

## **Safety Recommendations: a foundational building-block to EASA's Safety Risk Management process**

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### **Introduction**

Air accident safety investigations can be effectively described as a chain of investigation steps that starts with the gathering of the evidence, till the conclusion of the accident causes, and formulation of the most viable, efficient, and influential corrective actions.

This paper is focused on the final links of the chain: the follow-up of the safety recommendations (SR). The European Aviation Safety Agency (EASA) has put in place a robust internal system to transparently process the safety recommendations, in a way that goes beyond the applicable European and international requirements. In particular, the paper describes the existing link between the EASA Safety Risk Management process and the use of safety recommendations as a key element for the identification of the systemic safety issues and their prioritization.

Furthermore, the paper reports the process used and some of the main achievements that contributed to the preparation of the Safety Risk Portfolios developed by the Agency for the different domains of civil aviation.

### **Lecturer short introduction**

EASA Safety Investigation officer since August 2014.

Former Air Safety Investigator at ANSV (Italian Safety Investigation Authority) where we has been working for 7 years. In that timeframe he was also in charge of the Proactive Prevention Office.

Before joining the ANSV, Mario Colavita has been an Officer of the Italian Air Force since 1993. His military career was entirely performed at the Flight Test Centre that he left with the position of Head of the Structural Materials Department.

From 1990 to 1993 he was a Junior Scientist at the Centro Sviluppo Materiali in Rome, the R&D centre of the main Italian steelmaker company.

After graduating in Chemistry at the University "La Sapienza" of Rome in 1988, he got a MSc in Corrosion Science at the University of Ferrara (Italy) and a MSc in Advanced materials at Cranfield University (UK), as well as the completion of the Aviation Safety Certificate at the University of Southern California (US).



## Safety Recommendations: a brick to build-up the Safety Risk Management in EASA

### 1 Background

The European Aviation Safety Agency (EASA), has a key role for European aviation safety, in particular both as Certification Authority and Regulator.

For this reason EASA is also one of the main addressees of the Safety Recommendations issued by the Safety Investigation Authorities of the EU Members States (MS).

### 2 The European framework for the follow-up to safety recommendations

In addition to what is established by ICAO Annex 13, Regulation (EU) 996/2010 identifies specific obligations for the addressee of a safety recommendation, for both the originator and the addressee of a safety recommendation, in order to ensure an effective follow-up (*Art. 18, "Follow-up to safety recommendations and safety recommendations database"*).

In particular, Article 18(5) of the abovementioned Regulation, jointly with the Commission Regulation (EC) No 1321/2007 of 12 November 2007, which lays down implementing rules for the integration into a central repository of safety-related information on civil aviation occurrences, established the institution of the Safety Recommendations Information System database that is actually in place since January 2012. According to Article 18(5) of the Regulation, the Safety Investigation Authority of each Member State shall record in this EU database all safety recommendations it issued and the responses it received.

To address this topic, the European Network of Civil Aviation Safety Investigation Authorities (ENCASIA) established a dedicated Working Group (WG 6) aimed at harmonising the use of the Safety Recommendations Information System database among the MS, and analyse its content of database with a view to identifying important safety recommendations of Union-wide relevance.

Furthermore, on 5 December 2012, the EU Commission issued a Decision on access rights to the European Central Repository of safety recommendations and their responses. According to Article 2 of this Decision, all safety recommendations are considered as public.

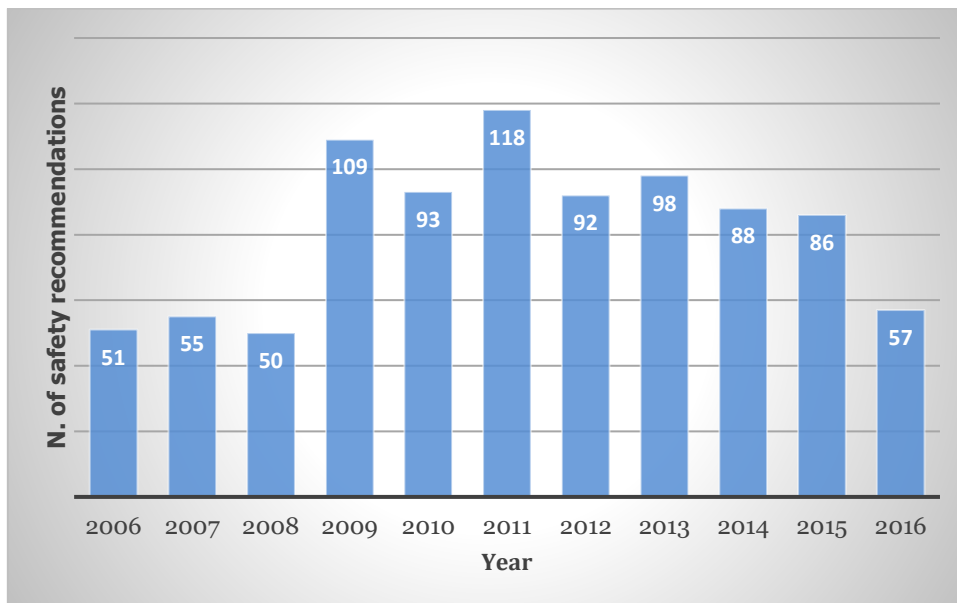
### 3 EASA management of the safety recommendations

EASA is processing safety recommendations received with a high level of priority, and a customised version of the Safety Recommendations Information System database has been used since the beginning to record and monitor not only those addressed to it, but also any other related to areas under its scope and remits.



The Safety Intelligence and Performance Department is in charge, through the Safety Investigation & Reporting Section, of the administration of each single investigation report and safety recommendation, as well as of the identification of the most appropriate responsible unit within the Agency to provide the required feedback.

Figure 1 depicts the trend of the safety recommendations received by the EASA since 2006<sup>1</sup>, whose average value is now around 100 per year ( $96 \pm 11$ ) since 2009.



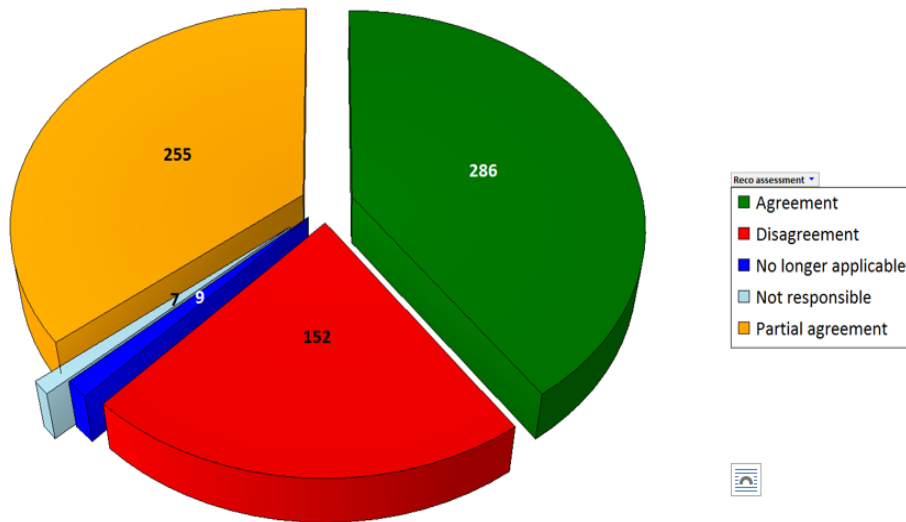
**Figure 1 – Safety recommendations addressed to EASA since 2006**

Furthermore, the same Department chairs the *Internal Safety Investigation Response Committee (ISIRC)* where all relevant Departments and Sections of the Agency are represented. The ISIRC meets every 6 weeks to -among other tasks- discuss and endorse the safety recommendations proposal responses prepared by the responsible units. The frequency of these meetings is properly established to match the deadline of 90 days from receipt established by Regulation (EU) 996/2010 to provide a first response to any new safety recommendation.

The first response can be either intermediate or final, depending on the action taken; this element will also impact the time required to close the safety recommendation. In effect, some actions can require several years for their final accomplishment (e.g.: rulemaking tasks, RMT). On this aspect, EASA's policy clearly defined since 2014 is that a safety recommendation will be considered "Open" until the expected action has been completed.

<sup>1</sup> For 2016, the data reported in the graph refer to the safety recommendations received up to 30.06.2016.

Furthermore, EASA’s assessments of the safety recommendations received (Figure 2) will be provided in occasion of the closing replies.



**Figure 2 – EASA safety recommendation assessments on closing replies provided in the last 10 years**

### 3.1 Processing of SIA assessment of EASA responses to safety recommendations

Recently, EASA has introduced an internal policy to process the SIA assessment of responses, in a way that goes beyond regulatory requirements.

So, any time that a “Not Adequate” assessment is received, no matter if in presence of an intermediate or a final reply, the safety recommendation will be re-evaluated by the ISIRC. In support of this re-evaluation, the SIA will be contacted to provide the justification of the assessment received, if not already contained in the response assessment,

A similar approach will be followed in case of “Partially Adequate” assessment, but only when this is referred to a closing reply and in presence of new elements clarifying the rationale of the assessment.

When these additional steps have been completed and a disagreement still remains between the EASA and the Originator, the final position of the Agency on the safety recommendation will then be consolidated at the level of the EASA Safety Committee (ESC)<sup>2</sup>.

<sup>2</sup> The ESC is the Agency Committee established to assist the Executive Director in the Agency’s safety mission. Its permanent membership is composed by the Executive Director, the Directors of Certification, Flight Standard, Strategy & Safety Management, and the Head of Departments of Safety Intelligence and Performance Department, and Strategy & Programmes Department.

## 4 Use of safety recommendations in the EASA's Safety Risk Management process

The latest introduction in EASA of a Safety Risk Management process is based on the introduction of the *Safety Risk Portfolios* that provide, for 10 different operational domains, the data-driven input to the decision-making process that supports the European Plan for Aviation Safety (EPAS)<sup>3</sup>.

### 4.1 The Safety Risk Portfolios

The "*Safety Risk Portfolios*" collect a list of systemic "Safety Issues" -the areas of safety concern that may cover one or more identified safety deficiencies that may lead to an accident- specifically identified per each aviation domain.

The objectives of safety risk management are to enable:

- the prioritization of safety actions which are most efficient in reducing risk levels;
- adequate internal and external coordination on the identification and assessment of safety issues, as well as the programming of the safety actions.

The Safety Issues have been identified by using the following 3 pillars:

- the analysis of historical occurrence data;
- a careful review of relevant safety recommendations;
- the joint expert judgment of the Agency, the Member States and industry, through the Network of Analysts (NoA) and the Collaborative Analysis Groups, respectively.

In particular, the safety recommendations represent a primary and strategic asset to be used, among the different data streams that may lead to the identification of the set of "safety issues" that can affect European aviation products, services, or European passengers.

Within each Safety Risk Portfolio, the Safety Issues are grouped into the areas of Operational, Technical, Human and Organisational.

### 4.2 Use of Safety Recommendations for the identification of systemic safety issues

The first Safety Risk Portfolio has been established for the aviation domain Commercial Aviation Transport – Fixed Wing (CAT-FW).

In that occasion, the review was carried out considering all safety recommendations addressed to EASA, with no restriction applied in terms of time of receipt, and only filtering those whose status, at the starting date of the review (March 2015), was:

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<sup>3</sup> The European Plan for Aviation Safety is the document that identifies, on a five-year period, the safety priorities addressed by specific actions in the Agency's rulemaking or safety promotion programmes, specific actions in the State Safety Programmes (SSPs) or through focused oversight activities performed either by the Agency or the MS.

- “Open”;
- “Closed”, but only with final assessment being of “Agreement” or “Partial Agreement”.

The rationale of this original approach stands on the assumption that in case of “Disagreement” the safety recommendation is acknowledged as not relevant in terms of safety or out of EASA’s remit. However, in later reviews carried out for other domains, this approach has been changed with the intent of making use of the safety elements contained also in the safety recommendations assessed with disagreement.

The additional filtering applied to the initial data set was that the safety recommendations had to be considered of Global Concern (SRGC)<sup>4</sup>. Since the formal introduction of the concept of Safety Recommendation of Union Relevance (SRUR)<sup>5</sup> endorsed by ENCASIA in Fall 2015, any of the two definitions is considered enough to pass in the screening.

The initial screening conducted under the abovementioned conditions reduced to 316 the number of safety recommendations selected for the following review.

During the review, each safety recommendation was associated to at least one “*main topic*” and up to a maximum of two “*sub-topics*”. This led to the identification of 91 “*main topics*” and 134 “*sub-topics*”.

This information has then been condensed in the identification of an initial set of 20 “*safety issues*” by building a cross-referenced matrix made of a total of 1820 elements. Consolidation of the result was achieved by cross-checking with the outcome of the parallel activity carried out by a dedicated Working Group through the systematic review of the accidents and incidents reports ascribed to the ADREP category of Loss of Control In-flight (LoC-I), available in the EASA data base and occurred in the timeframe 2009-2014 in Commercial Air Transport FW operations (65 occurrences).

As previously mentioned, final contribution from expert judgment of the Agency, the Member States and industry, through the Network of Analysts (NoA) and the Collaborative Analysis Groups was used to review and refine the Portfolio to reach the format eventually published in the EASA Annual Safety Review 2016 (table 1).

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<sup>4</sup> Safety Recommendation of Global Concern (SRGC) is defined by ICAO as: “A safety recommendation made to a State civil aviation authority, or to ICAO regarding a systemic deficiency having a probability of recurrence with the potential for significant consequences, and requiring timely action to improve safety.”

<sup>5</sup> As per ENCASIA Annual Report 2015, “a Safety Recommendation of Union wide Relevance (SRUR) would meet one or more of the following criteria:

-The deficiency underlying the safety recommendations is systemic, not related to a specific aircraft type, operator, manufacturer component, maintenance organisation, air navigation service and/or approved training organisation, and not solely a national issue, or;

-There is a history of recurrence across Europe of the relevant deficiency.”

### 4.3 Use of safety recommendations for the assessment of a safety issue

Once the SRP has been set, priority is given to those safety issues identified as the most critical based on their direct contribution to a fatal outcome as determined on the historical data of accidents.

As part of the Safety Risk Management process of the Agency, each single scenario in which the safety issue has been subdivided, it is then subsequently assessed, the purpose being to determine its associated risk, to understand existing weaknesses in the system that permit the safety issue developing towards a fatal outcome, and to draft possible safety actions to mitigate the identified risk.

| <b>CAT aeroplanes – Safety Risk Portfolio</b> |  |
|---|--|
| <b>Operational</b>                            | Detection, recognition and recovery of deviation from normal operations          |
|   | Operation in adverse weather conditions  |
|   | Ground handling operations   |
|   | Maintaining adequate separation between aircraft on the ground and in the air    |
|   | Pre-flight preparation/ planning and in-flight re-planning                       |
|   | Aircraft Maintenance   |
|   | Fuel management  |
|   | Birdstrikes  |
|   | Calculation and entry of take-off and landing parameters into aircraft system    |
|   | Handling and execution of go-arounds   |
|   | Prevention and resolution of conflict with aircraft not fitted with transponders |
|   | Dangerous goods handling   |
| <b>Technical</b>                              | Handling and operation of the aircraft following a technical failure             |
|   | False or disrupted ILS signal capture  |
|   | Contamination of controls or critical surfaces                                   |
| <b>Consequences</b>                           | Suitability of recording devices   |
|   | Survivability and evacuation   |
| <b>Human</b>                                  | Personal readiness and crew impairment   |
|   | Flight crew perception and awareness/ decision making and planning               |
|   | CRM and communication  |
|   | Monitoring of flight parameters and automation modes                             |
| <b>Organisational</b>                         | Knowledge of aircraft systems and use of associated procedures                   |
|   | Implementation of reporting systems and safety management                        |
|   | Oversight of organisations   |

**Table 1 – List of safety issues identified for Commercial Air Transport Fixed Wing**

The ultimate objective of the assessment of the safety issue is to identify the main areas where improvements could be sought.

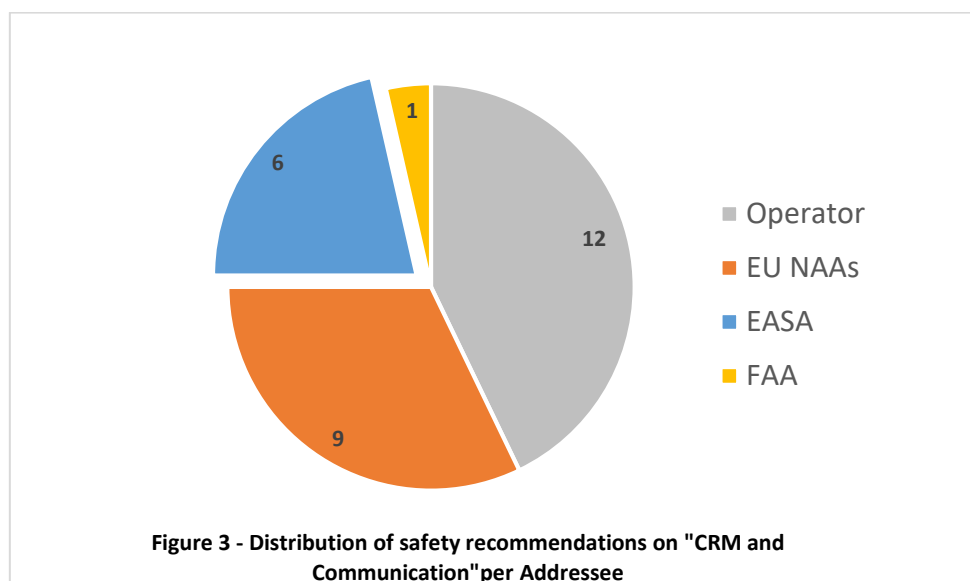
Although there is no prescribed approach to the analysis of the safety issue or its scenarios, the modelling more often used is in accordance with a bow-tie modelling, applied by a group of multidisciplinary profiles (Assessment Team). Bow-tie modelling has shown to be a practical tool for the identification and the evaluation of the effectiveness of each single barrier and mitigations already in place.

In the frame of the analysis of the safety issue, the safety recommendation data set is used once again to identify the most recurrent weaknesses, as well as to:

- weigh the request of the civil aviation community to further improve on the topic
- appraise the effort already put by EASA on it
- evaluate the most recurrent topics in the context of the safety issue.

The analysis of the safety recommendations is made in parallel on both, the EASA and EU Safety Recommendation Information System databases. For the first time, this review was carried out during the assessment of the safety issue on "Crew Resource Management and Communication".

The outcome of the review in terms of addressee distribution is shown in figure 3.

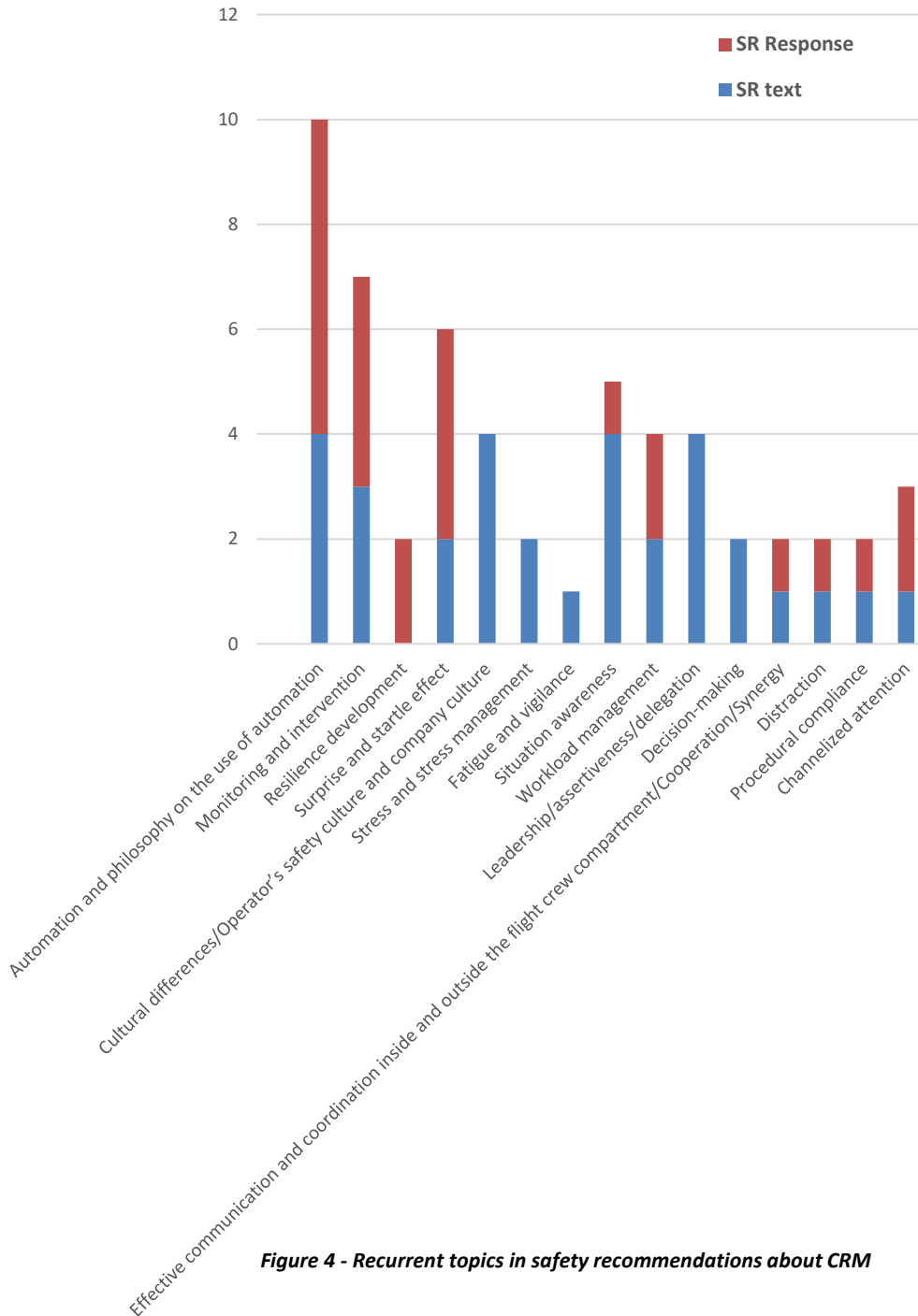


This information reveals that from the EU aviation community perspective, Operators and NAAs are seen as the players more often required to act on the topic. This led to the consideration that one of the actions to be strengthened from the Agency and NAAs perspective is a focus oversight on the subject, to better identify the correct implementation of the Crew Resource managements concepts.

When extended to the responses, the EASA databases showed that 22 more safety recommendations have been dealt by the Agency through actions in the area of Crew Resource Management and Communications, most of them containing information about regulation provisions related to the matter given by the Agency experts or were being taken into consideration within the framework of different rulemaking tasks.



The analysis of the most recurrent topics found in the total set of safety recommendations, provided the results shown in figure 4.



**Figure 4 - Recurrent topics in safety recommendations about CRM**

The results of this analysis was found in good agreement with the outcome of a similar analysis carried out on the events sequence describing in ECCAIRS the LoC-I events where “Crew Resource Management and Communication” was considered a relevant contributory factor.

The convergence of these two elements will stimulate further consideration given to the most recurrent topics to identify possible improvements.

