

# Measuring and improving safety culture in the aviation industry

*Europe has approximately 40 air navigation service providers employing over 50,000 staff and coordinating up to 30,000 flights a day. Two mid-air collisions, Milan Linate in 2001 and Überlingen in 2002, revealed serious problems in the safety culture of these service providers. **Tom Reader** developed a methodology for systematically measuring safety culture in air traffic management, which has contributed to stronger European air safety.*

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## Impact Case -- Research Excellence Framework (REF)

Poor safety culture is a causal factor in serious aviation accidents.

Safety culture refers to the norms and practices for how risk is managed within an organisation. In a strong safety culture, employees and managers agree on the importance of safety and it is integral to everyday practices such as incident reporting, teamwork, training, and resources. Where such practices are absent, management and employees are less able to identify, discuss, and ameliorate threats to safety, which has severe consequences.

Effective safety management is essential for aviation and air traffic management. Across Europe there are approximately 40 air navigation service providers employing over 50,000 staff and coordinating up to 30,000 flights a day (15,000 during the COVID-19 pandemic). Though fatal accidents are rare, mid-air collisions in 2001 (Milan Linate) and 2002 (Überlingen) revealed serious problems in the safety culture of European air navigation service providers.

## What did we do?

In 2006, EUROCONTROL, the European air traffic management network manager, launched a programme for measuring, evaluating, and improving safety culture across national European air navigation service providers. Initially this project was a collaboration with researchers at the University of Aberdeen led by Dr Kathryn Mearns and supported by me. I led later stages after I joined LSE in 2010.

Safety culture research has traditionally focused on measuring culture qualitatively or through generic surveys, usually within single companies, industries, or countries. The EUROCONTROL project, in contrast, was international and practice focused.

Between 2006 and 2008, we [created a toolkit](#) for identifying and measuring the core components of a “safe culture” in the industry. Through both top-down analysis (using safety culture theory to design and interpret survey items), and bottom-up assessment of survey responses, we designed a questionnaire that captured practices essential for safety management in air traffic control.

We then developed a six-dimension conceptual model of safety culture. These covered: management commitment, collaboration, incident reporting, communication, safety support (resources), and colleagues’ and staff commitment to safety. These dimensions were used to explore safety practices in focus groups, interviews, and discussions with executives in different countries.

Further [survey data](#) from a bespoke questionnaire based on these six dimensions were collected between 2011 and 2013 from air traffic controllers (n = 5,176) and managers (n = 1,230) in 17 countries. The results supported the use of a single conceptual model to explain, interpret, and benchmark safety culture across Europe, which could then generate recommendations for improvement.

Additional research with 13,000 employees in 21 air traffic management centres showed that safety culture is determined, in part, by [national norms](#) for uncertainty avoidance and [tendencies for challenging authority](#). This shows that safety culture can be shaped by factors outside of managerial control; as such, work to improve safety needs to be tailored to different national environments.

Together, this research has created a novel benchmark for safety culture, which can be customised for ensuring safety across the global air traffic management industry. It now represents the standard for measuring safety culture and has subsequently been adapted to the [wider airline industry](#).

## What happened?

This programme has been used by EUROCONTROL to monitor and improve safety management across the European air traffic management industry, and it has been applied by more than 30 national air navigation service providers. For EUROCONTROL it provides a mechanism to engage with national organisations on safety culture, to create a benchmark for monitoring safety and for making recommendations for improving safety at both organisation and industry levels. This is one of the largest ever international and industry-wide programmes of safety culture assessment and development, which received the 2014 Chartered Institute of Ergonomics and Human Factors President's Award.

We have helped national safety providers to run the survey and analyse data for more than 30,000 survey respondents and 1,000-plus focus group participants, which has informed EUROCONTROL's work with national organisations. Most European air navigation service providers have used this methodology, with many also participating in an annual safety culture workshop hosted by EUROCONTROL and attended by LSE researchers.

This process helps organisations to identify both strengths and areas for development in safety management. A [paper](#) by EUROCONTROL detailed the responses of seven large participating organisations, and what they had learnt from the process. Many reported benefits such as improved safety communication, collaboration, and incident reporting. One large organisation, for example, with 500,000-plus flights annually, reported an 80 per cent increase in incident reporting, and significant improvements in the quality of information gathered on safety incidents.

The application of this consistent methodology has helped air navigation providers to develop a coordinated approach to safety culture. CEOs of participating institutions have confirmed the assessment process has helped them to recognise safety culture as essential to operations, which enables them to drive change. Since taking part in the programme's surveys, many air navigation providers now conduct their own safety culture surveys and workshops.

This scientific, coordinated, and collaborative approach to safety culture has since been extended to the wider aviation system. In cooperation with the European Cockpit Association (ECA; the union for European pilots), the safety culture survey has been customised to measure safety culture across the airline industry. In 2016, a sample of 7,000 pilots from more than 30 airlines [completed the survey](#), run by LSE and ECA. The results provided new insights on issues such as zero-hour contracts and ineffective fatigue management. These informed [MEPs' questions](#) on Europe's "ultra-safe aviation industry"; an investigation by the European Commission into the working conditions of airline crews; and European Aviation Safety Agency [recommendations](#) on fatigue management.

Major airlines have also used insights from safety culture surveys. EasyJet, for example, made changes in its schedules and rosters, delivered new training, and created a pilot-peer support programme in response to its safety culture survey. Luton Airport was surveyed by [EUROCONTROL and LSE](#) in 2016, which helped it to bring together 15 organisations across its aviation system and improve coordination. This programme was recognised by a [2018 award](#) from the International Air Transport Association.

Finally, this research is so also becoming influential beyond aviation. The safety culture methodology has been used by the Financial Conduct Authority to shape its thinking on how to effectively conceptualise, measure, and manage culture in the financial industry.



*Notes:*

- *This blog post appeared originally as an LSE Research Excellence Framework (REF) [impact case study](#).*
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