

M. van Hijum, G.J. Vogelaar, J.J. Burtenshaw
Follow-up Safety Recommendation Investigations, 30 June 2023

The purpose of accident and incident investigations by an Accident Investigation Authority (AIA) is to contribute to improving aviation safety by establishing the facts of the accidents, identifying safety deficiencies and risks and recommend preventative action that it considers necessary to avoid future repeat accidents. Previously identified safety risks, for which the relevant safety recommendations have not been actioned, have in some cases led to repeat aircraft accidents¹.

The ability for AIAs to assess whether safety recommendations have been actioned can be limited, depending on their powers relative to their local law. A framework by which AIAs can conduct follow-up safety recommendation investigations (FSRIs) into previously released safety recommendations, can be a useful tool to evaluate safety actions taken and the need for further preventive actions.

This paper will provide a brief historical perspective on pilot helmet safety action, detail the current ICAO requirements and European regulations relating to safety recommendations, discuss the problem that exists in the current system in relation to safety recommendations and the limited legal powers of AIAs to assess the actions taken, the concept and benefits of a FSRI, and a potential ICAO framework for FSRIs. Examples will be used from Dutch Safety Board (DSB) investigations.

Several accident investigations have shown that accidents could have been prevented, and or the severity of the injuries to participants reduced, if the safety lessons and recommendations from previous investigations had been implemented. On 17 September 1908, at Fort Meyers in Florida, aviation's first fatal accident occurred when Orville Wright and Lt Selfridge were flying a 1908 Wright Military Flyer. The aircraft's right hand propeller broke, resulting in a loss of power and subsequent uncontrolled impact with the ground. Lt Selfridge struck his head on one of the wooden uprights of the framework, fracturing the base of his skull. He died later that day in hospital. There was speculation he had died because of his head injuries, and the US Army Corp pilots were instructed to wear helmets like early football helmets to minimise their chance of a head injury (Paur, 2010).

Despite the requirement for pilots to wear helmets to prevent head injuries being promoted in the US Army Corp in 1908, in recent years at least three AIAs have released similar safety recommendations because of aviators continuing to be injured or killed by head injuries suffered during aircraft accidents. In 2010, the BEA recommended the European Union Aviation Safety Agency (EASA) to "make it mandatory for helicopter crews to wear protective helmets..." (BEA, 2010). In 2021, the New Zealand Transport Accident Investigation Commission recommended the (New Zealand) Director of Civil Aviation to "promote education and awareness of the benefit of aircraft pilots and occupants wearing appropriate helmets when practicable and when operational conditions indicate a potential benefit" (TAIC, 2021). Most recently in 2022, the ATSB issued a Safety Advisory Notice that "strongly encourages all pilots conducting low-level operations to wear a properly fitted and

¹ An accident where the contributing factors are similar in nature to a previous accident.

maintained flight helmet to improve their survivability in the event of an accident” (ATSB, 2022). This raises a fundamental question, has the identified safety issue been addressed?

AIAs rarely have the required legal powers to enforce safety recommendations, nor should they be required to. Implementation of safety recommendations is reliant on the addressee of a safety recommendation being convinced to act on it and taking the appropriate action in a timely manner.

ICAO and the European Union both have documented follow-up requirements, but these are limited to the initial months after a safety recommendation has been issued. ICAO Annex 13 requires a State that receives a safety recommendation to inform the proposing State, within ninety days of the communication of the safety recommendation, of the preventive action taken or under consideration, or the reasons why no action will be taken. Annex 13 also requires the State that issued a safety recommendation to implement procedures to record the responses received to the safety recommendations issued (ICAO, 2020).

The European legislation (Regulation (EU) No 996/2010 on the investigation and prevention of accidents and incidents in civil aviation) gives the European Union AIAs the legal powers for some additional steps within sixty days after a reply is received: to inform the addressee whether or not it considers the reply adequate and to give justification when it disagrees with the decision to take no action (EU, 2010). This assessment is most of the time based on the reply letter or written explanation provided by the addressee.

Not all actions addressing safety recommendations can be completed by the addressee within the ninety days mentioned. For example, preparation or amendment of regulation, reviewing aircraft or component certification specifications, preparing, and introducing policy or training are typical examples of safety actions that require more time, sometimes even up to several years. The initial reply on a safety recommendation provided by the addressee might therefore include mostly intentions for safety actions. The final implementation and result of the safety action taken may be subject to change.

As shown above, AIAs may need additional tools following the issue of a safety recommendation to effect change and advance safety. The Dutch Safety Board (DSB) can conduct FSRI. Article 76 of the Dutch Safety Board Act states (Netherlands, 2004, p.20):

The Board is authorised to conduct an investigation into the state of affairs with respect to the implementation of recommendations made by the Board in previous investigations.

This article gives the legal powers to the DSB to initiate an investigation to determine the implementation status of recommendations made in earlier investigations. Investigating allows the DSB to determine what safety actions have been taken and if they address the identified safety risks. The publication of a FSRI report also gives the possibility to generate additional awareness on the issued safety recommendations and safety actions taken and highlights to the public, regulator, and other organisations if safety risks still exist in the aviation system. Also, a key benefit of a FSRI is that it provides the possibility to review the effectiveness of previously issued safety recommendations.

A FSRI is not intended to be a compliance focused activity, as that is the responsibility of a regulator. On the contrary, it provides an opportunity for an AIA to identify if the safety risks detailed in previous aircraft accident investigations have been addressed through the implementation of the associated safety recommendations. Maria Gregson, the ISASI winner of the Rudolf Kapustin Memorial Scholarship in 2017, identified in her paper on “What makes a good safety recommendation in the aviation industry?” that safety recommendations may cause unintended consequences and that investigators deemed they may be only 70% effective (Gregson, 2017). This further highlights the need to assess if the implementation of safety recommendations has been effective in addressing the targeted safety risk. FSRI can also support other existing mechanisms, such as the Most wanted list (NTSB, USA), Watch list (TAIC, New Zealand; TSB, Canada), and Safety Watch (ATSB, Australia).

On 17 July 2014, flight MH17 accident occurred in Ukraine, following the detonation of a surface-to-air missile outside the aircraft’s cockpit. All 298 persons on board lost their lives in the accident. Ukraine delegated the accident investigation to The Netherlands. The Dutch Safety Board (DSB) investigated the accident, and the final report was published in 2015. The report contained 11 recommendations on the topic of safety of flight routes. Most of the safety recommendations concerned international addressees and several required ICAO action.

At the time of publication of flight MH17 accident report, it was already foreseen that the implementation of the safety recommendations would take some time to action. Therefore, in 2016 the DSB announced that it would conduct a follow-up investigation at a later stage. The follow-up investigation report ‘Flying over conflict zones’ was published early 2019. It gave the status of the implementation of the individual safety recommendations, but also provided an update on other initiatives and developments regarding the management of risks associated with flying over or near conflict zones.

On 8 January 2020, flight PS752 was shot down by a surface-to-air missile, shortly after taking off from Teheran Airport in Iran. All 176 persons on board were killed. This accident once again raised concerns about the decisions taken in respect of flying over or near conflict zones. Even though there was no Dutch involvement in the accident of flight PS752, the Dutch Minister of Infrastructure and Water Management requested the DSB to reflect further on the implementation of the safety recommendations from the MH17 Crash report.

The Dutch Minister’s request was focused on possible improvements to the national, European, and global system for better managing the risks involved in flying over conflict zones. In response to this request, the DSB decided to start an additional FSRI into the safety of flight routes, as it was an additional opportunity to review the status of the management of the safety risks underlying the ‘MH17 Crash’ report safety recommendations. The DSB published the report ‘Safe flight routes’ in June 2021. The report included five safety recommendations addressed to the Dutch Minister of Infrastructure and Water Management, the European Commission and EASA.

The DSB has also used FSRI in other domains. The DSB has investigated the follow-up on the eight recommendations from the report “Capsizing Frisia”, published in 2012. This report was about the capsizing of a shell-dredger on December 14, 2010, resulting in three fatalities. This was the first time the DSB conducted a FSRI. The DSB decided to initiate a FSRI due to the seriousness of the accident and because serious safety shortcomings had been identified during the investigation. Also, the written reactions on the safety recommendations did not fully reassure the DSB that the chance of a repeat accident had been minimized. Interesting to note is that in addition to the follow-up assessment of the safety recommendations, the DSB also concluded that one of its safety recommendations was not well worded.

The DSB published a report in 2013 on Odfjell Terminals Rotterdam (OTR) safety during the 2000-2012 period. Odfjell Terminals Rotterdam is a company in the Rotterdam port area that stores hazardous substances on a large scale. In 2012 the company faced an unmanaged safety situation, which led to a shutdown of the entire complex under pressure from the authorities. The DSB investigation report looked not only at the company and the safety deficiencies identified, but also at how the various government services and other parties surrounding OTR responded to the situation. In a series of safety recommendations made at that time, the DSB indicated those areas that could be improved, in addition to measures required to be taken by the parties themselves.

In 2016 the Board decided to conduct a FSRI to determine what action the relevant parties had taken in response to the DSB OTR report safety recommendations, and the extent to which the safety issues had been addressed. The FSRI concluded that all relevant parties had taken steps to address safety deficiencies, including by following safety recommendations from the 2013 Odfjell report. However, the DSB identified some shortcomings, and the FSRI report provided an opportunity to bring attention to them and address further safety actions to the relevant parties.

The DSB conducts FSRI only for a limited number of its investigations that contain safety recommendations. But having the tool of conducting a FSRI on previously made safety recommendations, is in line with the DSB’s ambition to increase the impact and safety gains of its investigations.

The ability for AIAs to follow up on whether safety recommendations have been actioned and safety issues addressed can be limited, depending on their powers relative to their local law. An international framework established by ICAO within which AIAs have more tools available, can assist to effect change and improve aviation safety. Such a framework could consist of a recommended practice that assists States in creating legal powers for their AIA to conduct a FSRI. Such a framework should consider that it may take some time before organisations have implemented the safety recommendation and allow for evaluation if the safety recommendation has addressed the underlying safety risk sufficiently.

FSRI are a useful tool and have several benefits that would assist in improving aviation safety. They can be used to determine if safety recommendations made in earlier aircraft accident investigations have been implemented and if they have, were they effective. The publication of a FSRI report generates additional awareness and highlights to the public,

regulator, and other organisations, if the safety risks identified in the original investigation still exist in the aviation system and if additional action is recommended. A FSRI also provides an AIA an opportunity to review other relevant developments that may have addressed the earlier identified safety risks. It also provides a unique opportunity for AIAs to reflect on the quality of previously issued safety recommendations and assist them in enhancing future safety recommendations they may issue.

In many States the AIA does not have the legal powers to conduct a FSRI into previously released safety recommendations. Creating an international framework in ICAO Annex 13 for FSRI, would assist AIAs in developing their own State legal powers to enable them to conduct FSRI.

'No repeat accidents – ever!'²

DRAFT

² Vision statement for the New Zealand Transport Accident Investigation Commission

References

ATSB (2022). *Wirestrike and collision with terrain involving Robinson R44, VH-HNF AO-02020-040* (p. 26). Australian Transport Safety Bureau.

https://www.atsb.gov.au/publications/investigation_reports/2020/aair/ao-2020-040

BEA (2010). Accident on May 27, 2009 in Montferrier (09) to the AS 350 B3 helicopter registered F-GVCE (p. 15). Bureau d'Enquêtes et d'Analyses Pour la sécurité de l'Aviation Civile. <https://bea.aero/docspa/2009/f-ce090527/pdf/f-ce090527.pdf>

DSB (2012). *Capsized of shell dredger Frisia (HA38), North of Terschelling (Summary)*. Dutch Safety Board.

<https://www.onderzoeksraad.nl/en/page/1541/capsized-fishing-boat-off-the-coast-of-terschelling-14-december-2010>

DSB (2013). *Veiligheid Odfjell Terminals Rotterdam*. Dutch Safety Board. <https://www.onderzoeksraad.nl/en/page/1998/veiligheid-odfjell-terminals-rotterdam-periode-2000---2012>

DSB (2014). Follow-up on the recommendations from the report "Capsizing Frisia". Dutch Safety Board.

<https://www.onderzoeksraad.nl/en/page/3334/follow-up-on-the-recommendations-from-the-report-%E2%80%9Ccapsizing-frisia%E2%80%9D>

DSB (2015). *MH17 Crash*. Dutch Safety Board.

<https://www.onderzoeksraad.nl/en/page/3546/crash-mh17-17-july-2014>

DSB (2017). *Veiligheid Brzo-bedrijven Lessen na Odfjell*. Dutch Safety Board.

<https://www.onderzoeksraad.nl/nl/page/4202/veiligheid-brzo-bedrijven-lessen-na-odfjell>

DSB (2019). *Flying over conflict zones - Follow-up recommendations MH17 Crash*. Dutch Safety Board.

<https://www.onderzoeksraad.nl/en/page/4953/flying-over-conflict-zones---follow-up-recommendations-mh17-crash>

DSB (2021). *Safe flight routes - Responses to escalating conflicts*. Dutch Safety Board. <https://www.onderzoeksraad.nl/en/page/16610/safe-flight-routes---responses-to-escalating-conflicts>

EU (2010). Regulation (EU) No 996/2010 of the European Parliament and of the Council of 20 October 2010 on the investigation and prevention of accidents and incidents in civil aviation ... <https://eur-lex.europa.eu/legal-content/EN/ALL/?uri=celex%3A32010R0996>

Gregson, M. (2017). *What makes a good safety recommendation in the aviation industry?* (p. 2). The University of Nottingham.

ICAO (2020). Annex 13 To the Convention on International Civil Aviation Aircraft Accident and Incident Investigation, Twelfth Edition, July 2020.

Netherlands (2004). Kingdom Act, 2 December 2004, instituting a Safety Investigation Board
https://www.onderzoeksraad.nl/nl/media/inline/2023/4/20/kingdom_act_dutch_safety_board.pdf (Translated from Dutch)

TAIC (2021). *Aviation inquiry AO-2018-005 MD Helicopters 600N, ZK-ILD Engine control malfunction and forced landing Ngamatea Station 14 June 2018* (p. 32). New Zealand Transport Accident Investigation Commission.
<https://www.taic.org.nz/sites/default/files/inquiry/documents/AO-2018-005%20Final%20report.pdf>

Paur, J. (2010). *Sept. 17, 1908: First Airplane Passenger Death*. Wired. Retrieved June 18, 2023, from <https://www.wired.com/2010/09/0917selfridge-first-us-air-fatality/>

DRAFT