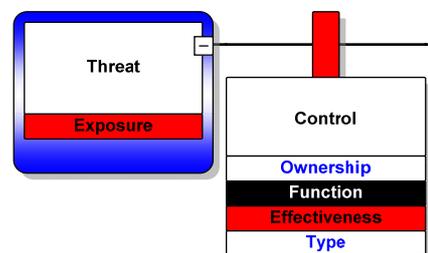


# Definitions and Key for Bowties created by the UK CAA.

The threats and controls within the bowtie have been classified to inform the reader/user how well the top event (undesired safety state) is being managed and how exposed an aircraft is to the top event through the threats.

The bowtie has been classified regarding:

- Threat Exposure
- Control Criticality
- Control Effectiveness
- Control Functionality
- Control Type
- Control Ownership



## Threat Exposure

Identifying exposure to the threats can add value to the bowtie by highlighting areas of greater concern overall. This may help prioritise action areas for controls.

### Taxonomy

The following taxonomy is used to define the exposure:

- **Constant Exposure** – where the potential to be exposed exists throughout the majority of every flight e.g. Flt Crew failing to follow an ATCO instruction;
- **Commonly Exposed** – where the potential to be exposed is likely to be once or twice during every flight e.g. incorrect takeoff configuration selected;
- **Limited Exposure** – where the potential to be exposed is likely to be less frequent e.g. conducting a Non Precision Approach or De-icing aircraft.

### Color legend of Threat Exposures

- <NULL> <No Value Assigned>
- Limited exposure
- Commonly exposed
- Constant exposure

## Control Criticality

It is to be expected that not all controls will have the same importance with regard to the management of a specific threat. Within the bowties, differentiation has been achieved based on two types of criticality definitions: 'standard controls' and 'critical controls'. Criticality ratings provide a starting point for further evaluation.

### Future Possibilities

An additional definition included in the criticality taxonomy is 'future possibility'. This identifies a control that may not be currently available to the aviation industry at large but one that is expected to become commonly accessible.

The purpose is to help 'future proof' the bowties to some extent, by identifying controls on the safety management horizon.

### Taxonomy

The following taxonomy is used to define the various criticality types:

- High Criticality (red)
- Standard Criticality (grey)
- Future Possibilities (white textured)

### Color legend of Criticalities

- <NULL> <No Value Assigned>
- Standard Control
- Critical Control
- Future Possibility

The control "tab" depicted in the diagram is coloured (the top "tab" pinning the control to the threat/consequence/escalation line).

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## Control Effectiveness

The purpose of rating control effectiveness is to highlight areas of strength and weakness within the context of how a particular top event and its associated threats and consequences are managed. The effectiveness ratings assigned to the bowtie templates were made using the following assumptions:

- That the control is actually in place and functioning as might be typically encountered (e.g. if the control is a piece of equipment, it is assumed to be installed/ available).
- The rating is based on how the control might typically be encountered not according to the best possible effectiveness e.g. whilst a control may be rated as poor in the bowtie template, that is not to say that it does not have the potential to be better than poor given adequate resourcing and effort.

The effectiveness rating in the bowtie template is intended to be a starting point for further evaluation.

### Taxonomy

The following taxonomy is used to define the various effectiveness ratings:

- Very Poor (red)
- Poor (orange)
- Good (light green)
- Very Good (dark green)
- Un-assessed (yellow)

### Color legend of Effectivenesses

|   |                            |
|---|----------------------------|
|  | <NULL> <No Value Assigned> |
|  | Very Poor                  |
|  | Poor                       |
|  | Good                       |
|  | Very Good                  |
|  | Unassessed                 |

This is shown in block colour across the extra information text box below the control.

## Control Functionality

Controls can be identified according to their function within the bowtie. These 'functions' are shown to provide clarity for the end user as well as appreciating where efforts are concentrated on (e.g. is there more we can do to eliminate the threat as the majority of control are preventative?)

### Taxonomy

The following taxonomy is used to define the various control functionalities:

- **Elimination:** eliminating the threat completely, therefore making sure the threat is not present
- **Prevention:** preventing the threat from developing into a top event if the threat becomes "live"
- **Reduction:** reduce the likelihood of the top event developing into a consequence
- **Mitigation:** mitigating the severity of the consequence.

## Control Type

Control types illustrate the high level grouping based on the type of control. This helps illustrate what type of weak spots there are and whether there is an over-reliance in the safety system e.g. over-reliance on training or proficiency controls surrounding a particular risk.

### Taxonomy

The following taxonomy is used to define the various control types:

- **Policy/Procedure:** For controls that rely primarily on a person to perform a particular action according to a pre-determined procedure or policy which may be based on regulation
- **Engineered devices:** for controls that rely primarily on technical equipment such as FMS, TCAS, TAWS or interlocks on thrust levers
- **Training/ proficiency:** for controls that seek to assure an action is performed to a certain standard
- **Human sensory:** for controls where a human's sight/hear/taste/smell/touch is used outside of procedures

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## Control Ownership

This feature has been used to identify the industry sector with the most significant and direct influence over the effectiveness of a particular control, such as:

- **Aerodrome Operator**
- **Aircraft Operator**
- **ANSP (Air Navigation Service Provider)**
- **Approved Design Organisation**
- **Handling Agent**
- **Manufacturer**
- **Misc. Third Party**
- **MRO (Maintenance Repair Organisation)**
- **Regulator**
- **Type Certificate/Supplemental Type Certificate Holder** (*AW Project only*)

The information is displayed as a text box below the control.