

# **A Systems Approach to Designing Complex Systems: Role of Unpredictability**

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## **Abstract**

For generations designers have learnt the iterative methods of designing for the purposes of delineating the failure modes that are known to be common in the earlier versions. Henry Petroski and other researchers have argued that designers must go beyond merely ensuring success. They must strive to anticipate the ways in which a design might fail.

Good designers and successful designs try to build in their designs, methods to mitigate such anticipated failures. Anticipating failures is not an easy task, more so, when designing complex systems. US Defense Secretary's comments became famous and gained recognition at several forums when he tried to distinguish between "known unknowns" and "unknown unknowns". While addressing anticipated failures we need to deal with those that are intended and those that are unintended. This paper will cover the topic of identifying unpredictability in complex systems designs and managing its unintended consequences. The author will draw upon her work from systems engineering in defining unpredictability and its sources.

**Keywords:** Systems Design, Complexity, Unpredictability, Emergence, Unintended, Consequences