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THE POWER OF INTEGRATING DECISIONAL ANALYSIS

Abstract

Know yourself and you will know the Universe and the Gods." (Inscription in the Temple of Apollo, Delphi)

Nowadays, we think about why a rocket fails in any of its phases and despite having actions and elements to mitigate the damage to its payload, in most cases this does not happen or that an airplane equipped with the highest technology and with a cost of millions of dollars, a tragedy is suffered due to a failure in a small element such as a Pitot tube, generating a big question. Is it that the flight computer has made one or more bad decisions?

In principle, a rocket is built as a set of interrelated elements with a common objective, this under the definition of a systemic approach. Each element that makes it up is coupled and tested in the best possible way because "the chain is as strong as its weakest link" and if each element was integrated correctly it is logical to expect that the entire system works correctly and fulfills its purpose in each phase. but this hypothesis ends up being false in many cases. The purpose of my research is to add decisional analysis to the central computer, understanding that a decision is an irreversible allocation of resources and that in flight time, as there are thousands of variables, correctly determining the real scenario can avoid the so-called type III decisional error (reference to type I and II error of statistics) which is efficiently solving the wrong problem with which the allocation of both actions and resources will end up being a bad decision.

For this purpose, a super tree is built in which the possible errors are placed in each node and under a simulation system the branches of the tree are built in order to determine the possible scenarios and generate the so-called suboptimal solutions (the second best) that in summary is that despite operational failures occurring in one of the flight phases, it is capable of making a good decision such as ejecting the payload or using the parachutes before entering the area of severe or permanent damage, reducing material losses and generating significant savings.