Second Closure of Anomalies

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Introduction

This presentation

- Introduces the topic of second closure of anomalies in satellite MAIT
- And the major lessons learned on the process as applied in Airbus DS Space Systems in MAIT

Why this topic?

- Anomalies impact the flow of MAIT and create schedule delays, additional cost and variation
- Reducing the number of anomalies reduces variation
- Reduced variation improves quality as well as cost and schedule credibility

We distinguish two categories of anomalies

- Anomalies caused by MAIT
- Anomalies found by MAIT and either caused by design or detected post equipment acceptance

Anomalies impact the flow of MAIT and create schedule delays, additional cost and variation

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A short excursion into the theory of anomaly management - definitions used in this presentation

Important references for us

- ECSS-Q-ST10-09C chapter 5.3 Corrective and preventive actions
- ISO 9000:2015 Quality Management Systems – Fundamentals and vocabulary

Anomaly (ECSS)

Any deviation from the expected situation

Correction (ISO 9000)

Action to eliminate a detected nonconformity

Corrective Action (ISO 9000)

Action to eliminate the cause of a nonconformity and to prevent recurrence

Preventive Action (ISO 9000)

Action to eliminate the cause of a potential nonconformity or other potential undesirable situation

In Airbus DS anomaly management, correction is often referred to as closure 1, corrective as closure 2 and preventive as closure 3

Source: ISO 9000:2015

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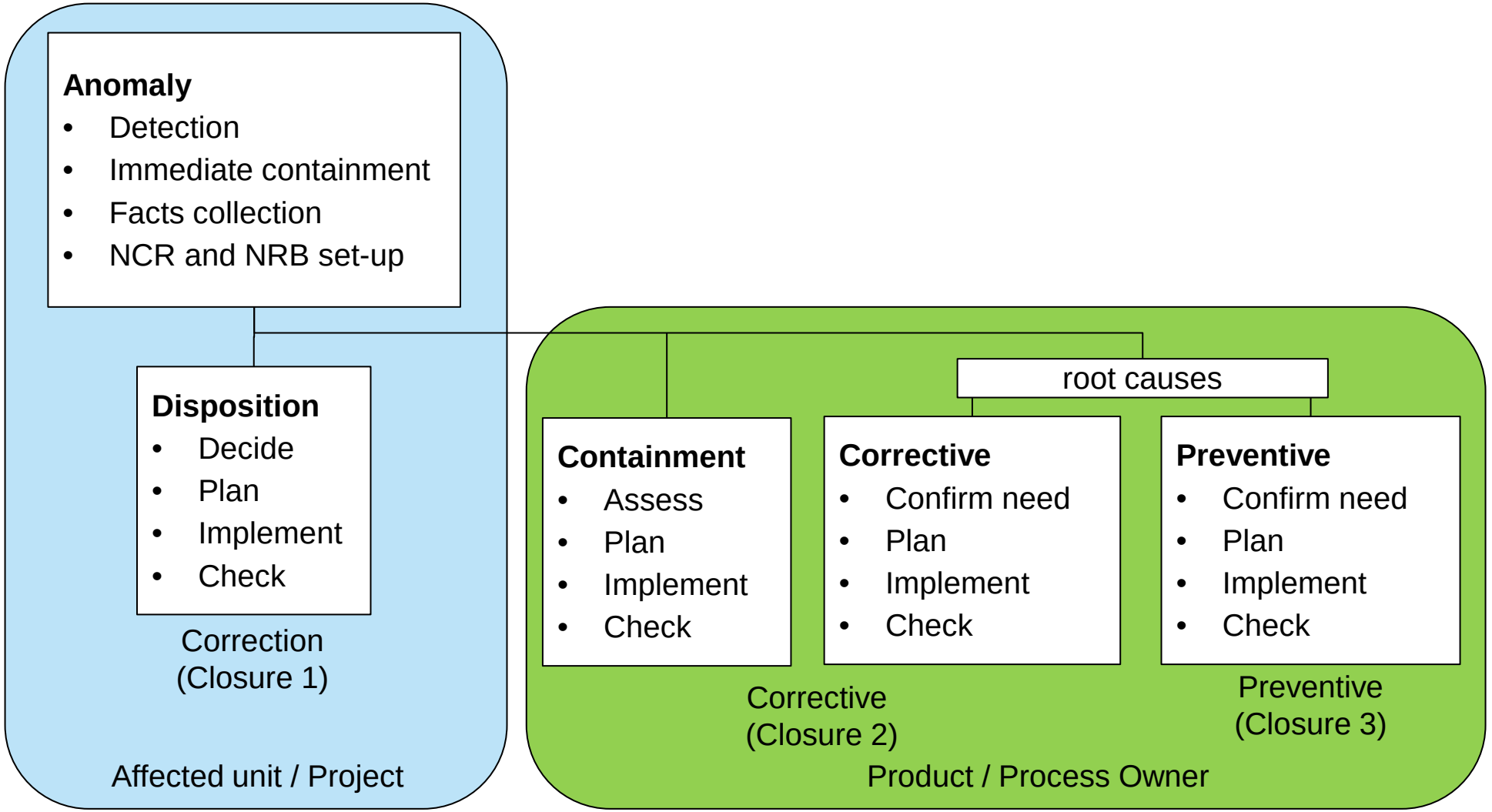
Standard NCR management process in Airbus DS ADS.E.101



Anomaly management following the Correction, Corrective and Preventive methodology is widely applied in Airbus DS

Source: Airbus DS ADS.E.101, latest version by Eric D'Andrimont

Transfer process from Closure 1 to Closure 2

What we have after closure 1

- A detailed description of the initial finding with technical details, e.g. part number, material, drawings,…
- An analysis of effects and cause
- Impacts analysis, e.g. stress
- A repair and verification procedure
- The final check stating ‚ok‘

What we need for closure 2 and 3

- A short and conclusive description of the facts
- A root cause analysis
- Identified the root process and the process owner
- Identification of affected units outside the project scope

The information we typically get out of closure 1 is different from what is needed for closure 2.
The step from Correction to Corrective and Preventive requires consolidation of information and handover of NC ownership.

Closure 2 Standard Reporting Sheet

<table>
<tr><th>Issue</th><th colspan="2">Description</th><th>Root Cause</th></tr>
<tr><td rowspan="3">What happened?

What happened
Where
During which process step
Sequence of events

Do not put any names of people</td><td>When:</td><td>Date</td><td rowspan="3">Why did it happen?

1) Process and Materials
2) People
3) Tools & Environment
4) Engineering
5) ….</td></tr>
<tr><td>Ref:</td><td>NCR Reference</td></tr>
<tr><td>Impact:</td><td>Hardware impact.</td></tr>
<tr><th>Correction Action</th><th colspan="2">2nd Closure</th><th>Schematic / Picture</th></tr>
<tr><td>1st Closure:

Disposition
(+ immediate containment if needed within project)</td><td colspan="2">2nd Closure answering the Root Cause analysis:

Identify actions in answer to the root cause
(+ wider containment if needed outside of project)</td><td></td></tr>
</table>

The Closure 2 Standard Reporting Sheet has been introduced in 2014 in Airbus DS to further improve systematic communication and management of second closure of anomalies in MAIT.

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Example: A lifting issue in MAIT

Issue

What happened?

One of the 38 fixings securing the GSE to the satellite was not removed prior to lifting..

During the lift it was observed that the load cell displayed 1,500kg (1,200kg was expected mass). Lift was stopped, H/W made safe for investigation.

Description

When:	01 April 2016
Ref:	REF.NCR.00057
Impact:	Potential stress to satellite. Lifting held until agreement with customer at NRB.

Root Cause

Why did it happen?

Critical move procedure requires operator, QC and QA to confirm that all fixings are removed, however fixing was missed and remained engaged.

Root causes determined as:

- Quantity of fixings to remove undefined
- Fixing missed by 3 people (human error)
- Poor visibility of fixings
- MGSE fixing control

Correction Action

1st Closure:

Fixing was remove, no signs of deformation.

All lifting points were inspected and showed no damage.

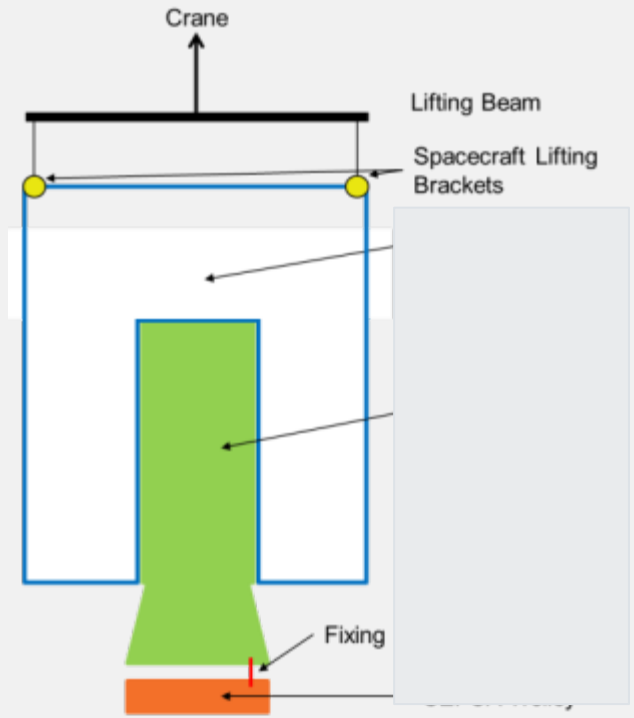
NRB held with Stress Team to determine whether lifting could commence

2nd Closure

2nd Closure answering the Root Cause analysis:

- Procedures to be fully reviewed to define quantities of MGSE fixings
- Shadow board for fixings to be implemented → update MAIT best practise
- Update standard MGSE spec requiring yellow fixing → update GSE standard spec
- Investigation and analysis to be communicated across AIT to ensure risks are mitigated on all sites.

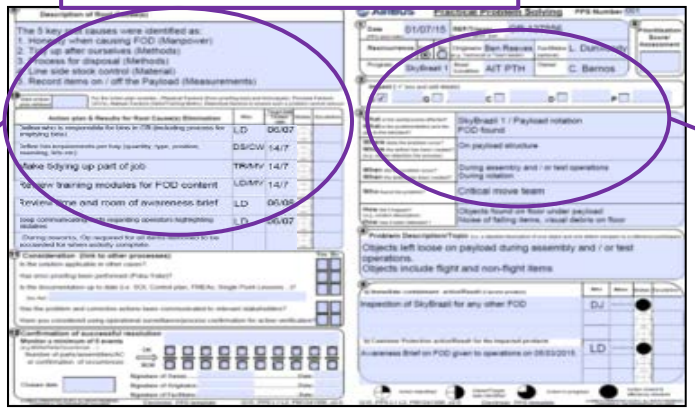
Schematic / Picture



Root cause analysis

- Airbus is implementing systematically root cause analysis as part of its group wide QUEST quality improvement initiative
- Root Cause analysis is performed by a Multifunctional Team

1. ‘A3’ template used

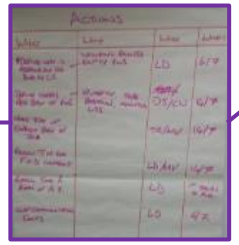


2. Problem defined

3. ‘Ishikawa’ (fishbone) brainstorm of causes

4. ‘5 Why’ analysis of major root causes

5. Actions defined and agreed



Root cause analysis is the first and most important step in closure 2.

Conclusion and Questions

Conclusion

- Anomalies impact the flow of MAIT and create schedule delays, additional cost and variation
- Anomaly management following the Correction, Corrective and Preventive methodology is widely applied in Airbus DS
- The step from Correction to Corrective and Preventive requires consolidation of information and handover of NC ownership
- The Closure 2 Standard Reporting Sheet has been introduced in 2014 in Airbus DS to further improve systematic communication and management of second closure of anomalies in MAIT
- A proper root cause analysis is the first and most important step in Corrective and Preventive Management

→ The second closure of anomalies has helped us to substantially reduce the number of anomalies caused by MAIT

→ The Space Systems Quality Board has adopted the Closure 2 Standard Reporting Sheet to rigorously track corrective and preventive closure.

Questions

- Should our NCR tools support the consolidation of information and handover of NC ownership
- Do we see a benefit to wider apply the presented method between ESA and industry?

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