CAA Strategy for Bowtie Risk Models

An updated briefing from the Civil Aviation Authority

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Introduction

This CAA strategy identifies how the usage of Bowtie risk models will be maximised as an effective and proactive safety risk assessment tool. The CAA aspires to work with the aviation industry to inform and improve decision making so that the right actions can be taken to achieve the best safety outcomes for the UK public.

Bowtie is a methodology to proactively identify and manage weaknesses in the aviation system so that resource can be focussed in the most efficient and effective way. The Bowtie strategy aims to enhance and compliment the CAA's Performance Based Regulation (PBR) system.

Overarching Principles and Key Drivers

The CAA exists to protect the public from unacceptable harm when they encounter aviation and use the Better Regulation principles: Proportionality, Accountability, Consistency, Transparency and Targeting to achieve the high-level strategic objective, as laid out in the CAA Safety Policy.

One of the key drivers of Performance Based Regulation is the demonstration of resource to risk (are we targeting the right activity with the right people). The CAA Bowtie strategy will enhance and support the PBR philosophy and support the CAA in meeting its safety accountabilities through better risk assessment and subsequent management.

CAA's Primary Strategic Objectives

The CAA Bowtie strategy for using risk models and the methodology comprises of the following primary objectives:

1. CAA's Performance Based Regulation

a. We want to embed Bowtie methodology and its output as a key element within the CAA's Regulatory Safety Management System (RSMS) to help drive safety improvement activity and safety planning

With having Bowtie methodology and its output featured within our RSMS processes, we aim to improve our understanding and proactive management of safety risk ensuring governance forums such as the Safety Risk Panel (SRP), Safety Review Committee (SRC) and Safety Leadership Group (SLG) are familiar with the Bowtie output to help decision making and identify SMART[1] mitigating actions.

1 SMART stands for Specific, Measurable, Achievable, Realistic, Timebound

b. We want to ensure the Bowtie output is fundamental to Performance Based Oversight (PBO)

By using the Bowtie output as a source of intelligence for Performance Based Oversight (in connection with other intelligence) we can assist the CAA inspectorate teams in asking control focussed questions and assist industry in identifying best practice safety mitigations. We aim to assure Bowtie risk models produced and owned by industry entities are sound and meaningful by equipping the CAA inspectorate teams with appropriate knowledge and specialist assistance.

c. We want to improve our intelligence capability through Bowtie output identifying and driving data collection

We aim to work with industry to identify common critical controls for effective Safety Performance Indicators (SPIs) and feed, where appropriate, into the UK State Safety Programme (SSP), Safety Plan and other industry action plans.

2. CAA's Assurance and Approvals

a. We want to enhance CAA business and safety assurance activities and use the Bowtie models to identify non-compliance and improvement areas against control performance

We can identify areas where the performance of our safety critical functions may be degraded. Through the regular testing and audit of the models, we can identify where intervention may be required to ensure our continued compliance with International and National obligations, including ICAO SARPS, EASA Authority Requirements (ARA) and ISO 900-2015 frameworks. These compliance aspects can be used alongside safety maturity measurement and improvement activity to provide a holistic view of SARG performance, including Training, Resource, Procedures, Processes, Doctrine, Policy and Culture.

b. We want to strengthen CAA's issuance of approvals to ensure industry can proactively achieve compliance

We can systemise applications against a compliance framework and ensure a standardised approach toward assessment is followed. Bowtie allows external organisations to submit requests and for those requests to be audited and retained for future assessment. Bowtie enables multiple applications to be processed simultaneously and for management to have visibility of the status of those applications. Data can be collated to highlight where organisations may have difficulty with specific aspects of approval, allowing proactive intervention to improve process or policy.

3. CAA's reputation and influence on Bowtie Risk Modelling

a. We want to be known as the world leader on aviation Bowtie risk modelling expertise

From keeping up-to-date on bowtie methodology, its application worldwide and from collaborating with international bodies to promote CAA's best practice, we aim to improve our Bowtie risk modelling knowledge by learning from others and understanding different uses. With enhancing CAA's centre of Bowtie expertise within the Intelligence function[2] and building upon the assistance from the identified capability area[3] Bowtie focal points we aim to retain and expand expertise within the organisation.

b. We want to raise aviation safety management standards within CAA and UK and aspire worldwide industry, other National Aviation Authorities (NAAs) and international bodies from using the Bowtie methodology and its output

From collaborating with International Civil Aviation Organisation (ICAO), Safety Management International Collaboration Group (SMICG) and other aviation safety risk groups, we aim to demonstrate Bowtie as an effective safety risk management tool for inclusion into relevant guidance material. From engaging with industry, we aim to assist organisations with the embedding of Bowtie methodology to progress their Safety Management Systems (SMS) through improved risk management techniques, understanding a barrier approach and the different components of risk. We also strive to enhance current and new State Safety Partnerships by using Bowtie methodology and its output to highlight key improvement areas and appropriate mitigations.

2 The intelligence function is a UK CAA department (within the Safety Performance & Risk) team of the Safety and Airspace Regulation Group (SARG)

3 Capability Areas are departments within the UK CAA SARG where the technical inspectorate teams (inspectors and surveyors) are based.

Measuring Success against CAA's Primary Strategic Objectives – Performance Measures

We aim to check the status of our aspirations and objectives periodically with potential positive indicators being:

1. **CAA's Performance Based Regulation**
    - The Bowtie methodology and the use of output from Bowties are embedded into CAA's Performance Based Oversight (PBO) and CAA's Regulatory Safety Management System (RSMS) practice.
    - The Intelligence Team actively measure meaningful SPIs which are frequently presented to CAA and industry forums with SMART actions being identified for any safety mitigation activity.
    - CAA best practice guidance being used internally for created Bowtie risk models resulting in minimal recommendations following quality assessments.
    - The Bowtie methodology and the use of output from Bowties, in accordance with CAA best practice, is embedded into UK industries Safety Management Systems (SMS).
2. **CAA Assurance and Approvals**
    - The Bowtie models enable early identification of issues that may lead to findings during internal and external audit.
    - Improvement actions and recommendations accepted and acted upon by appropriate CAA teams following a safety assurance report which consisted of Bowtie model outputs.
    - Improved transparency and confidence in industry applications and compliance resulting in quicker turnarounds for issuing approvals based on Bowtie model control-based surveys. Increase in the uptake of this approach and tool by CAA teams.
    - Weak controls are identified at an early stage enabling interventions to be put in place prior to any degradation of regulatory effectiveness.
    - Performance is demonstrated through the application of audits and testing of the models such as the Regulatory and the ISO 9001 Bowtie models.
    - Trends are identified through barrier failure analysis and measuring where safety accountabilities might not be met.
    - Identification of the impact of; changes in the operating environment; inappropriate behaviours; poor use of data and; inappropriate proximity to risk.
3. **CAA's reputation and influence with Bowtie Risk Modelling**
    - ICAO Doc. 9859 (Safety Management Manual) contains examples of work or content influenced by the CAA's Bowtie risk work.
    - The CAA/industry Bowtie User Group (BUG) reach their objectives and achievements and the group continues to be supported by a wide range of industry organisations.

Limitations

Whilst the Bowtie methodology has multiple benefits, there are limitations. These include but are not fully exhaustive:

- Requiring in-depth knowledge from consistent subject matter experts to contribute to the development of a topical Bowtie
- To develop a meaningful and comprehensive model, significant time and resource may need to be utilised
- The methodology does not provide a framework to evaluate whether identified mitigations are enough and relies on the contributions of the bowtie developers
- Does not provide a quantitative assessment or evaluation of the acceptability of risks
- No standard exists; therefore, there is a range of different and subtle representations of Bowtie models.