



October 7, 2019

The Honorable Peter DeFazio  
Chairman  
House Committee on Transportation and  
Infrastructure  
2134 Rayburn House Office Building  
Washington, DC 20515

The Honorable Roger Wicker  
Chairman  
Senate Committee on Commerce, Science, and  
Transportation  
555 Dirksen Senate Office Building  
Washington, DC 20510

The Honorable Sam Graves  
Ranking Member  
House Committee on Transportation and  
Infrastructure  
1135 Longworth House Office Building  
Washington, DC 20515

The Honorable Maria Cantwell  
Ranking Member  
Senate Committee on Commerce, Science, and  
Transportation  
511 Hart Senate Office Building  
Washington, DC 20510

Dear Chairmen DeFazio and Wicker and Ranking Members Graves and Cantwell:

I write to you on behalf of the Human Factors and Ergonomics Society (HFES) regarding our concerns over investigations into the fatal Boeing 737-MAX8 incidents in Indonesia and Ethiopia earlier this year. As scientists and engineers who lead and provide expertise in similar inquiries, we are concerned over issues and questions related to the breadth, transparency, and sufficiency of the investigations on this matter. **HFES urges Congress to establish a fully independent scientific and technical investigation in order to identify the cause(s) of these accidents, prevent their re-occurrence, and provide recommendations to improve the safety culture in aviation.**

With over 4,600 members, HFES is the world's largest nonprofit association for human factors and ergonomics (HF/E) professionals. HFES members include psychologists and other scientists, designers, and engineers, including researchers, practitioners, and federal agency officials, all of whom have a common interest in working to develop safe, effective, and practical human use of technology, particularly in challenging settings. HFES has a particularly strong aviation expertise and network with membership consisting of former Federal Aviation Administration (FAA) employees, pilots, industry representatives, academics, and other aviation experts.

These fatal accidents illustrate extensive issues not only with the 737-MAX8 aircraft, but underlying training requirements, systems design, and equipment testing processes. Awareness of the role these factors played in the accident is deficient. What is known is that – individually or cumulatively – their failure resulted in the loss of 346 lives, the grounding of entire aircraft fleet, and significant economic consequences. At the heart of these accidents are potentially many socio-technical problems including:

- Human-automation integration, as demonstrated by the lack of transparency and understandability of the 737-Max8 MCAS system,
- Requirements for training and presentation of critical information to pilots who are ultimately responsible for maintaining flight safety,

- System design processes in use for analyzing, predicting and preventing catastrophic errors in safety critical systems,
- Automation reliability and resiliency,
- Testing processes for assessing the performance of safety critical automation under various failure modes.
- The flow of information, standards and processes used for certification of new automation systems,
- Organizational factors, including a lack of emphasis on safety and human factors considerations in automaton design decisions, and communication of design changes across the design and certification teams.

An empowered and independent body is required to provide insight into the circumstances of the incidents and establish a set of best practices to ensure they are not repeated. This is consistent with previous incidents of catastrophic technical failures involving the Fukushima Nuclear Plant<sup>1</sup> and the British Petroleum Deepwater Horizon drilling platform.<sup>2</sup> Whether due to mandated scope or jurisdictions, the Department of Transportation (DOT), DOT's Inspector General, and the National Transportation Safety Board (NTSB) investigations are distinct from the historical approach of similar unprecedented incidents.

For example, the NTSB report "*Assumptions Used in the Safety Assessment Process and the Effects of Multiple Alerts and Indications on Pilot Performance*"<sup>3</sup> focuses primarily on issues of communicating automation alerts to pilots. This is only one of many pertinent factors in these accidents that have large implications for aviation safety. Further, the FAA has stated that its own Joint Authorities Technical Review panel will only "complement" the work of the Secretary-appointed expert review committee. These issues and DOT's posture towards industry self-oversight on safety call into question the Department's investigatory transparency on methodologies and procedures used to establish recommendations needed for corrective action. Meanwhile, DOT's Inspector General is limited by its authority to focus solely on the FAA's role in certifying the aircraft, as opposed to a comprehensive review of the underlying factors. No over-arching investigation has been considered that will link issues related to organizational design processes, certification processes and oversight, safety culture, automation design, pilot feedback, processes to ensure effective pilot performance, and others. A comprehensive investigation that seeks answers to issues with the design, testing, safety analysis, and certification process of the aircraft requires the empanelment of an independent board of inquiry. We believe an investigation of technical and regulatory failures with ramifications of unprecedented magnitude and scale are beyond the scope and resources of the NTSB, DOT, and DOT's IG.

**HFES urges Congress to direct the National Academies of Sciences, Engineering, and Medicine's Board on Human-Systems Integration (BOHSI) to conduct an independent investigation into the cause of the accidents and provide recommendations for improving safety culture and safety processes to avoid such outcomes in future. The analysis should be conducted by experts in the areas of human-**

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<sup>1</sup> National Research Council. 2014. *Lessons Learned from the Fukushima Nuclear Accident for Improving Safety of U.S. Nuclear Plants*. Washington, DC: The National Academies Press. <https://doi.org/10.17226/18294>.

<sup>2</sup> National Academy of Engineering and National Research Council. 2012. *Macondo Well Deepwater Horizon Blowout: Lessons for Improving Offshore Drilling Safety*. Washington, DC: The National Academies Press. <https://doi.org/10.17226/13273>.

<sup>3</sup> National Transportation Safety Board (2019). *Assumptions Used in the Safety Assessment Process and the Effects of Multiple Alerts and Indications on Pilot Performance*. Washington, D.C.

**automation integration, aviation safety, safety culture, training, certification, testing, and organizational accidents. Such an analysis would provide a useful roadmap for companies, utilities and government bodies as the country moves forward with increased use of automated systems.**

BOHSI is uniquely positioned to address this issue. Since it became a standing board within the National Academies in 2010, it has issued over 40 independent reports on transportation safety and human-systems integration issues. This includes a comprehensive analysis and investigation of the 2010 Deepwater Horizon accident that spurred safety reforms in the offshore oil and gas industry.<sup>2</sup>

HFES is committed to advocating on behalf of the scientific and technical foundations of its discipline where they intersect with promoting the safety of the general public. As the leading organization representing the human factors field, HFES believes it is critical to the safety of all passengers that a thorough, transparent, and unbiased investigation is conducted. Please do not hesitate to contact us should you have any questions or require additional information.

Sincerely,



Kermit Davis, Ph.D., CPE  
President, Human Factors and Ergonomics Society  
Fellow of HFES, Fellow of AIHA

CC: The Honorable Rick Larsen  
The Honorable Garret Graves  
The Honorable Ted Cruz  
The Honorable Kyrsten Sinema