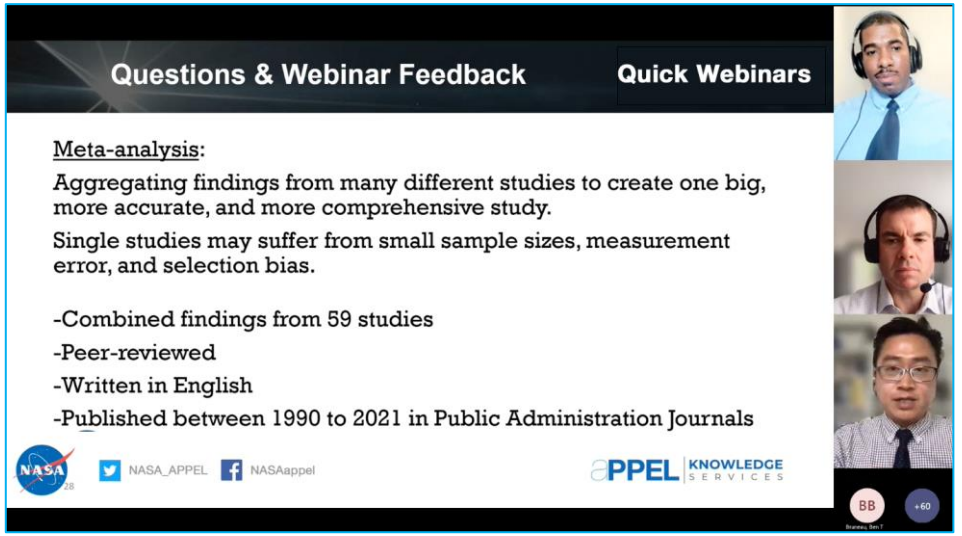
How to Get Your Knowledge Known

Michael Bell, Ph.D.
Chief Knowledge Officer, Kennedy Space Center

Knowledge Sharing Methods and Platforms

- APPEL KS Curriculum
- Spotlight on Lessons Learned
- Critical Knowledge videos
- Small Steps, Giant Leaps podcast
- INSIGHT monthly publication
- Quick Webinars

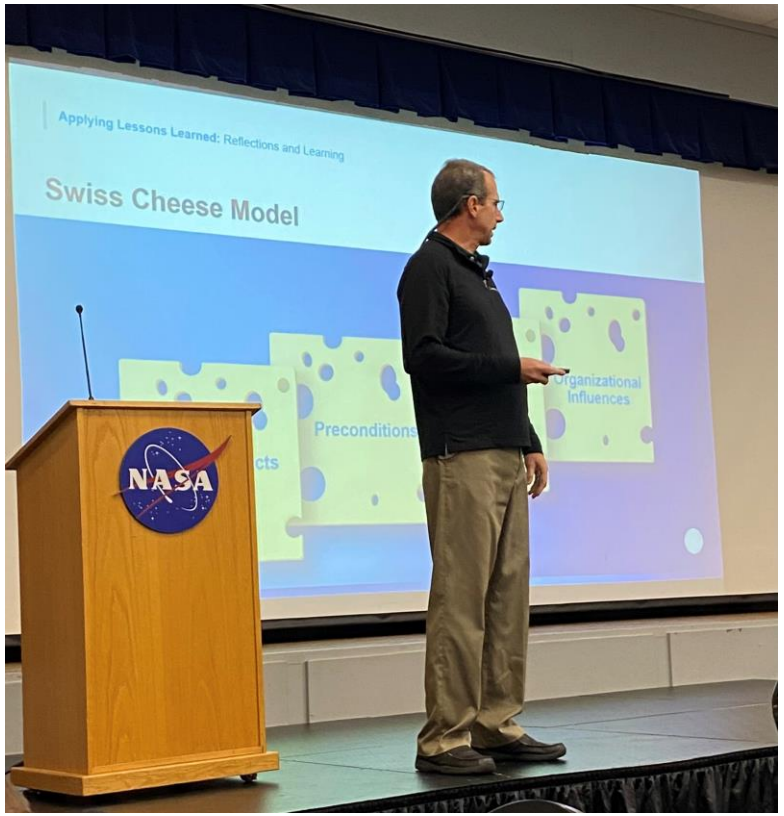


Critical Knowledge Sharing Tour

ISS EVA 23 Mishap Lessons Learned

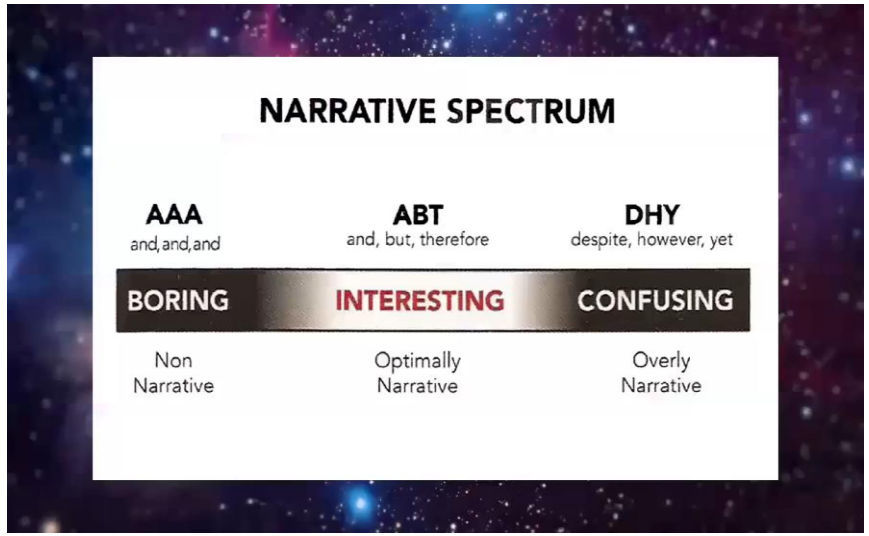
Chris Hansen, Chairman – Mishap Investigation Board

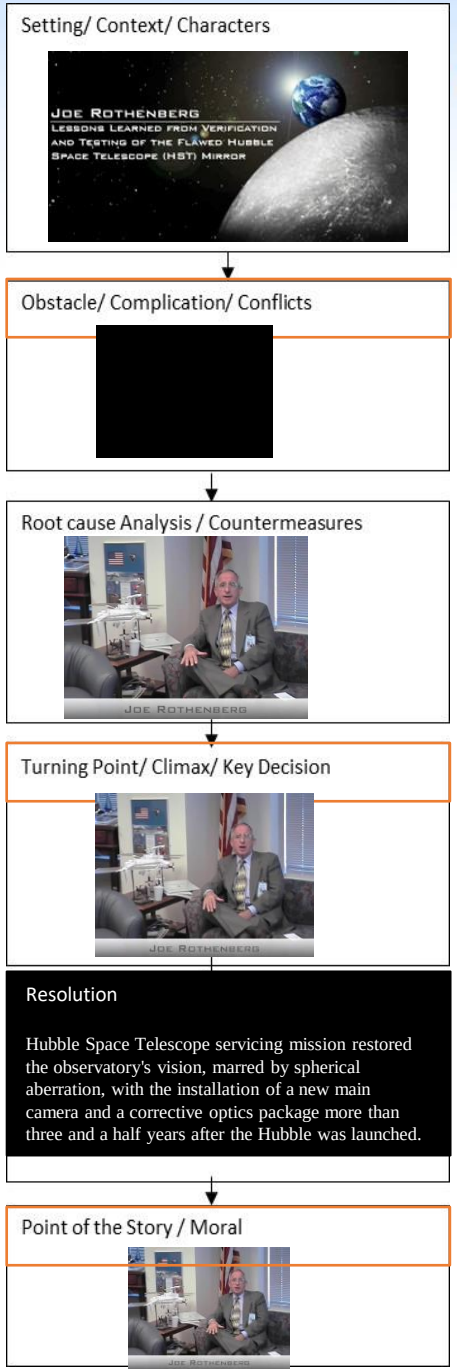
Knowledge Sharing Workshops
Columbia Lessons Learned



Storytelling

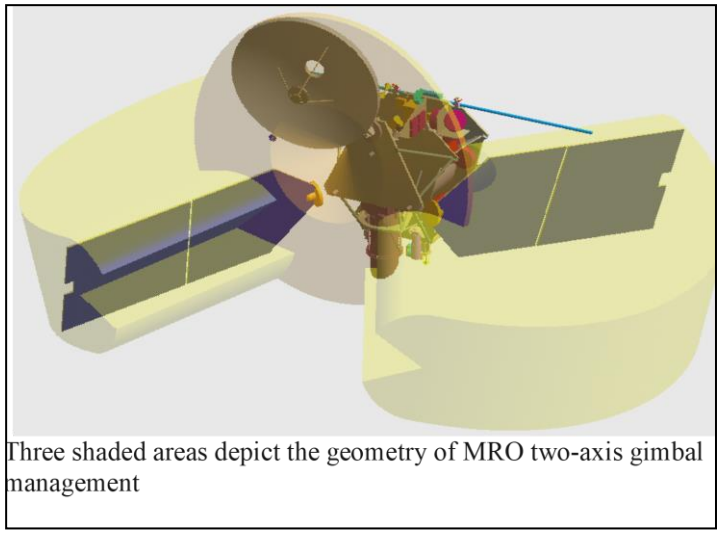
- And, But, Therefore



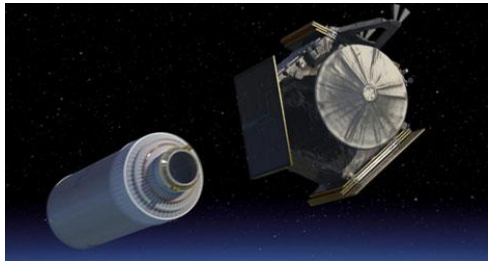


Project to Project Knowledge Transfer

- Mars Reconnaissance Orbiter (MRO) solar array articulation Keep-Out Zone Anomaly violation occurred, resulting in actual appendage contact with a thermal blanket
- The Juno team met with them and investigated similarities for the Juno solar array articulation. (Jupiter arrival in 2016)



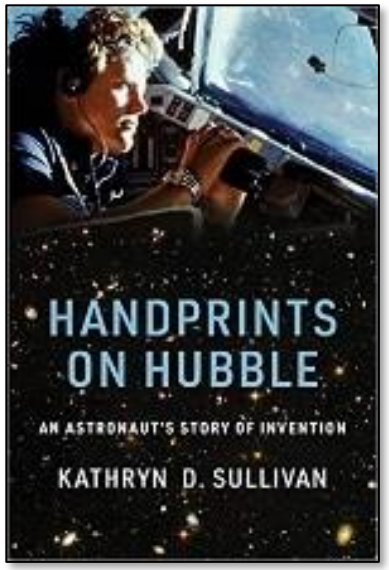
Three shaded areas depict the geometry of MRO two-axis gimbal management

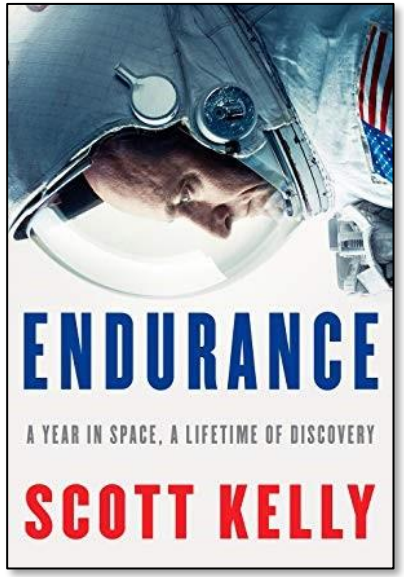


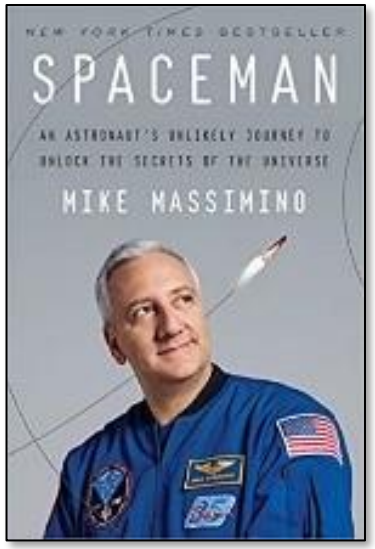
Juno Spacecraft

Book Discussions

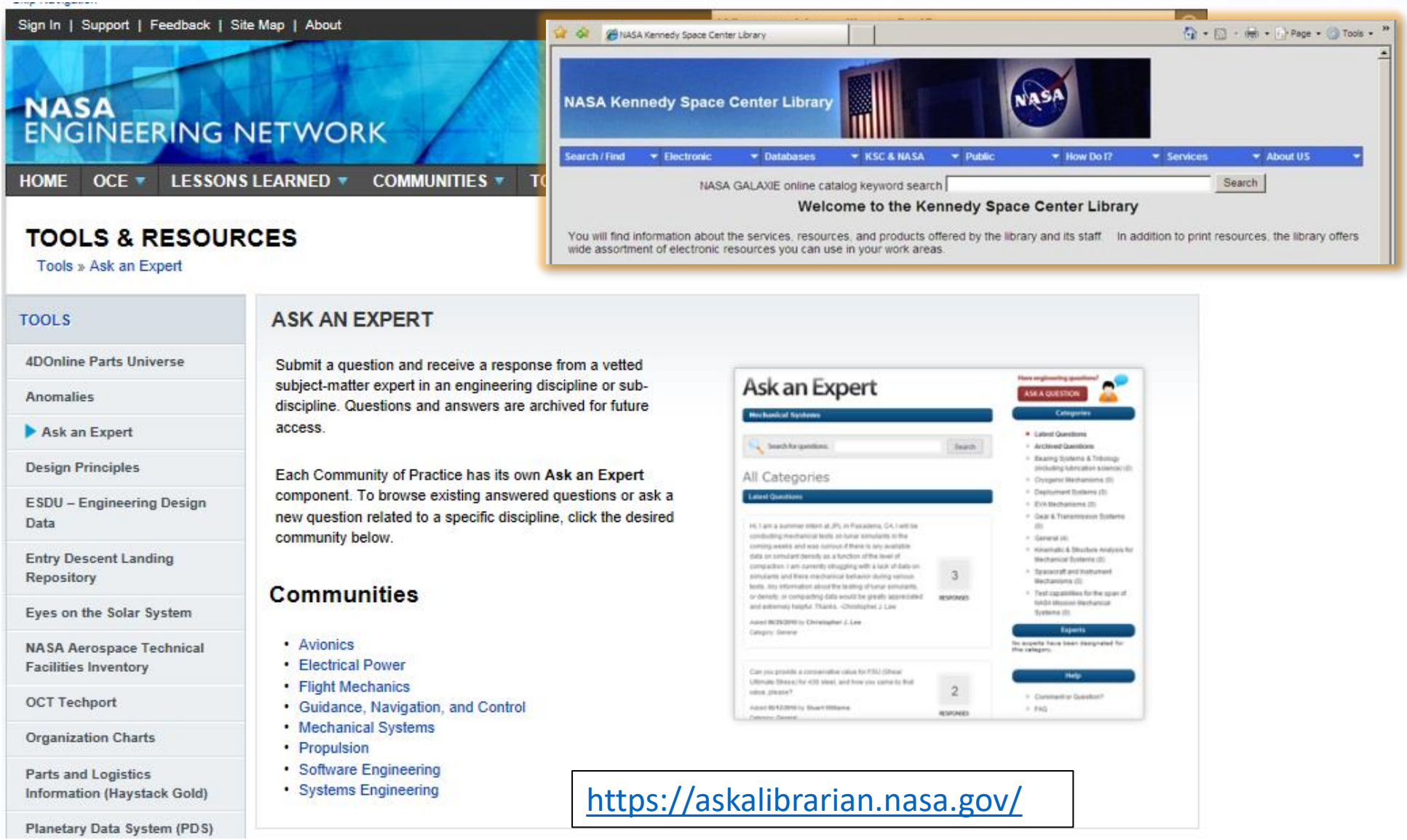
- Handprints on Hubble: An Astronaut's Story of Invention by Kathryn D. Sulivan
- Endurance: A Year in Space, A Lifetime of Discovery by Scott Kelly
- Spaceman: An Astronaut's Unlikely Journey to Unlock the Secrets of the Universe by Mike Massimino







Ask an Expert or Ask A Librarian

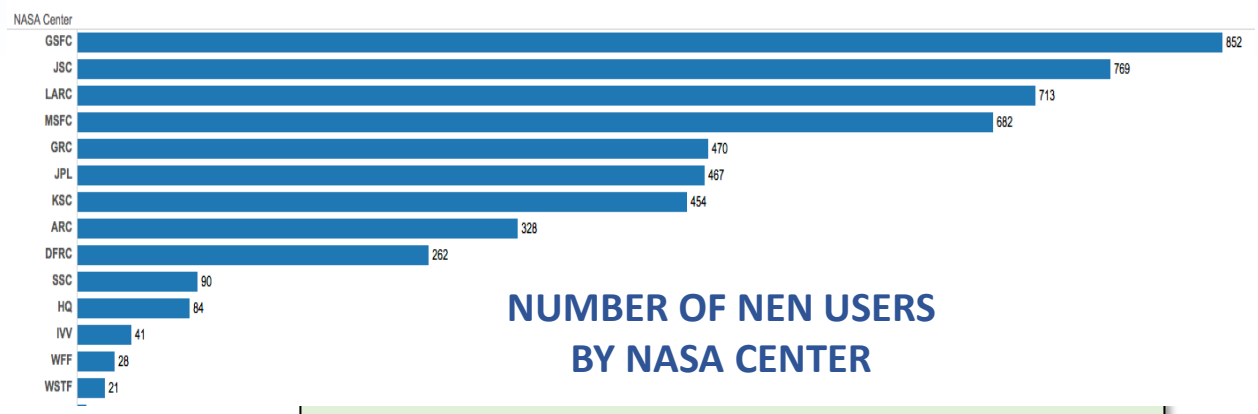


https://askalibrarian.nasa.gov/

Communities of Practice

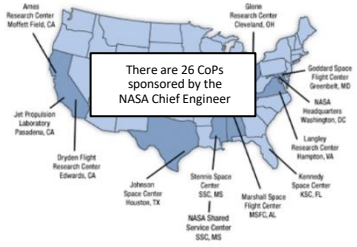
NASA Engineering Network

Knowledge Networks

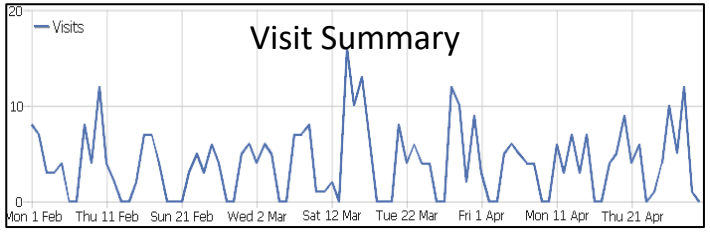


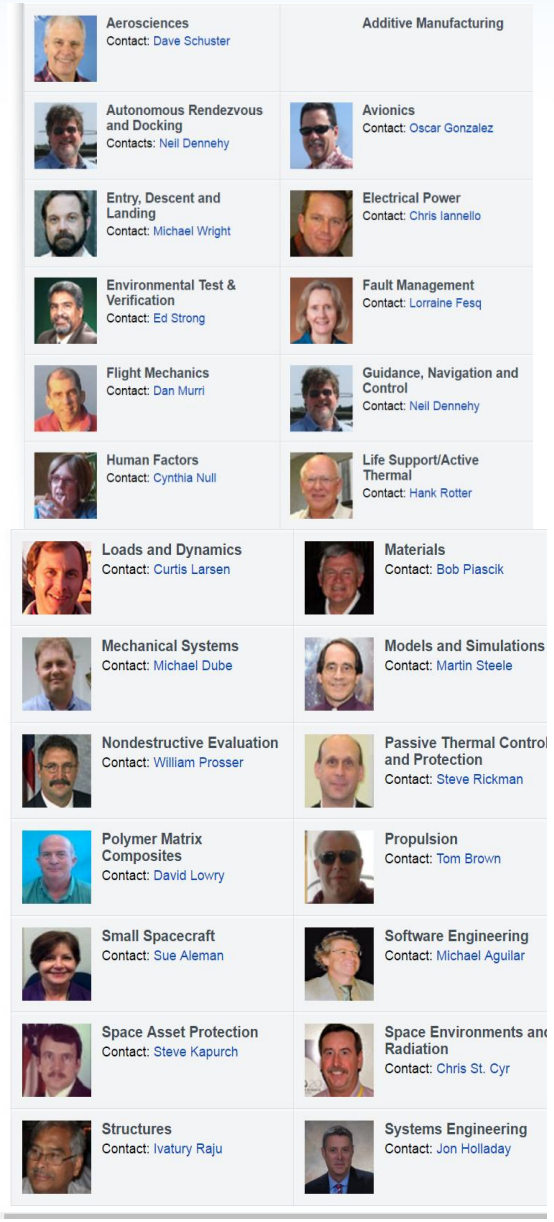
NUMBER OF NEN USERS BY NASA CENTER

A group of people who "share a concern, a set of problems or a passion about a topic, and who *deepen their knowledge* and expertise in this area by interacting on an ongoing basis."



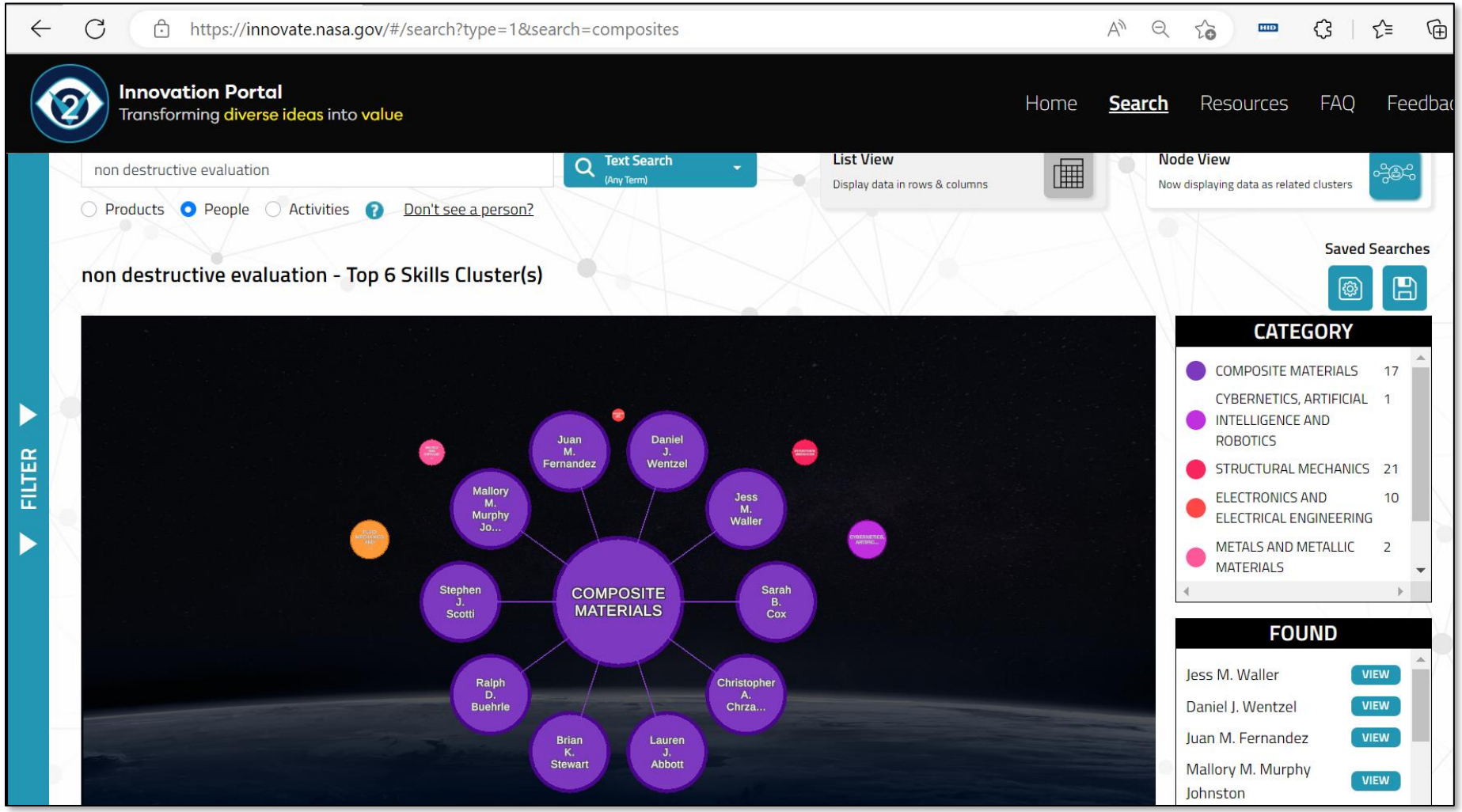
https://nen.nasa.gov/web/nen



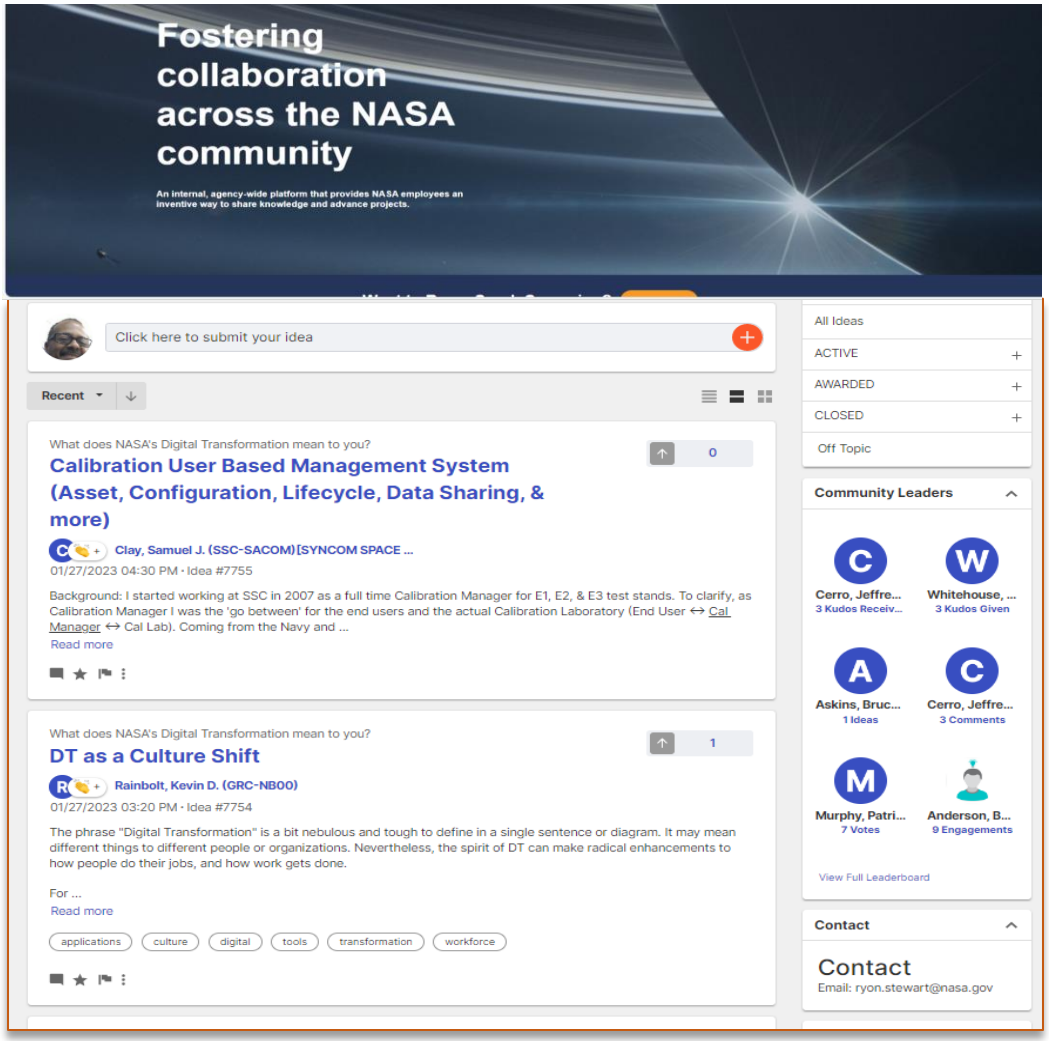


appel.nasa.gov

Expert Finder

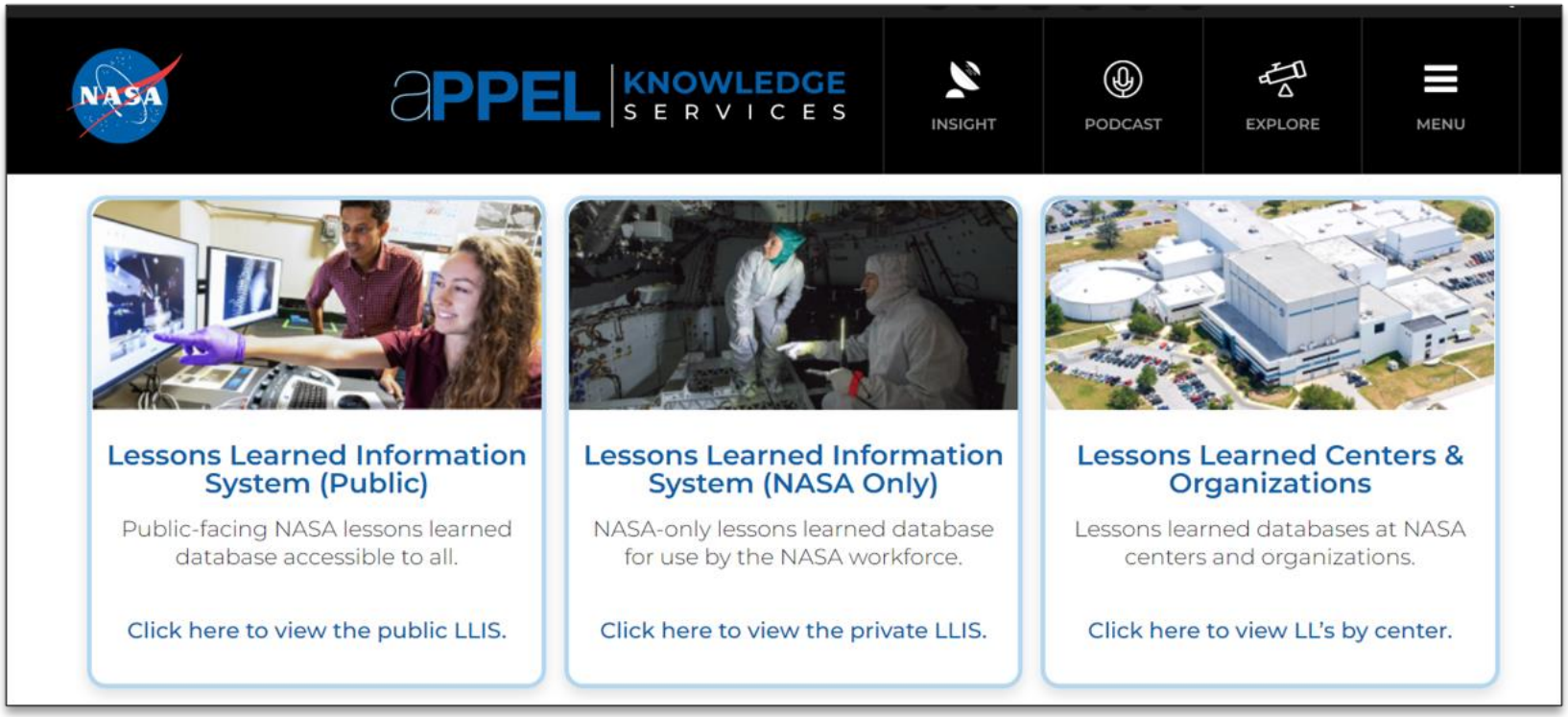


Crowd Sourcing



https://spark.nasa.gov/

Lessons Learned Gateway



Lessons learned are;
- knowledge or understanding gained by experience either successful mission or project failure.
- important to future programs because they show insights from previous projects

Lessons Learned Entry: 1534

Lesson Info:

- **Lesson Number:** 1534
- **Lesson Date:** 2005-04-29
- **Submitting Organization:** DFRC
- **Submitted by:** Trong Bui

Subject:

Excessive Slack in the Retention Line of the Main Rocket Recovery Parachute

Abstract:

The Dryden Aerospike Rocket Test Director's Discretionary Fund (DDF) project conducted flight research of an aerospike rocket nozzle design using high power amateur rockets. The standard nozzles in these rockets were replaced by the aerospike nozzles and the rockets are then flown with aerospike nozzles only. Two aerospike rockets were flown successfully to altitudes of over 26,000 ft and speeds of over Mach 1.5. The flight data acquired during the flight tests were stored onboard and retrieved after the rockets were recovered. The rockets were recovered using a dual-stage parachute system. The smaller drogue chute comes out at rocket apogee to stabilize the rocket. The main chute deploys at approximately 2500 ft above ground level to slow the rocket descend for a soft impact on landing. During the first rocket launch, the main chute deployed inadvertently when the drogue chute activated, and the rocket descended on the main chute from apogee. During the second rocket launch, the main chute bag got outside of the rocket airframe and was entangled with the main chute retention line, preventing main chute deployment and causing the rocket to descend under drogue chute only. Both of these problems were caused by excessive slack in the main parachute retaining line.

Description of Driving Event:

The main chute bag is retained inside the rocket by the main parachute retention line and the main chute's electronically controlled release device. The drogue chute pulls on the main chute pack when the drogue chute is deployed. The excessive length of the main chute retention line causes the main chute to be pulled out of the rocket airframe when the drogue chute is deployed at apogee during the first rocket launch. During the second rocket launch, the main chute retention line was shortened in an attempt to solve this problem. However, it still contained enough slack to cause the main chute bag to exit the rocket airframe and become entangled with the retention line, preventing deployment of the main chute.

Lesson(s) Learned:

Excessive slack in the main chute retention line can cause inadvertent main chute deployment or main chute bag entanglement.

Recommendation(s):

Eliminate the need for a main chute retention line. Use a strap that secures the main bag to the electronically controlled main chute release device.

Evidence of Recurrence Control Effectiveness:

Exploration Flight Test 1 (EFT-1) Nominal End-of-Mission Recovery Operations

Lesson #: 14801

ABSTRACT

During the time leading up to the EFT-1 recovery in December 2014, the Ground Systems Development and Operations (GSDO) Program developed nominal end-of-mission recovery procedures and hardware used to recover the Orion Crew Module (CM) into a U.S. Navy well deck ship. After the recovery operation was complete, hardware suitable for the at-sea well deck environment; and 3) need to review methods of integrating trained personnel to accomplish the mission. After EFT-1 was accomplished, GSDO led a Cross Program Integration Team sponsored ad-hoc trade study to apply these lessons and develop an improved nominal end-of-mission recovery concept of operations to meet the Exploration Systems Development (ESD) requirement number R-6.

DRIVING EVENT

During the EFT-1 recovery operation, several events delayed the recovery operation. These include: 1) time required to reconfigure support equipment to prevent equipment failure; 2) time required to accomplish underwater heatshield imagery; and 3) time required to pass tending lines from the recovery ship to small boats. In addition, there was a pre-determined procedural delay to measure thermal soak back (the amount of thermal energy absorbed by the CM). As a result, the time from splashdown to CM secured in the well deck exceeded seven hours.

LESSON(S) LEARNED

- Need to simplify the CM recovery operation. Numerous lessons learned specified that the operation was too complex, required excessive communications, was hampered by competing shipboard operations and requires two separate movements to place the CM into the designated recovery cradle.
- Need to review methods of integrating trained personnel to accomplish the mission. The Recovery Team noted that personnel who were provided mission orientation were pulled away to do other unrelated tasks and replaced with personnel who did not receive familiarization, several ground operations personnel did not participate in pre-mission test activities and were thus unfamiliar with the planned flow of operations, and personnel tasked to accomplish heatshield imagery were unfamiliar with the camera equipment.

RECOMMENDATION(S)

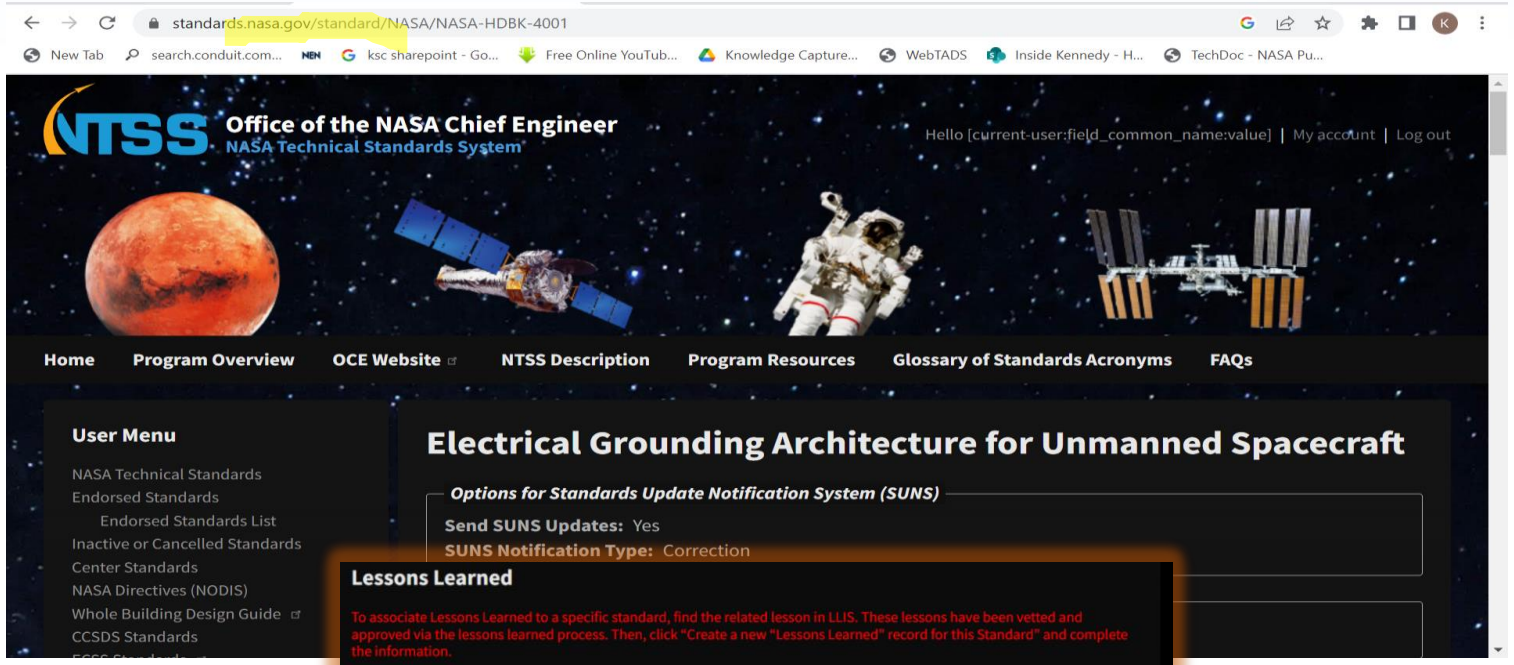
1. Accomplish the Landing and Recovery trade study to evaluate alternate nominal end-of-mission concepts of operation.
2. Publish lessons learned from the development tests and EFT-1 in a single document and make that document easily accessible for quick reference.
3. Apply lessons learned to future training/orientation programs, operations procedures development and support equipment development events.

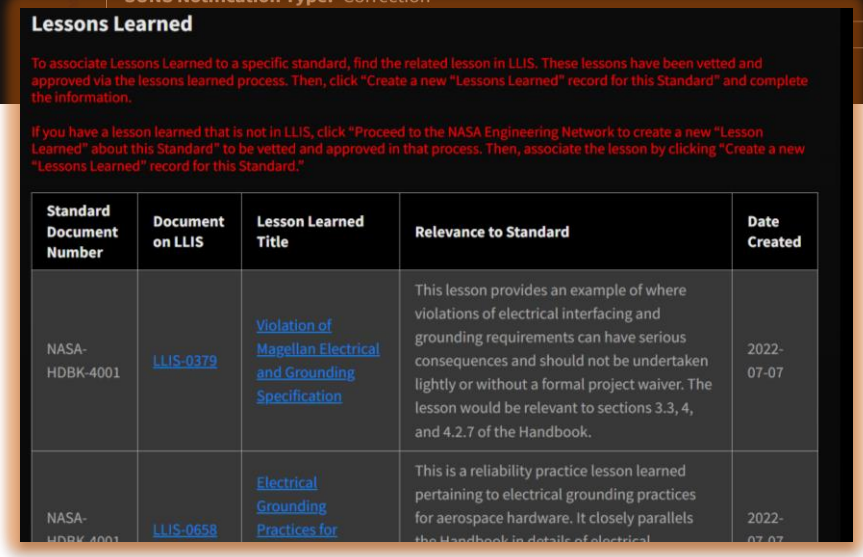
RELATED POLICIES, STANDARDS, HANDBOOKS, PROCEDURES, OR OTHER DOCUMENTS

OPI 4003; Ground Systems Development and Operations Program Offline Processing and Infrastructure Integrated Processing Team Results of Orion Crew Module Underway Recovery Development Tests 1-4 and Exploration Flight Test-1

Tech Standards

https://standards.nasa.gov/nasa-technical-standards





Lessons Learned

To associate Lessons Learned to a specific standard, find the related lesson in LLIS. These lessons have been vetted and approved via the lessons learned process. Then, click "Create a new "Lessons Learned" record for this Standard" and complete the information.

If you have a lesson learned that is not in LLIS, click "Proceed to the NASA Engineering Network to create a new "Lesson Learned" about this Standard" to be vetted and approved in that process. Then, associate the lesson by clicking "Create a new "Lessons Learned" record for this Standard."

Standard Document Number	Document on LLIS	Lesson Learned Title	Relevance to Standard	Date Created
NASA-HDBK-4001	LLIS-0379	Violation of Magellan Electrical and Grounding Specification	This lesson provides an example of where violations of electrical interfacing and grounding requirements can have serious consequences and should not be undertaken lightly or without a formal project waiver. The lesson would be relevant to sections 3.3, 4, and 4.2.7 of the Handbook.	2022-07-07
NASA-HDBK-4001	LLIS-0658	Electrical Grounding Practices for	This is a reliability practice lesson learned pertaining to electrical grounding practices for aerospace hardware. It closely parallels	2022-07-07

How to get your knowledge known “E-mail blasts”

KSC Daily News

John F. Kennedy Space Center - America's gateway to the universe

Monday, August 28, 2023

Announcements | Notifications & Reminders | Employees & Employment | Safety & Securit
Health & Wellness | KSC Exchange | Food Services | More Updates | Events

Announcements

New Lessons Available in the NASA Engineering Network
The following new lessons learned entries were added the NASA Engineering Network.

- **Inadvertent Lift of NORS Tank in the SSPF**
- **SharePoint Nintex Licensing**

Find more NASA Lessons Learned at: https://nen.nasa.gov/web/ll. POC: Michael Bell 867-3312 or michael.a.bell@nasa.gov

From: NASA Engineering Network - Subscription Service <larc-dl-support-nen@mail.nasa.gov>
Sent: Thursday, January 12, 2023 1:00 AM
To: Bell, Michael A. (KSC-NETA0) <michael.a.bell@nasa.gov>
Subject: NEN Subscription Service

LESSONS LEARNED

- E-1 Triethyl Aluminum-Triethyl Borane (TEA-TEB) System Contamination

Manage Your Subscriptions
Contact NEN

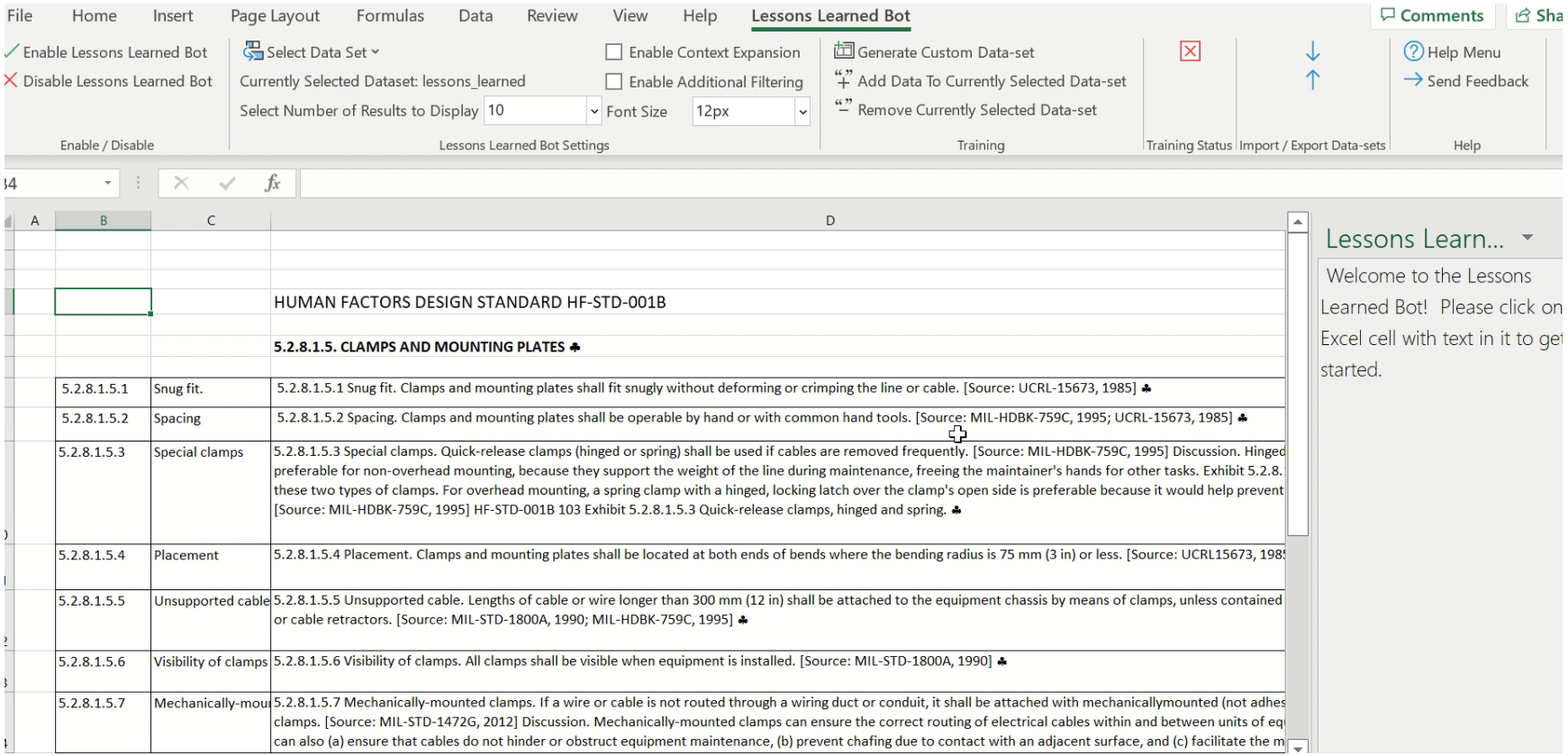
From: NASA Engineering Network - Subscription Service <larc-dl-support-nen@mail.nasa.gov>
Sent: Tuesday, November 22, 2022 1:02 AM
To: Bell, Michael A. (KSC-NETA0) <michael.a.bell@nasa.gov>
Subject: NEN Subscription Service

LESSONS LEARNED

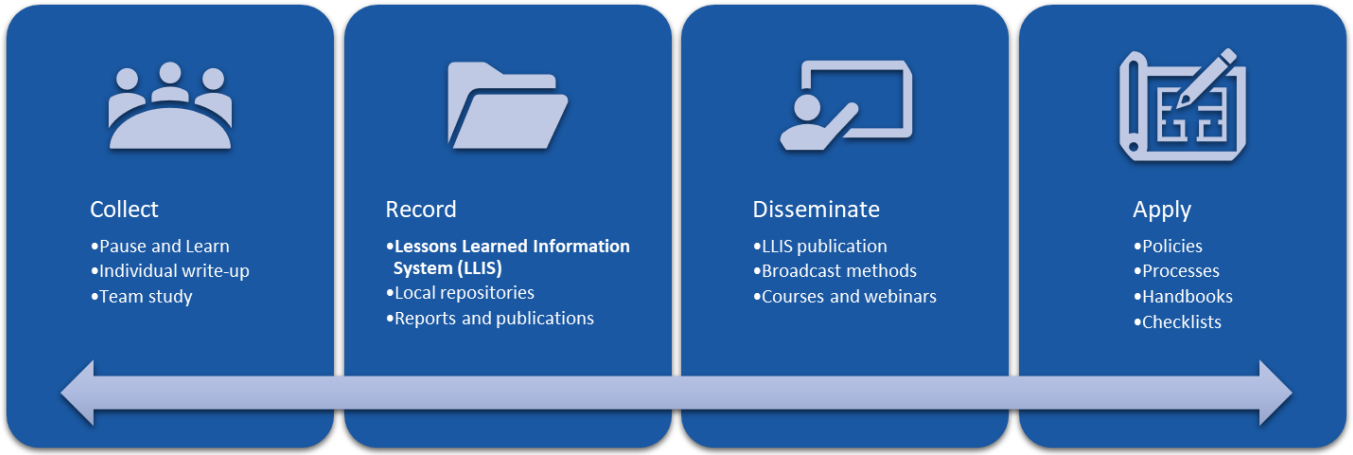
- NDE Investigation of Crawler Shoes: Process Refinement and Logistics

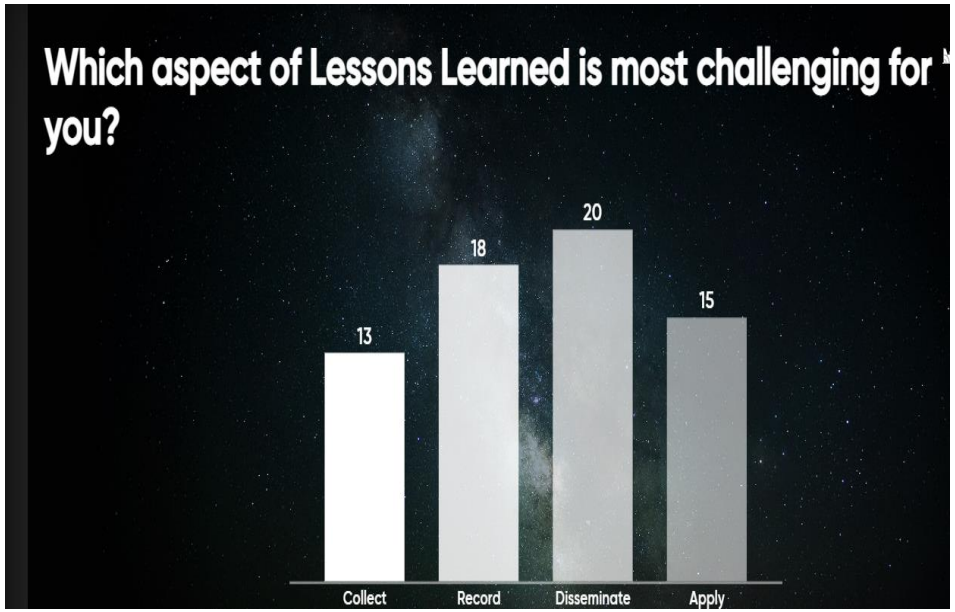
Manage Your Subscriptions
Contact NEN

LLBot **Excel** Add-In for searching for lessons learned



Lesson Learned Process Activities





Knowledge Tools

Collect

- After Action Review
- Pause and Learn
- Collaboration Tools

Record

- Taxonomy and Metadata
- Capturing Legacy: Drawing Out a Great Story
- Tricks for the Smartphone Videographer

Disseminate

- Lessons Learned Database Inventory
- Quick Webinars
- Storytelling
- Search and Findability
- Podcasts
- Panels, Presentations, Lunch and Learns

Apply

- Mentoring
- Reflective Practice
- Policy Review
- Case Study Discussion

NASA Knowledge Community

Tiffany Smith

NASA Chief Knowledge Officer

Ian Boyd

Aeronautics Research Mission Directorate (ARMD)

Don Mendoza

Ames Research Center

Mark Davis

Armstrong Flight Research Center

Zudayyah Taylor-Dunn

Space Operations Mission Directorate

GRC KM Contact: Lee Jackson

Glenn Research Center

Moses Adoko

Goddard Space Flight Center

Jeff Northey

Independent Verification and Validation

Michelle Drabik

Jet Propulsion Laboratory

Jim Rostohar

Johnson Space Center

Michael Bell

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Scientific and Technical Information (STI) Program

David Walters

Space Technology Mission Directorate

John Stealey

Stennis Space Center

https://appel.nasa.gov/critical-knowledge/nasa-knowledge-community/

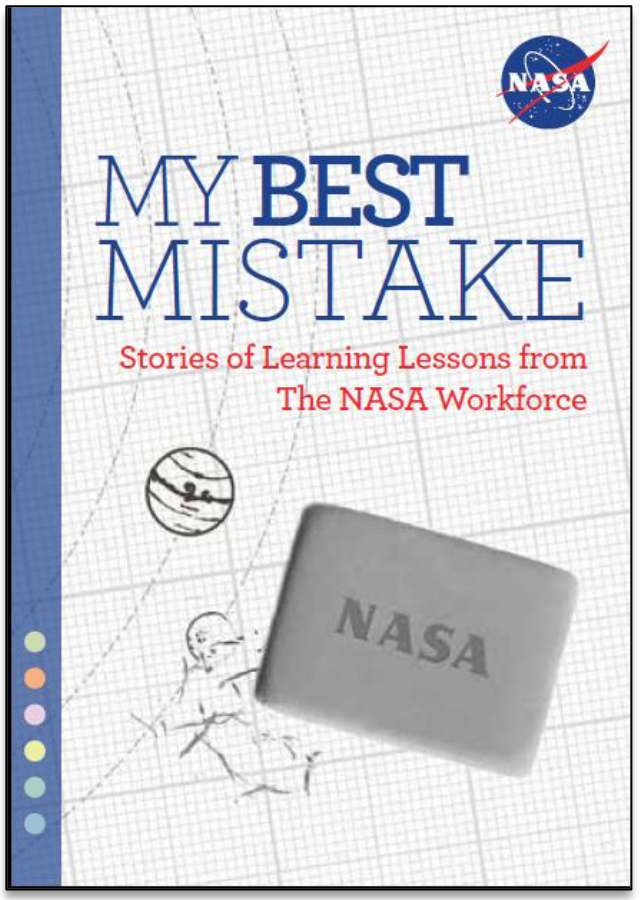
Comms Plan with ADKAR and RACI

If We Build It…They Will Come…..

Item #	Organization	Solution	ADKAR	Description/Message Purpose	Communication Method	Target Audience	Completion Target Date	Author	Delivered From	Status	R	A	C	I	Notes
	Enter the organization	Enter the product/solution	What stage of ADKAR is aligned to the communication	Enter the activity - town hall? Virtual? Tool?	Enter the description of the communication	Enter target audience	Enter the date of the communication	Who will write the communication	Who will send the communication	Complete, started not scheduled	Enter the person's name, job title, role, function				Additional Information
1	Knowledge Community	KC&T Report Presentation/Next Steps	A	Email	Review of report and next steps	Center and MD CKO teams	12/9/21	T	T	12/17/21	T CKO	T CKO	KC&T Team	Joe P. Terry S.	
2	History Office DISA	KC&T Report/ Recommendations	A	Personal call/email	Peer Review request	History Office POC and DISA CKO	12/9/21	T	T	12/17/21	T CKO	T CKO	SM WOC	KC	
3	OCE Deputies	KC&T Report/Next Steps	A	Virtual Meeting	Review of report and next steps	Terry S. Joe P	1/14/2022	T	T	1/14/2022	T CKO	T CKO	SM WOC	KC	
4	Science and Technical Information Program	KC&T Final Report	A	Email	Request to post in NTRS	Public	1/18/21	SM	T	2/1/22	T CKO	T CKO	TS JP	KC	
5	OCE	KC&T Presentation	A	Virtual Meeting	Announcement and overview of project	OCE Leadership	Regular leadership meeting	SM	T	TBD	SM WOC	T CKO	TS JP	KC	
6	APMC	KC&T Presentation	A	APMC's Virtual Meeting	Announcement and overview of project	PM Counsel	Regular APMC meeting	SM	T	TBD	SM WOC	T CKO	TS JP	KC	
7	OCHCO	KC&T Presentation	A	Personal call	Awareness of project, request to update leads in regular meeting	OCHCO lead	2/14/22	SM	T	TBD	SM WOC	T CKO	TS JP	KC	
8	EMC	KC&T Presentation	A	EMC Virtual Meeting	Announcement and overview of project	EMC	Regular APMC meeting	SM	T	TBD	SM WOC	T CKO	TS JP	KC	

Barriers to Knowledge Sharing

- Fear of Rejection or Criticism
- Lack of Communication Channels
- Time Constraints



https://appel.nasa.gov/tag/my-best-mistake/

Breaking Down the Barriers

- Creating a Culture of Openness
- Tie Knowledge Sharing To Program Objectives
- Recognizing and Rewarding Knowledge Sharing
- Leading by Example
- It's Top Down and Bottoms Up

"We did and extensive lessons learned process that enabled us at every level within the organization and within the hardware production with the contractor level or NASA doing integration and analysis to be able to factor that into the learning as well as future missions."

JANUARY 17, 2024 | **NASA OFFICIALS TESTIFY ON MOON EXPLORATION**

Questions?

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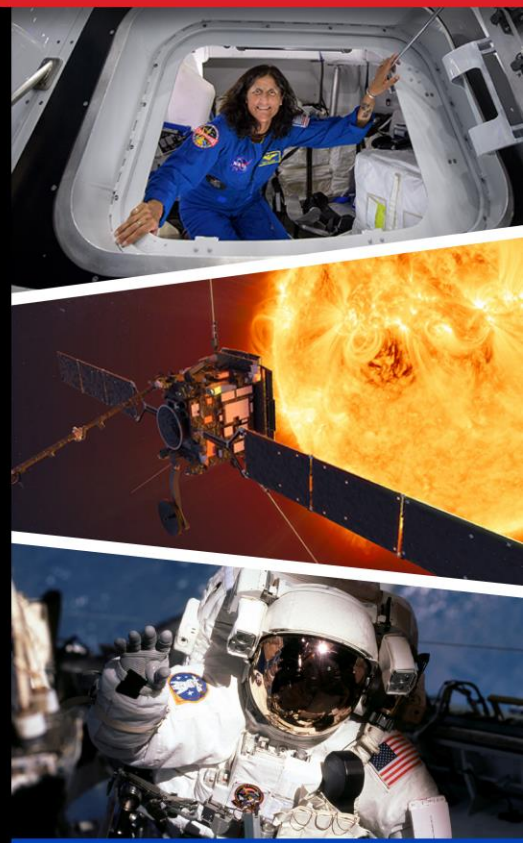
- Support



appel.nasa.gov