

## **Addressing Unison and Uniqueness of Reliability and Safety for Better Integration**

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### **Abstract**

For a long time, both in theory and in practice, safety and reliability have not been clearly differentiated, which leads to confusion, inefficiency, and sometime counter-productive practices in executing each of these two disciplines. It is imperative to address the uniqueness and the unison of these two disciplines to help both disciplines become more effective and to promote a better integration of the two for enhancing safety and reliability in our products as an overall objective.

There are two purposes of this paper. First, it will investigate the uniqueness and unison of each discipline and discuss the interrelationship between the two for awareness and clarification. Second, after clearly understanding the unique roles and interrelationship between the two in a product design and development life cycle, we offer suggestions to enhance the disciplines with distinguished and focused roles, to better integrate the two, and to improve unique sets of skills and tools of reliability and safety processes.

From the uniqueness aspect, the paper identifies and discusses the respective uniqueness of reliability and safety from their roles, accountability, nature of requirements, technical scopes, detailed technical approaches, and analysis boundaries. It is misleading to equate unreliable to unsafe, since a safety hazard may or may not be related to the component, sub-system, or system functions, which are primarily what reliability addresses. Similarly, failing-to-function may or may not lead to hazard events. Examples will be given in the paper from aerospace, defense, and consumer products to illustrate the uniqueness and differences between reliability and safety.

From the unison aspect, the paper discusses what the commonalities between reliability and safety are, and how these two disciplines are linked, integrated, and supplemented with each other to accomplish the customer requirements and product goals. In addition to understanding the uniqueness in reliability and safety, a better understanding of unison and commonalities will further help in understanding the interaction between reliability and safety.

This paper discusses the unison and uniqueness of reliability and safety. It presents some suggestions for better integration of the two disciplines in terms of technical approaches, tools, techniques, and skills to enhance the role of reliability and safety in supporting a product design and development life cycle. The paper also discusses eliminating the redundant effort and minimizing the overlap of reliability and safety analyses for an efficient implementation of the two disciplines.