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EXAMINING RISK MANAGEMENT FAILURES THROUGH COUNTERFACTUAL STUDIES: THE  
CASE OF THE BOEING 737 MAX PROGRAM

**Abstract**

The loss of two Boeing 737 Max aircraft, their 346 passengers and crew in 2017 and 2018 stunned the aerospace community and the flying public. In this paper we will examine the established facts of these cases and through a counterfactual framework attempt to determine if a more rigorous risk management process might have broken the causal chain of the two 737 Max mishaps. To do this requires the creation of counterfactuals that are “plausible —reasonable, believable, and acceptable.” This will require review and discussion of documents, motivation, and underlying constraints on the interaction between Boeing’s Commercial Aircraft Division, Boeing Corporate and the U.S. Federal Aviation Administration (FAA). The review will revisit Boeing internal communications as well as the investigations conducted by the U.S. House of Representatives and the U.S. Department of Justice. A number of 737 Max inherent system safety design failures and operational training assumptions were so glaringly wrong that it may be difficult to tease out the logic used by engineers and managers during the design process. While the 737 Max mishaps are unique they are in some respects similar to the National Aeronautics and Space Administration’s Challenger and Columbia mishaps. Therefore, NASA lessons in culture and constraints (cost and schedule pressure) will be brought to bear to construct the plausible antecedents and counterfactual outcomes for the 737 Max case.