WORKSHOP
BOOKLET

Emerging Trends in Aviation Safety

Second Strategic Workshop
29 August 2023

NATIONAL ACADEMIES *Sciences Engineering Medicine*

TRB
TRANSPORTATION RESEARCH BOARD

NATIONAL ACADEMIES Sciences Engineering Medicine

Workshop Agenda – SUBJECT TO CHANGE

August 29, 2023; Keck Building Room 100; 8:30 AM – 5:00PM

Objective: The workshop discussions will focus on anticipating safety issues for innovations in aviation technology and operations sufficient to inform the safety cases that organizations may ultimately be required to prepare and options that regulators such as the FAA may choose to employ. The committee's interest is in developing methods by which stakeholders and experts representing a variety of perspectives can elicit insights on emerging hazards that have not been captured by other methods.

8:00 – 8:30 AM **Continental Breakfast Available**

8:30 – 8:40 AM **Opening Remarks from the Study Sponsor and Study Chair**

Ms. Kimberly Pyle, Executive Director of the Office of Accident Investigation and Prevention (AVP) at the Federal Aviation Administration (FAA), and Dr. Amy Pritchett will briefly discuss the study tasks and workshop goals.

8:40 – 10:15 AM **Innovator Presentations**

Presentations from SkyGrid, Wisk, and XWing highlighting new or unusual challenges in establishing a safety case that their innovation is facing.

10:15 – 10:30 AM **Break**

10:30 – 12:00 PM **Facilitated Breakout Group Discussions on Safety Cases**

Aerospace Corp facilitates small group discussions based on the innovator presentations.

12:00 – 12:30 PM **Lunch Provided**

12:30 – 1:00 PM **Cross-share Breakout Team Insights and Discuss Afternoon Breakout Focus**

The workshop participants reconvene to share insights on their discussions.

1:00 – 3:15 PM **Facilitated Breakout Group Discussions**

3:15 – 3:30 PM **Break**

3:30 – 4:00 PM **Cross-share Breakout Team Insights**

The workshop participants reconvene to share key insights on their safety case discussions.

4:00 – 5:00 PM **Concluding Discussions Led by Study Chair**

5:00 PM **Workshop Adjourns**

EMERGING TRENDS IN AVIATION SAFETY

Statement of Task

In response to a request from Congress, this project will "identify, categorize, and analyze emerging safety trends in air transportation." The committee will review data and analyses of all relevant sources of information, such as operational data being used by the Federal Aviation Administration (FAA) and the air transport industry to monitor for potential safety concerns; government and industry voluntary aviation safety reporting systems; FAA's annual safety culture assessment; and other sources the committee deems appropriate, including National Transportation Safety Board accident investigations; FAA investigations of accidents and incidents; air carrier incidents and safety indicators; and international investigations of accidents and incidents, including information from foreign authorities and the International Civil Aviation Organization. The committee will assess whether these available sources of information are being analyzed in ways that can help identify emerging safety risks as the aviation system evolves and whether other information should be collected and analyzed for this purpose, such as data on accident precursors. The committee may engage in its own empirical analyses of databases.

The project will focus primarily on commercial air transportation sector, but will also include other current and prospective users of the national airspace system that could pose risks to commercial aviation. The committee will draw on the results of FAA's annual internal safety culture assessments and also advise the agency on data and approaches for assessing safety culture to assure that FAA is identifying emerging risks to commercial aviation and sharing that information throughout the agency and with the public.

The project will produce an initial report in mid-2022, biennial reports through 2030, and a final report in 2031. It is expected that the committee's first report will include a high-level assessment of the efficacy of domestic public and private sources of data and information for identifying and assessing emerging risks and advise on data gaps that need filling. The first report is also expected to include the approach the committee intends to pursue in subsequent biennial reports to assess the robustness of domestic and international data sources and processes for analyzing them for the purpose of identifying emerging risks to commercial air transportation. In addition to documenting its study findings in each report, the committee may offer advice to Congress, FAA, industry, and others on options for improving means for identifying, monitoring, understanding, and addressing emerging aviation safety risks, including supplementing, improving, and harmonizing existing databases, reporting systems, and analysis methods.

During the second phase of the study to produce its first biennial report, the committee may employ strategic foresight method, such as horizon scanning, to demonstrate alternative strategies for identifying emerging trends in aviation safety. While this exercise may reveal previously unidentified or overlooked hazards in commercial aviation, its primary aim will be to reveal whether such methods, including those that seek broad input from diverse parties, have the potential to be applied successfully for this purpose. The study committee is also expected to continue with its in-depth assessment of existing domestic and international data sources and analytic processes as means for identifying emerging risks to commercial air transportation.

EMERGING TRENDS IN AVIATION SAFETY

From the Consolidated Appropriations Act, 2021

SEC. 132. EMERGING SAFETY TRENDS IN AVIATION.

(a) ***General*** *—Not later than 180 days after the date of enactment of this title, the Administrator shall enter into an agreement with the Transportation Research Board for the purpose of developing an annual report identifying, categorizing, and analyzing emerging safety trends in air transportation.*

(b) ***Factors*** *—The emerging safety trends report should be based on the following data:*

(1) The National Transportation Safety Board's investigation of accidents under section 1132 of title 49, United States Code 554.

(2) The Administrator's Investigations of accidents under section 40113 of title 49, United States Code.

(3) Information provided by air operators pursuant to safety management systems.

(4) International investigation of accidents and incidents, including reports, data, and information from foreign authorities and ICAO.

(5) Other sources deemed appropriate for establishing emerging safety trends in the aviation sector, including the FAA's annual safety culture assessment required under subsection (c)

(c) ***Safety Culture Assessment -*** *The Administrator shall conduct an annual safety culture assessment through fiscal year 2031, which shall include surveying all employees in the FAA's Aviation Safety organization (AVS) to determine the employees' collective opinion regarding, and to assess the health of, AVS' safety culture and implementation of any voluntary safety reporting program.*

(d) ***Existing Reporting System*** *– The Executive Director of the Transportation Research Board, in consultation with the Secretary of Transportation and Administrator, may take into account and, as necessary, harmonize data and sources from existing reporting systems within the Department of Transportation and FAA.*

(e) ***Biennial Report To Congress*** *– One year after the Administrator enters into the agreement with the Transportation Research Board as set forth in subsection (a) and biennially thereafter through fiscal year 2031, the Executive Director, in consultation with the Secretary and Administrator, shall submit to the congressional committees of jurisdiction a report identifying the emerging safety trends in air transportation.*

OPEN SOLICITATION TO PRESENT

BACKGROUND

The Committee on Emerging Trends in Aviation Safety is soliciting presentations from organizations proposing to implement novel commercial aviation technologies, operations, and services for which there are not-yet widely established standards in the industry for assuring their safety. These presentations will be the starting point of a workshop discussing new and emerging safety issues in commercial aviation and how safety can be monitored and mitigated. In particular, the workshop will provide a forum for frank discussion amongst industry, regulators and researchers as to the safety cases required to implement novel changes in aviation, and the methods and data required to demonstrate these safety cases and monitor for safety within operations. This event is NOT part of the formal application process for regulatory approval.

This committee is responding to a request to the National Academies from Congress regarding the U.S. commercial airline sector's capability to identify emerging hazards and mitigate them before they result in accidents. The National Academies is acting as a neutral third party to foster dialogue among industry, regulators, and independent experts, and then provide an informed assessment on the challenges of assuring safety during times of innovation and transformative changes in a report to be authored over the next year.

GOALS

The workshop intends to serve both innovators in the aviation industry and the Federal Aviation Administration (FAA) in anticipating safety issues for innovations in aviation technology and operations sufficient to inform the safety cases that organizations may ultimately be required to prepare and options that regulators such as the FAA may choose to employ. The committee's interest is in developing methods by which stakeholders and experts representing a variety of perspectives can elicit insights on emerging hazards that have not been captured by other methods.

WORKSHOP DESIGN

The workshop will be all-day and in-person on **Tuesday, August 29, 2023**. We envision three or four organizations will each present an innovation they propose in aviation technology and/or operations, and the elements they propose in a safety case sufficient to allow their implementation, particularly focusing on those aspects for which the industry, and regulatory guidance, have not yet established standards. The safety case should holistically discuss potential risks associated with the innovation and/or changes in how current risks are protected against, and how they may be mitigated by a range of factors including technologies, operational design, human factors, and organizational performance.

CRITERIA FOR REVIEW OF REQUESTS TO PRESENT

Interested parties are invited to submit an expression of interest to participate that includes a response by email to the criteria described in this paragraph (no more than 1,000 words). The committee will review all expressions of interest and decide which participants to invite. However, the committee will NOT review applications regarding new inventions or services that are entirely conceptual at this stage. Applications should instead discuss innovations sufficiently mature to have a fully developed concept of operations (CONOPS), the essential elements of a safety case, and the key concepts underlying a safety management system (SMS), including how the hazards of on-going operation would be identified, monitored, and mitigated. The workshop will not afford the time to review complete CONOPS, proposed safety cases, or proposed SMSs in detail. Instead, the application should propose a presentation focusing on a new or unusual challenge in establishing a safety case that their innovation is facing. Presentations will not require disclosure of proprietary information. However, applicants must be able to discuss in an open forum key design aspects and assumptions central to the safety case (or challenge in creating a safety case). The committee will select presentations representing a diverse set of innovations to discuss during the workshop. Applicants who are not invited to present may request participating in the workshop, which the committee will consider regarding achieving a balance of perspectives and expertise, and relative to limitations in the meeting facilities. Applicants interested in presenting should contact Lida Beninson of the National Academies (lbeninson@nas.edu) by **July 7, 2023**. To comply with Federal Advisory Committee Act (Pub. L. 92-463), all applications to present at the workshop will be publicly assessable.

REPORT

This workshop is the second of its kind that the committee has hosted to invite open discussions among experts in aviation safety about how to anticipate the hazards that may emerge in the 5-to-10-year future, as discussed in its first report. A proceedings of the first workshop will not be made available, nor will the proceedings of the second workshop. These events will used to inform the committee's second report to Congress in July 2024.

About The Transportation Research Board

The **Transportation Research Board** is one of seven major programs of the National Academies of Sciences, Engineering, and Medicine. The mission of the Transportation Research Board is to provide leadership in transportation improvements and innovation through trusted, timely, impartial, and evidence-based information exchange, research, and advice regarding all modes of transportation. The Board's varied activities annually engage about 8,000 engineers, scientists, and other transportation researchers and practitioners from the public and private sectors and academia, all of whom contribute their expertise in the public interest. The program is supported by state departments of transportation, federal agencies including the component administrations of the U.S. Department of Transportation, and other organizations and individuals interested in the development of transportation.

Learn more about the Transportation Research Board at www.TRB.org.

About Consensus Study Reports

Consensus Study Reports published by the National Academies of Sciences, Engineering, and Medicine document the evidence-based consensus on the study's statement of task by an authoring committee of experts. Reports typically include findings, conclusions, and recommendations based on information gathered by the committee and the committee's deliberations. Each report has been subjected to a rigorous and independent peer-review process and it represents the position of the National Academies on the statement of task.

Statement on Diversity, Equity, and Inclusion

The National Academies of Sciences, Engineering, and Medicine value diversity in our members, volunteers, and staff and strive for a culture of inclusion in our workplace and activities. Convening a diverse community to exchange ideas and perspectives enhances the quality of our work and increases our relevance as advisers to the nation about the most complex issues facing the nation and the world.

To promote diversity and inclusion in the sciences, engineering, and medicine, we are committed to increasing the diversity of the National Academies' staff, members, and volunteers to reflect the populations we serve. We pledge to cultivate an environment and culture that promotes inclusion and values respectful participation of all individuals who help advance the mission of the institution.

Committee on Emerging Trends in Aviation Safety

Chair: Amy Ruth Pritchett
Professor and Head of the Department of Aerospace Engineering
Pennsylvania State University

Committee Members

Cody Fleming
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Iowa State University

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Christopher Hart
Former Chairman
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Maxime Gariel
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Fabrice Kunzi
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NASA Langley

Earl Lawrence
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Coalition of Airline Pilots Associations

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NASA Ames

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ABOUT

AEROSPACE: As an independent, nonprofit corporation operating the only FFRDC for the space enterprise, The Aerospace Corporation performs objective technical analyses and assessments for a variety of government, civil, and commercial customers.

THE CENTER FOR SPACE POLICY AND STRATEGY: The Center for Space Policy and Strategy is dedicated to shaping the future by providing nonpartisan research and strategic analysis to decisionmakers. The center is part of The Aerospace Corporation, a nonprofit organization that advises the government on complex space enterprise and systems engineering problems

STRATEGIC FORESIGHT TEAM: The Strategic Foresight Team housed within the Center for Space Policy and Strategy at Aerospace is focused on cultivating a formalized approach to futures thinking, helping the enterprise adequately prepare its organizations and capabilities to proactively shape the future through innovative approaches across strategy, acquisition, science, and technology portfolio management, policy, and operations. To learn more go to https://aerospace.org/strategic-foresighting or email futures@aero.org.