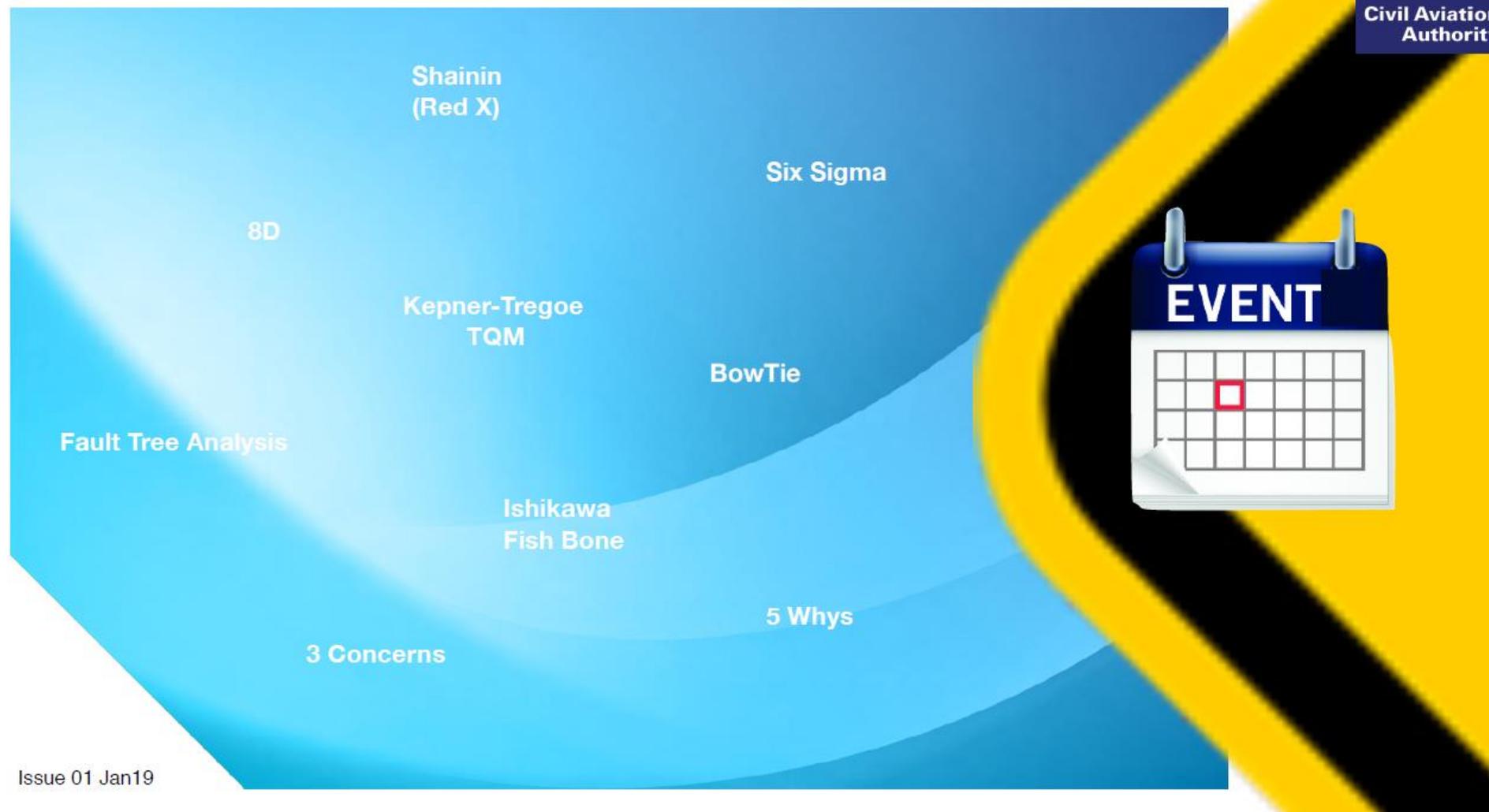# Effective Problem Solving and Root Cause Identification

**Jason Digance,  Airworthiness Surveyor**

CAA AW Seminar, February 2019

# Effective Problem Solving and Root Cause Identification

Shainin
(Red X)

Six Sigma

8D

Kepner-Tregoe
TQM

BowTie

Fault Tree Analysis

Ishikawa
Fish Bone

5 Whys

3 Concerns

**EVENT**

# Working with Industry



BARNBROOK SYSTEMS
*setting higher standards*
**Effective Problem Solving & Root Cause Identification**
**Frank Dearie 26th February 2019**
**RR Derby**



2EXCEL
The Investigation Road Map
– How it has worked for us.

Nick Clutton
Deputy Safety Manager
2Excel Aviation

ROLLS ROYCE

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Export Control classification: Not Listed

Our journey to improve problem solving across Civil Aerospace...the story so far

CAA Seminar - Effective Problem Solving & Root Cause Identification

Christine Brown, Head of Operations Quality
Civil Aerospace, Rolls-Royce plc

26th February 2019

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# The Route Map to Success

**EVENT**
- What Actually Happened
- Details of actual incident, accident, finding etc

*RECORD*

**Review**
- Triage the EVENT, is the event allocated to the correct area? Has it happened before? Review any historic data.
- Is the event the symptom of a larger problem?

**PS**
- Develop a PROBLEM STATEMENT (PS) that describes the effects and potential risks of the EVENT on the entire organisation

*PROBLEM STATEMENT*

**RA**
- Carry out a RISK ASSESSMENT (RA) to determine what effect the PS has on your organisation
- Determine the level of investigation required

*RISK ASSESSMENT*

**Cont A**
- Determine and implement CONTAINMENT ACTIONS (Cont A) to bring the EVENT back to a desired state
- If you cannot contain the EVENT you may need to STOP or SUSPEND operations/production

*CONTAINMENT ACTIONS*

**INV**
- Carry out an INVESTIGATION into the EVENT as determined by your RA

*INVESTIGATION*

**RCA**
- Carry out your ROOT CAUSE ANALYSIS (RCA) to determine how and why the PS developed

*ROOT CAUSE ANALYSIS*

**RCS**
- Develop and document a ROOT CAUSE STATEMENT (RCS) that explains the underlying reason for the PS

*ROOT CAUSE STATEMENT*

**Corr A**
- Develop CORRECTIVE ACTIONS (Corr A) that are directly linked to the RCS that will return the PS back to a desired state

*CORRECTIVE ACTIONS*

**PA**
- Develop PREVENTIVE ACTIONS (PA) to prevent the recurrence of the RCS

*PREVENTIVE ACTIONS*

**Monitor**
- Review all Corr A and PA to ensure they were effective. Monitor through Quality/Safety Audits
- If Actions are shown to be ineffective, review Actions taken and RCA to ensure the PS correctly described the effects and potential risks of the EVENT on the entire organisation

*MONITOR OUTCOME*

**Civil Aviation Authority**

# Following the Process

**STAGE 1:** Record the *event* in your MEMS, Quality System or SMS and if appropriate report it to the NAA

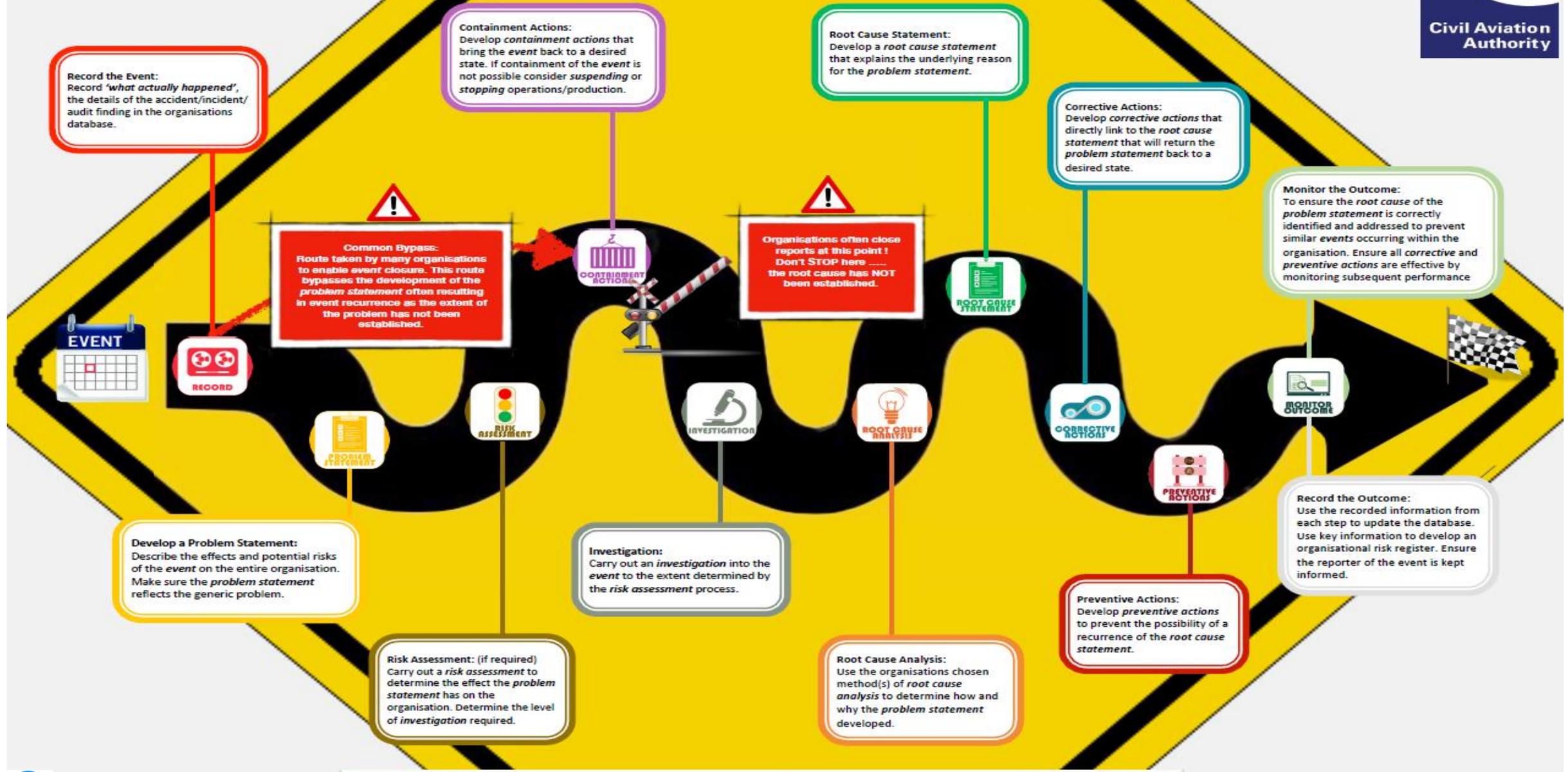**STAGE 2:** Create the Problem Statement.

**STAGE 3:** Carry out a Risk Assessment (if required)

**STAGE 4:** Develop and Implement Containment Actions

Cont A
- Determine and implement CONTAINMENT ACTIONS (Cont A) to bring the EVENT back to a desired state
- If you cannot contain the EVENT you may need to STOP or SUSPEND operations/production

**Civil Aviation Authority**

**Record the Event:**
Record *'what actually happened'*, the details of the accident/incident/audit finding in the organisations database.

**Containment Actions:**
Develop *containment actions* that bring the *event* back to a desired state. If containment of the *event* is not possible consider *suspending* or *stopping* operations/production.

**Root Cause Statement:**
Develop a *root cause statement* that explains the underlying reason for the *problem statement*.

**Corrective Actions:**
Develop *corrective actions* that directly link to the *root cause statement* that will return the *problem statement* back to a desired state.

**Monitor the Outcome:**
To ensure the *root cause* of the *problem statement* is correctly identified and addressed to prevent similar *events* occurring within the organisation. Ensure all *corrective* and *preventive actions* are effective by monitoring subsequent performance

**Common Bypass:**
Route taken by many organisations to enable *event* closure. This route bypasses the development of the *problem statement* often resulting in event recurrence as the extent of the problem has not been established.

Organisations often close reports at this point ! Don't STOP here ...... the root cause has NOT been established.

**EVENT**

RECORD

PROBLEM STATEMENT

RISK ASSESSMENT

CONTAINMENT ACTIONS

INVESTIGATION

ROOT CAUSE ANALYSIS

ROOT CAUSE STATEMENT

CORRECTIVE ACTIONS

PREVENTIVE ACTIONS

MONITOR OUTCOME

**Develop a Problem Statement:**
Describe the effects and potential risks of the *event* on the entire organisation. Make sure the *problem statement* reflects the generic problem.

**Investigation:**
Carry out an *investigation* into the *event* to the extent determined by the *risk assessment* process.

**Record the Outcome:**
Use the recorded information from each step to update the database. Use key information to develop an organisational risk register. Ensure the reporter of the event is kept informed.

**Risk Assessment: (if required)**
Carry out a *risk assessment* to determine the effect the *problem statement* has on the organisation. Determine the level of *investigation* required.

**Root Cause Analysis:**
Use the organisations chosen method(s) of *root cause analysis* to determine how and why the *problem statement* developed.

**Preventive Actions:**
Develop *preventive actions* to prevent the possibility of a recurrence of the *root cause statement*.

**A route map to effective problem solving and root cause identification**

QuickTime™

Issue 01 Jan19

# Record the s...

## EVENT RECORD TABLE

| Event (What Happened) | | |
|---|---|---|
| | | |

| Phase | 1) Initial event information | 2) Subsequent investigation |
|---|---|---|
| When | | |
| Where | | |
| Who | | |
| How | | |

| Problem Statement (Potential effects/risks) | | |
|---|---|---|
| | | |

| Risk Assessment | Initial Risk Score | Final Risk Score |
|---|---|---|
| | Investigation     Low    Medium    High | |
| Operation | Production    Review    Continue    STOP<br>Sales    Review    Continue    STOP<br>Operations    Review    Continue    STOP | |
| Containment | | |
| Evidence | | |
| Human Factors | Evidence: | Conclusion: |

| Root Cause Statement | |
|---|---|
| | |

| Validation / timescale |
|---|
| |

# Following the Process

**STAGE 5: The Investigation Process**

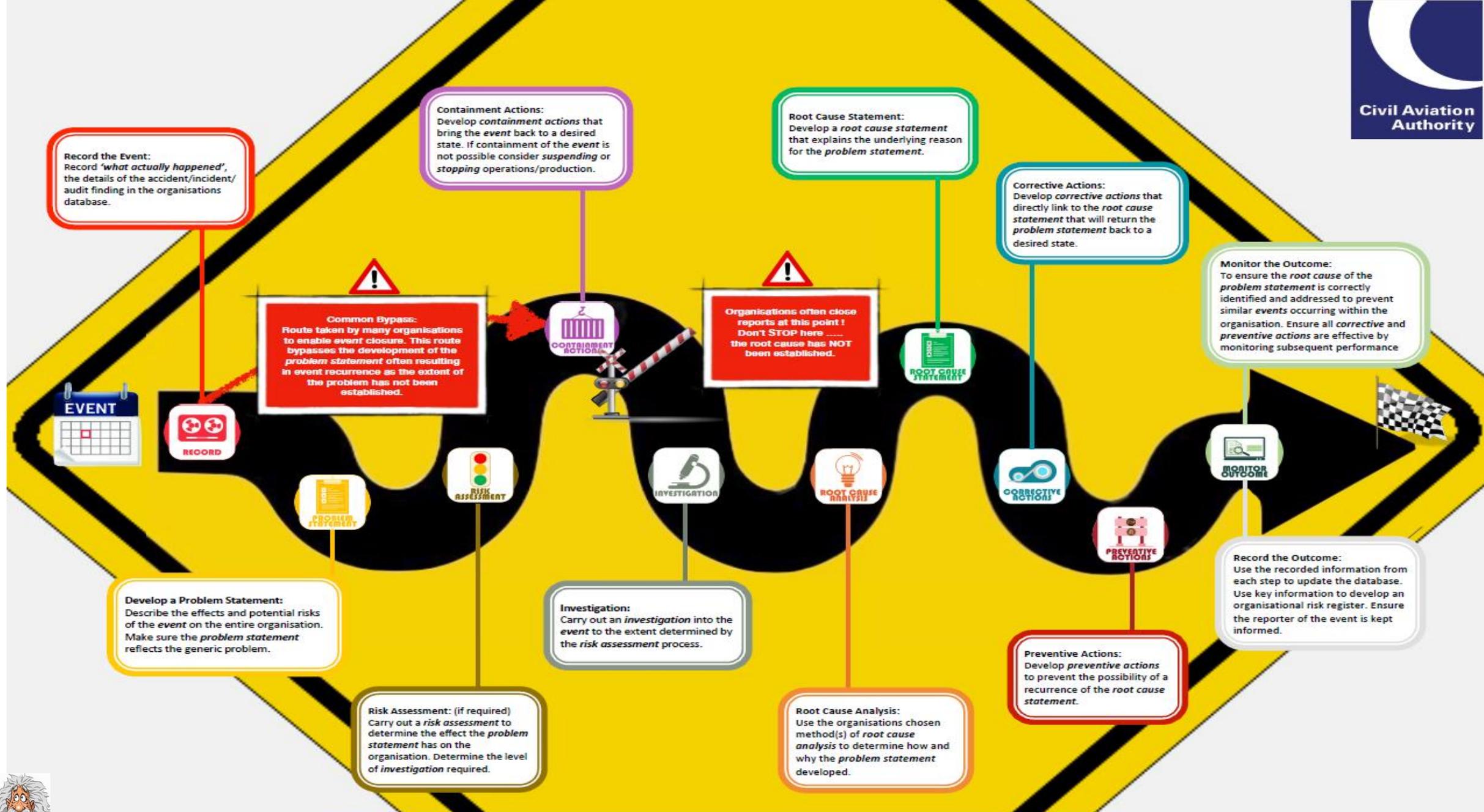**STAGE 6: Effective Root Cause Analysis**

**STAGE 7: Develop and Document a Root Cause Statement**

RCS
- Develop and document a ROOT CAUSE STATEMENT (RCS) that explains the underlying reason for the PS

**Civil Aviation Authority**

**Record the Event:**
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**Root Cause Statement:**
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EVENT

RECORD

RISK ASSESSMENT

PROBLEM STATEMENT

CONTAINMENT ACTIONS

INVESTIGATION

ROOT CAUSE ANALYSIS

ROOT CAUSE STATEMENT

CORRECTIVE ACTIONS

PREVENTIVE ACTIONS

MONITOR OUTCOME

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## A route map to effective problem solving and root cause identification

# Roo

**Root Cause Analysis Table**

| Step | | | Problem Statement |
|---|---|---|---|
| Step 1 | What was the problem expressed in terms of a **subject** and **undesired state**? | | |
| Step 2 | What was the direct cause of the problem expressed in the terms of a **subject** and **state**? | | |
| Step 3 | Produce a line of causal factors expressed in the terms of a **subject** and **state**. Think of these causes as links of a chain | | |
| Step 4 | Determine who owns each causal factor? | A B C D E | |
| Step 5 | What causal factors can be directly influenced by the organisation. | A B C D | |
| Step 6 | Which of the causal factors would solve the underlying organisational problem. | | |

TIME

Civil Aviation Authority

'The Root Cause Myth'
T.Finlow-Bates

# Following the Process

**STAGE 8: Determine and Document Corrective Actions**

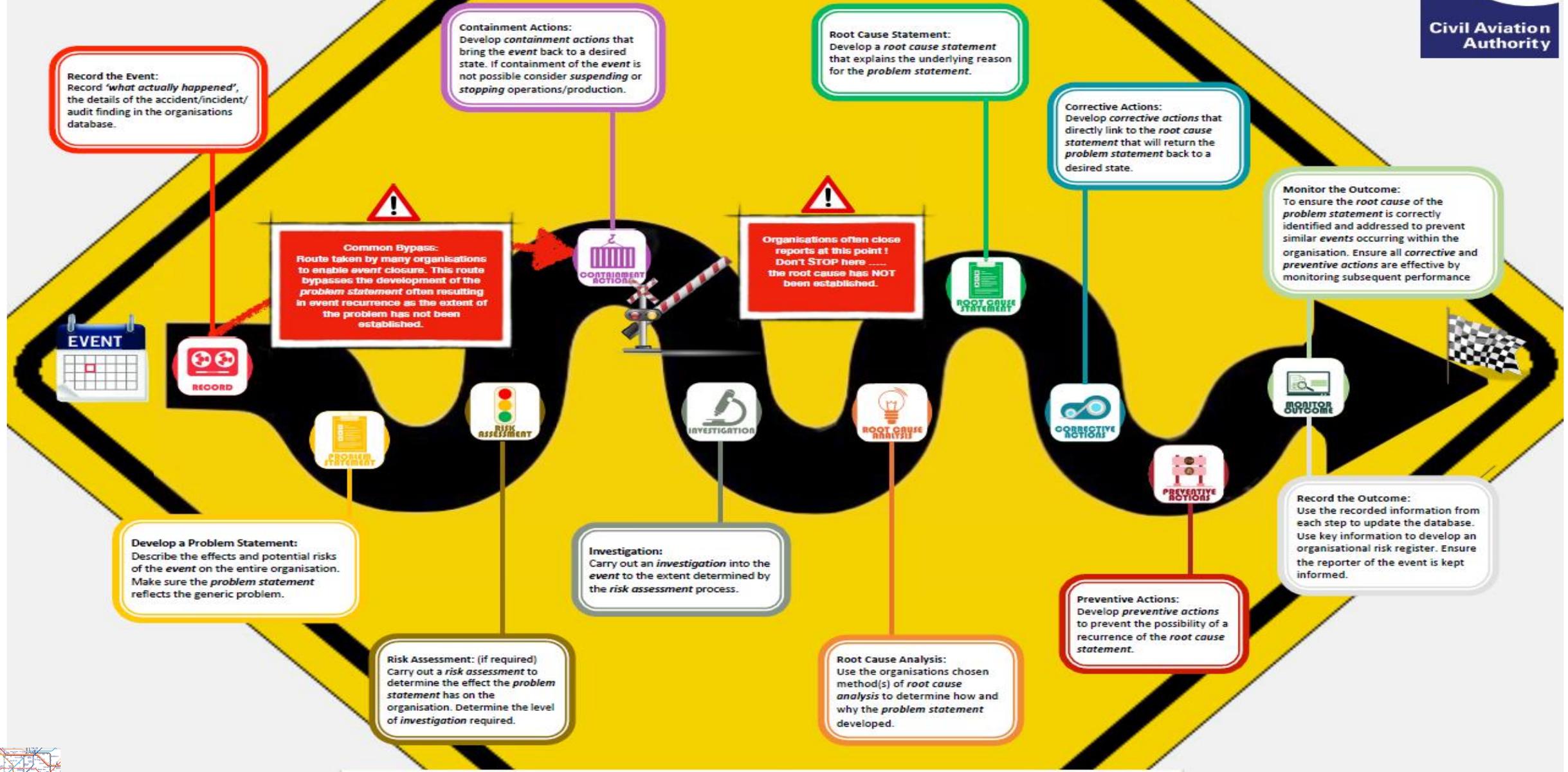**STAGE 9: Determine and Document Preventive Actions**

**STAGE 10: Monitor Outcome - Ensure Corrective and Preventive Actions are Effective**

**Monitor**

- Review all Corr A and PA to ensure they were effective. Monitor through Quality/Safety Audits
- If Actions are shown to be ineffective, review Actions taken and RCA to ensure the PS correctly described the potential effects/ risks of the EVENT on the organisation

**Civil Aviation Authority**

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**A route map to effective problem solving and root cause identification**

Issue 01 Jan19

# EVENT RECORD TABLE

**Civil Aviation Authority**

**Event (What Happened)**

| Phase | 1) Initial event information | 2) Subsequent investigation |
|---|---|---|
| When | | |
| Where | | |
| Who | | |
| How | | |

**Problem Statement (Potential effects/risks)**

| Risk Assessment | Initial Risk Score | Final Risk Score |
|---|---|---|
| | Investigation    Low   Medium   High | |
| Operation | Production   Review   Continue   STOP<br>Sales   Review   Continue   STOP<br>Operations   Review   Continue   STOP | |
| Containment | | |
| Evidence | | |
| Human Factors | Evidence: | Conclusion: |

**Root Cause Statement**

**Validation / timescale**

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# EVENT CLOSURE TABLE

**Civil Aviation Authority**

**Event (What Happened)**

**Problem Statement (Potential effects/risks)**

| Containment Action(s) | | Notes: | Stakeholder/ Action Owner | Due Date | Actioned | Additional detail: |
|---|---|---|---|---|---|---|
| 1 | | | | | | |
| 2 | | | | | | |
| 3 | | | | | | |

**Root Cause Statement**

| Corrective Action(s) | | Notes: | Stakeholder/ Action Owner | Due Date | Actioned | Additional detail: |
|---|---|---|---|---|---|---|
| 1 | | | | | | |
| 2 | | | | | | |
| 3 | | | | | | |
| 4 | | | | | | |

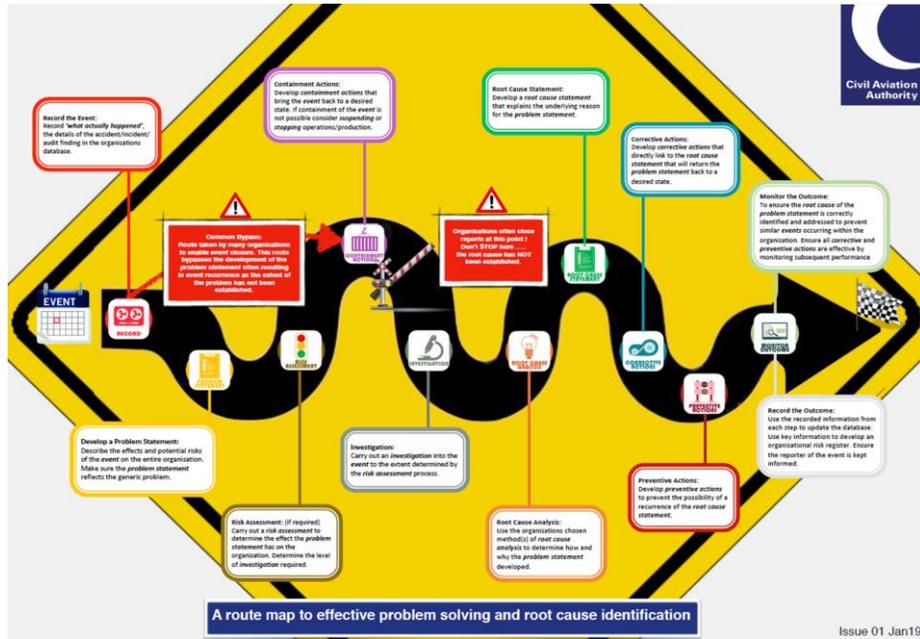| Preventive Action(s) | | Notes: | Stakeholder/ Action Owner | Due Date | Actioned | Additional detail: |
|---|---|---|---|---|---|---|
| 1 | | | | | | |
| 2 | | | | | | |
| 3 | | | | | | |

**Validation / timescale**

# Meeting current and future requirements



EU 376/2014