Evolution of International Space Station Program Safety Review Processes and Tools

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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
• 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
**Linked Causes**

<table>
<thead>
<tr>
<th></th>
<th>First Cause of this Hazard</th>
<th>Record 160</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>INWORK</td>
<td>Open</td>
</tr>
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</table>

<table>
<thead>
<tr>
<th></th>
<th>Second Cause of this hazard</th>
<th>Record 161</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>INWORK</td>
<td>Open</td>
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</table>

<table>
<thead>
<tr>
<th></th>
<th>Another Cause now 2</th>
<th>Record 102</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>APPROVED</td>
<td>Open Phase II Complete</td>
</tr>
</tbody>
</table>

**Link More Causes:** Record ID

**Create New Cause Record**

Affected System: ...

* Interfaces:
CTRL1. Control 1

Controls ID: CTRL2

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:
- V1
- V2

Related Parts:
- Link More Related Hardware
<table>
<thead>
<tr>
<th>Control(s)</th>
<th>Verification(s)</th>
</tr>
</thead>
</table>
| **CTRL1.**  
Design:  
Operational  
34S  | **1.1 (V-1)**  
Test  
Closed to VTL  
Verify Each Flight  
Verification Estimated Completion Date: No information listed. |
| **CTRL2.**  
Detailed description of the second control on this cause record.  
Design:  
Operational  | **2.1 (V-1)**  
Test  
Closed to VTL  
Verify Each Flight  
Verification Estimated Completion Date: No information listed. |
| **CTRL3.**  
Detail on the control  
Design:  
Operational  | **3.1 (V-3)**  
Ops Cntr (OCAD)  
Open  
Verify Once  
Verification Estimated Completion Date: 2013-06-06 |
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
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