / Discussions / Decisions

- **Presenting on JSC's new tool at the 8/20 OSMA Webinar**
- Transition all teams approved for EDS extension by December 1, 2026
- Define requirements for migration of historical QARC data to COSMIC
- ID scope & ROI of combining NA Data Systems related to hardware or software Certification. Will return to NADIR with FY27/28 funding request for new scope
- Identify opportunities to integrate Luna AI capabilities including potential cost impacts to users based on testing. Define V&V plan for response accuracy.

Development Metrics



- ***Millions*** of lines of code.
- 8,000+ branch commits.
- Thousands of complex Quality & user requirements met, changed, and met again.
- 850+ support tickets or new capability requests submitted by users, triaged, and responded to or incorporated.
- A fast, cloud-based, structured data set that ties to part information, and looks and feels like a tool we should be using to build spaceflight products on.

JSC's New Nonconformance Process

Non-Conformance Report (NCR)

1. Create an NCR
- ❑ Complete the required fields
- ❑ Determine if NCR is Controlled or Uncontrolled
- ❑ Link the NCR to a source document(s)

2. Record the Nonconforming Article(s)
- ❑ Select a Part, Tool, S/W Version, etc. from COSMIC's tracked inventory or document untracked hardware as the NCA(s)
- ❑ Multiple NCA's with the same Cause Type and Defect Type can be added to the same NCR
- ❑ For each Nonconforming Article, record:
  - ❑ Disposition Type & Disposition Summary
- ❑ Print a JSC 911-R tag for the NCA(s) directly from the tool
- ❑ Define any No Constraints and route them for approval

3. Create a Disposition TPS for the NCA(s)
- ❑ Open a Disposition TPS for one or more of the NCA's on the NCR
  - ❑ The child TPS can be rev'd to document and execute steps tied to multiple dispositions recorded on the NCR
- ❑ An NCA cannot be Closed until the Disposition TPS is Closed

4. Close NCA(s) & Move NCR to Remedial Action Complete (RAC)
- ❑ If a Disposition TPS was required, once Closed, the corresponding NCA(s) can be Closed. For each NCA, record the Final Disposition Type & Summary
- ❑ Record any Review Board decisions and attach supplemental material
- ❑ Record the NCR-level Cause Type and Defect Type
- ❑ Route the NCA for closure approval
  - ❑ If the NCR is Controlled, this must include a MIP Authority reviewer
- ❑ *Once signed, the NCR moves to Remedial Action Complete status*

5. Complete the Required Fields to Close the Overall NCR
- ❑ Determine PRACA reportability; record the PRACA # and link
- ❑ Assess need for Further Root Cause Investigation
- ❑ Assess need for Preventative Action/Recurrence Control
  - ❑ Detail planned actions, assign POCs, and define validation criteria
  - ❑ Verify implementation, record outcome, and assess effectiveness

6. Route NCR for Closure Approvals & Close the NCR
- ❑ Route the overall NCR for closure approval(s). If the NCR was marked as Controlled, this must include a MIP Authority reviewer
- ❑ *Once signed by all requested approvers, the NCR will move to Closed.*

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THANK YOU!

Upcoming Webinars

- Sept. 10, 2026 – QLF Virtual Series: Supply Chain Risk Management
- Oct. 15, 2026 – QLF Virtual Series: Fatigue
- Dec. 2, 2026 – QLF Virtual Series: IMAP Lessons Learned

Please visit https://sma.nasa.gov/sma-disciplines/quality/qlf/virtual-series for upcoming virtual events