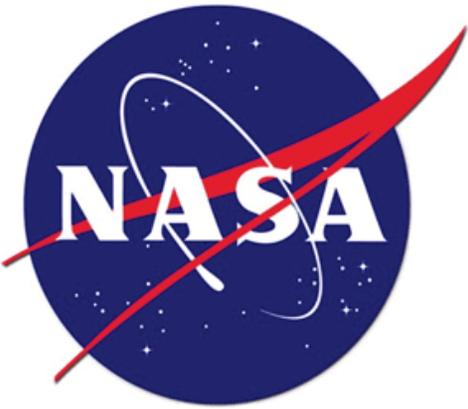


Evolution of International Space Station Program Safety Review Processes and Tools



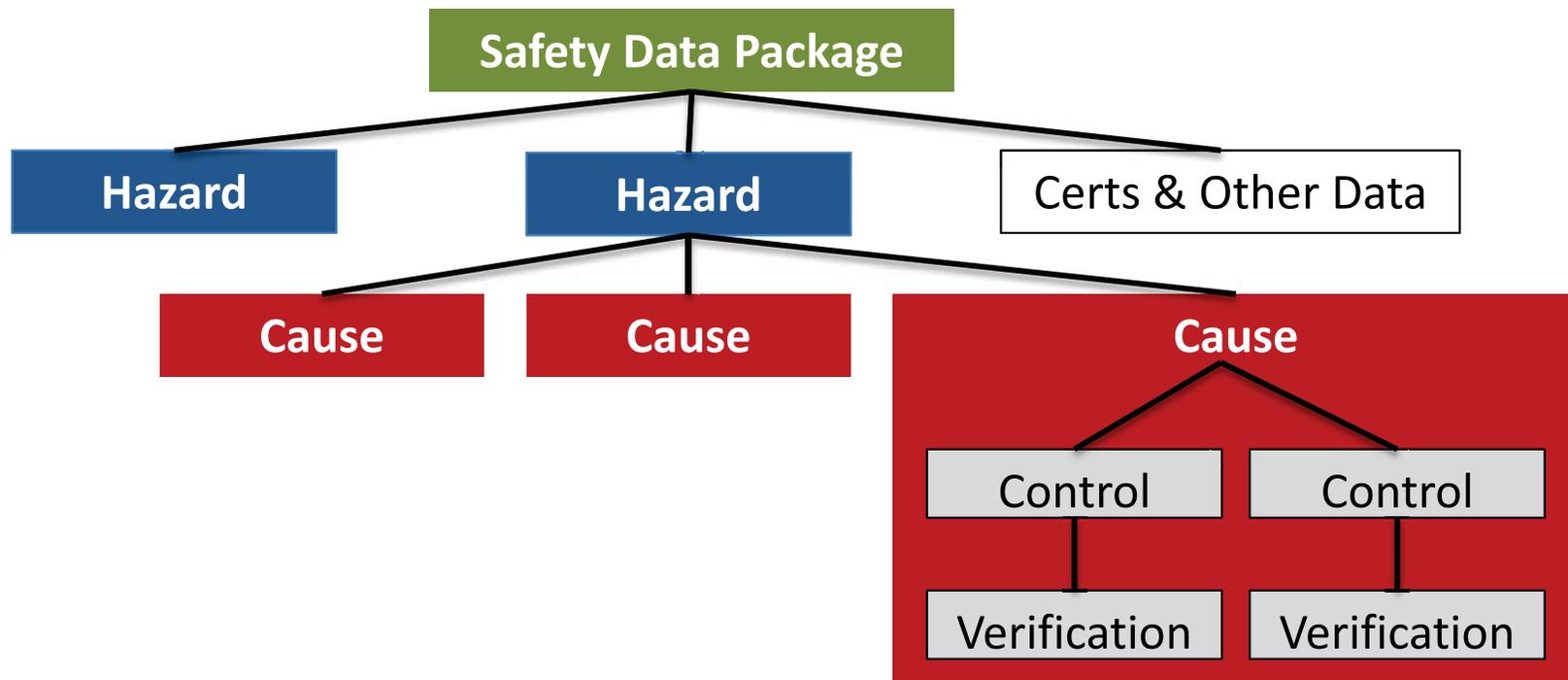
Presenter: Christian D. Ratterman
Christian.D.Ratterman@nasa.gov

Authors: Christian D. Ratterman, Collin Green, Matthew R. Guibert, Kristle I. McCracken, Anthony C. Sang, Matthew D. Sharpe, Irene V. Tollinger



Safety & Mission Assurance

- The safe conduct of ISS operations is of great importance to NASA and International Partners
- One aspect of keeping ISS safe is careful analysis, tracking, and mitigation of Hazards





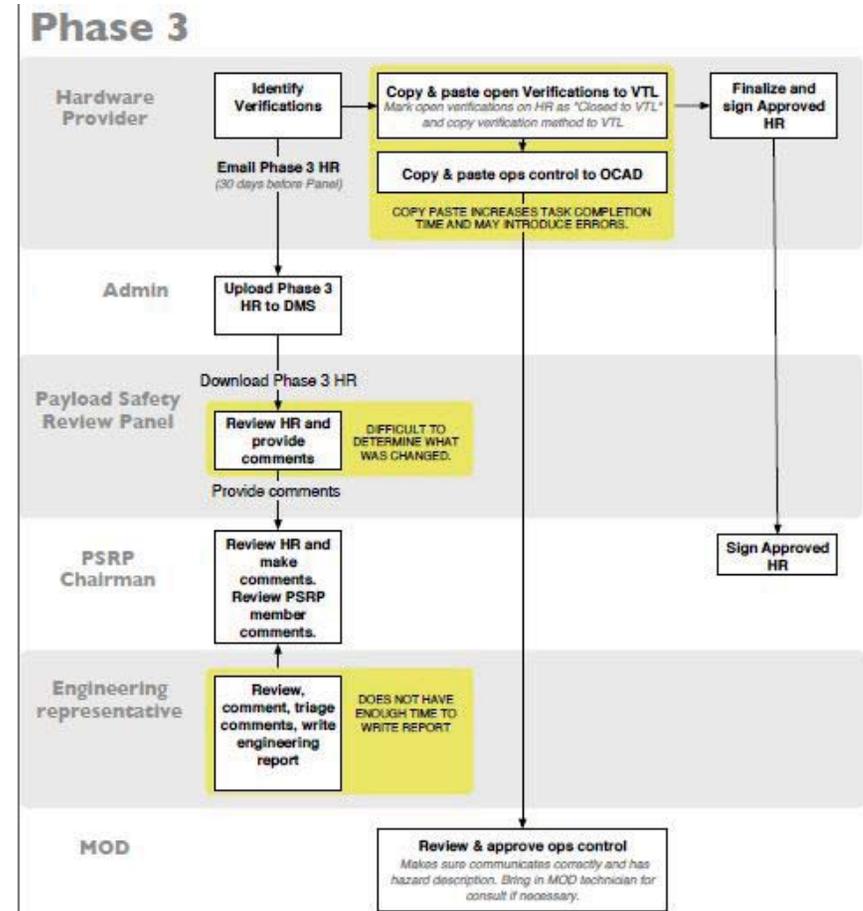
The Need for a Change

- ISS transition from assembly phase to the sustaining & operations as an world class laboratory in low earth orbit.
- Continued need for safety review process for Research & Technology development
- The resource limitations and increasing demands drive process improvement to provide better ways of developing, capturing, and sharing safety documentation
- Broader work on ISS software improvement offered integration options with related S&MA and Engineering systems



Process Evaluation & System Research

- Early 2011 process Audits (Kaizen) to identify improvements toward common and efficient processes
- Late 2011 System study (HCI user research and process analysis) to understand current state of processes & data management





The New Hazard System

- Process, data collected, workflow and integrations configured without programming
- Directly link and integrate with authoritative S&MA tools
- Maintains common record format and process
- Data security and integrity
- Web-accessible data system
- Highly structured form entry of related Safety Data packages, Hazard Records, Cause Records, Controls and Verifications



Benefits of Structured Hazards

- Minimize duplication of data
- Access & tracking of Data
- Process control
- Integration & reporting

Structured Data (Database, XML)

Linked Causes

1	First Cause of this Hazard	Record 160
INWORK	Open	(No POC specified)

2	Second Cause of this hazard	Record 161
INWORK	Open	Kristle McCracken

3	Another Cause now 2	Record 102
APPROVED	Open Phase II Complete	Matt Guibert

Link More Causes:

Create New Cause Record

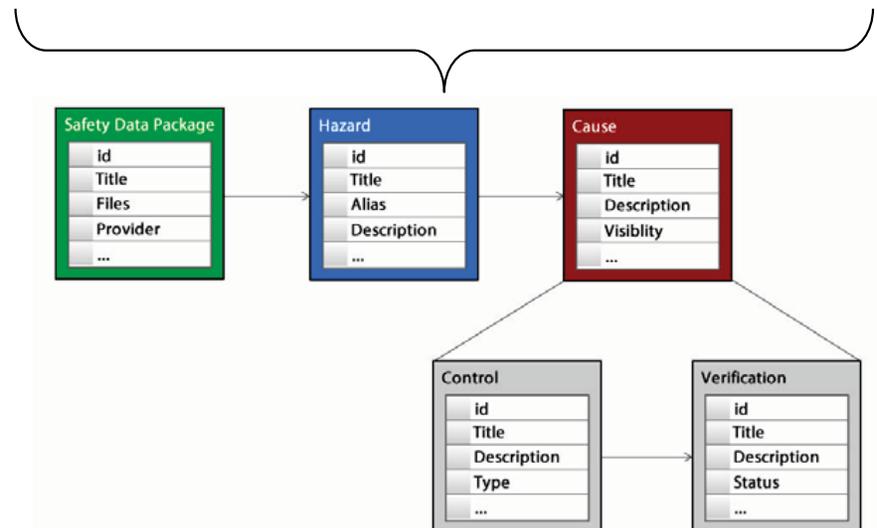
Related Verifications:

- [V.1](#) title
- [V.2](#) another verifaciton

[Link More Verifications](#)

Related Parts:

[Link More Related Hardware](#)



Hazard
Record 162 - INWORK
Example Hazard record (edit)

< prev (6 of 11 Search Results) next >

This is a **draft version**. [View all versions of this record.](#)

International Partner Access



- Basic Information
- Related Documents**
- Approvals and Concurrences

CC: Myself (Christian Ratterman)
 0 users (edit)

* Record Type: Hazard

◇ Hardware Category:

Hardware Provider: NASA JSC

* Subsystem/Payload: General

Hazard Report Focal: Christian Ratterman (edit)

Report POC:

Linked Causes

1	First Cause of this Hazard	Record 160
INWORK	Open	(No POC specified) <input type="button" value="trash"/>
2	Second Cause of this hazard	Record 161
INWORK	Open	Kristle McCracken <input type="button" value="trash"/>
3	Another Cause now 2	Record 102
APPROVED	Open Phase II Complete	Matt Guibert <input type="button" value="trash"/>

Link More Causes:

Affected System:

◇ Interfaces:

Cause
Record 83 - INWORK
Another Cause (edit)

< prev (27 of 188 Search Results) next >

International Partner Access

- Basic Information
- Controls
- Verifications
- Detection and Warning Methods
- Related Documents
- Approvals and Concurrences

Controls

 CTRL1. Control 1	Expand/Edit
 Controls ID: CTRL2 (Delete)	Collapse

Subcontrol ID:

◇ **Control Type:**
Design definitions

Control Title:
New Control 2

◇ **Control Description:**
Detailed description of the second control on this cause record.

◇ **Control Flight Applicability:**

Related Verifications:

- [V-1](#) title 
- [V-2](#) another verificaiton 

[Link More Verifications](#)

Related Parts:
[Link More Related Hardware](#)

 CTRL3. Another Contorl	Expand/Edit
--	-----------------------------

CR #: No information listed. (83)	Hardware Category: Integration Hardware Provider: Boeing	Record Type: Cause Closure Status: Open <u>Phase II Complete</u>	
Title: Another Cause			

Control(s):	Verification(s):
<p>CTRL1. <u>The full partial Control description</u> Design <u>Operational</u> 34S</p>	<p>1.1 (V-1) <u>Detailed description of the first verification. This</u> Test <u>verification is used to verify two of the controls on this</u> Closed to VTL <u>cause record.</u> Verify Each Flight</p> <p>Verification Estimated Completion Date: No information listed.</p>
<p>CTRL2. <u>Detailed description of the second control on this cause record.</u> Operational <u>Design</u> —</p>	<p>2.1 (V-1) <u>Detailed description of the first verification. This</u> Test <u>verification is used to verify two of the controls on this</u> Closed to VTL <u>cause record.</u> Verify Each Flight</p> <p>Verification Estimated Completion Date: No information listed.</p> <p>2.2 (V-2) <u>Verification Information for the second verification</u> Inspection — —</p>
<p>CTRL3. <u>Detail on the control</u> Design <u>Operational</u> —</p>	<p>3.1 (V-3) <u>Detailed information on the Operational Control that will</u> <u>Ops Cntr (OCAD) cover the third control</u> <u>Open</u> <u>Verify Once</u></p> <p>Verification Estimated Completion Date: <u>2013-06-06</u></p>

Controls and Verifications

Cause Report #No information listed.

Search

Words

Record IDs
(comma-separated)

Hazard Report Numbers
(comma-separated)

Category is any of

Basic Hazard and Cause Forms
 Form 1298 Creation

0 selected

Record Type

--
 Standard Hazard
 Hazard
 Cause

0 selected

Flight Applicability

Assembly Complete
 ALL Flights
 Covers Subsequent
 32S

0 selected

Severity

--
 Catastrophic
 Critical
 Marginal

0 selected

Status

UNCONFIRMED
 INWORK
 REVIEW
 APPROVED

0 selected

Hardware Provider is any of

AI Solutions
 AMES
 ASI
 Astrium

0 selected

Subsystem/Payload is any of

APAS
 COL
 CT
 ECL

0 selected

Hardware Category

--
 GFE
 Integration
 Payload

0 selected

Likelihood

--
 Probable
 Infrequent
 Remote

0 selected

Cause Description contains any of the words

Affected System

--
 ISS Integrated

0 selected

Part Number contains any of the words

Part Name contains any of the words

Record Status

Closure Status Level

--
 Open
 Open Phase I Complete
 Open Phase II Complete

0 selected

Search by people

Search by change

Search by signature

Search by field

Search within specific fields (boolean statements)
 NOT (negate all of the following) New filter

Field Criteria Words

Remember as my default search

Sort results by: Reuse same sort as last time

Search

Home | New | Charts | Search | Help Signatures | Saved Searches | Whining | Prefs | Admin

Sun May 12 2013 21:20:14 PDT

Reporter: christian.d.ratterman@nasa.gov Change Columns | Edit Search | Chart Search | Email Search Results | Save Search

43 records found | [View 8 Standard Hazards](#) | [View 11 Hazards](#) | [View 24 Causes](#)

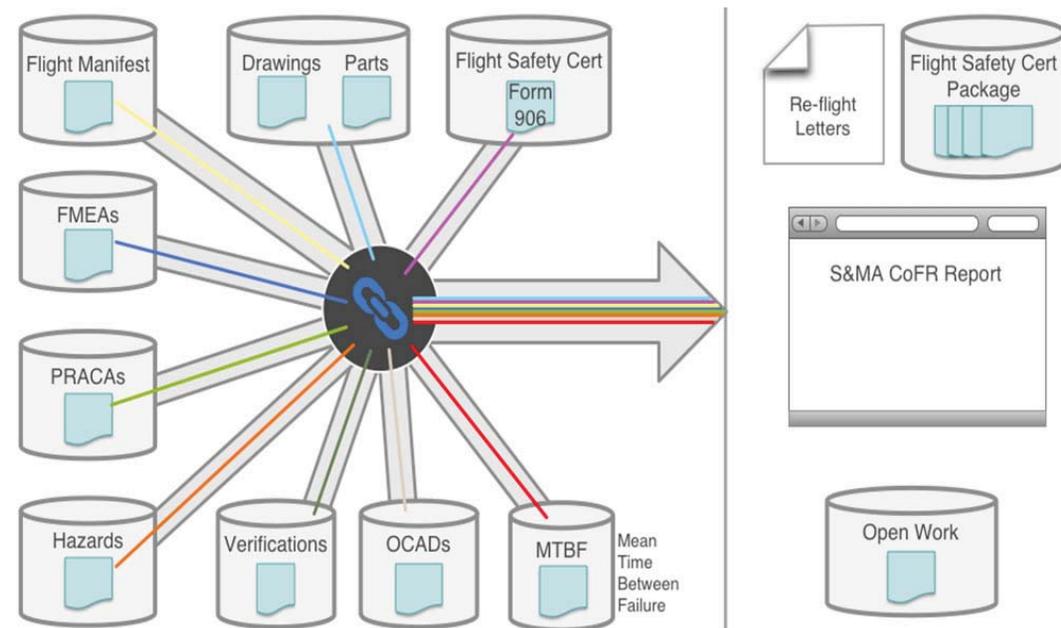
Print	ID	Record Type	Hazard Report Focal Realname	Subsystem/Payload	Status	Closure Status Level	Title	Cause Description
	54	Hazard	Christian Ratterman	APAS	INWORK	Open	CDR Test Record ULF7	
	58	Cause	Christian Ratterman	APAS	APPROVED	Open Phase I Complete	Cause Test record 1	Test
	59	Cause	Christian Ratterman	APAS	APPROVED	Open Phase I Complete	Cause record 2	
	64	Cause	Christian Ratterman	APAS	APPROVED	Open Phase I Complete	New Cause	
	65	Cause	Christian Ratterman	APAS	REVIEW	Open	Cause Test record 1	Test
	68	Standard Hazard	Christian Ratterman	COL	INWORK	Open	Payload hazard for decompression	
	69	Hazard	Christian Ratterman	ENV	APPROVED	Open Phase I Complete	CDR Test Hazard record - Thursday	
	82	Cause	Christian Ratterman	ECL	INWORK	Open Phase I Complete	My first Cause	My Cause Detail
	83	Cause	Christian Ratterman	ENV	INWORK	Open Phase II Complete	Another Cause	Fill in the description
	102	Cause	Christian Ratterman	ENV	APPROVED	Open Phase II Complete	Another Cause now 2	Details on the Cause
	106	Cause	Christian Ratterman	ENV	INWORK	Open	My first Cause	My Cause Description
	110	Standard Hazard	Christian Ratterman	COL	INWORK	Open	My standard Hazard	
	113	Hazard	Christian Ratterman	MCH	REVIEW	Open Phase I Complete	Test Record CDR - Friday	
	123	Cause	Christian Ratterman	MCH	APPROVED	Open Phase I Complete	A first Test Cause	Needed more detail
	124	Cause	Christian Ratterman	MCH	INWORK	Open	Another Cause	
	128	Cause	Christian Ratterman	MCH	INWORK	Open	New number 2 record	New Cause Description
	135	Cause	Christian Ratterman	MCH	INWORK	Open	A first Test Cause	Needed more detail
	136	Standard	Christian Ratterman	General	INWORK	Open	Form 1298	



Larger Goal & Ongoing Work

- The ISS Hazard System is just the beginning of capturing safety documentation in structured data systems capable of tight integration and automated status tracking
 - Flight Certifications
 - Verification Tracking & Operational Controls
 - Non-Compliance Reports
- Integration effort tying existing and new systems together to provide standardized and streamlined access to data

- The goal is to have an integrated system by end of FY2014





Conclusion

- Evolve Hazard data collection to structured format
- Integrate key S&MA systems to simplify data tracking
- Increase in-context access to related data improves speed of access and understanding of data
- Reduce costs and improve safety through standardizing process and data management
- More efficient hazard analysis reduces errors and inconsistencies that compromise safety



Point of Contact

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- NASA JSC (ISS Safety)
 - Tony Sang (Anthony.C.Sang@nasa.gov)