IAF SPACE SYSTEMS SYMPOSIUM (D1)
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STATES AND MODES - AN OVERARCHING VIEW INCORPORATING USER NEEDS

Abstract

Why is it so hard to write a consistent state and mode model in a requirement set? Why do we have it in the first place? The experience of the writers is that the concept of states and modes is very hard to get right for all cases, and even harder to make it consistent over the different integration levels. Inconsistencies can potentially lead to mission critical events. A new approach was chosen to look at the problem from a different perspective.

States and modes exist to allow the operator to quickly assess the condition of the system. They do not benefit the system itself, but are a way to introduce logic into its operation. An operator, being a human being, has limited processing power, and has personal preferences in terms of priorities. The complex prioritization required by the system (stakeholders, physical needs, safety, security etc) requires a level of abstraction to guide the operator's actions in order to operate successfully.

In comparison, the human body has the same type of needs, but uses a very efficient method to tell the "CPU", the conscious brain, what condition the system (body) is in. For example, when your toe hits a stone, you feel pain through a low level "interrupt", and this immediately causes the owner of the toe to consciously check the origin of the pain, take corrective action and fix the problem.

The writers of this paper have been working on an analysis that would allow us to change the concept of states and modes to one that allows the operator to intuitively assess the system health. Applying studies on the human needs and using system engineering concepts as an extra dimension ensures a model which, taking all stakeholders into account eventually provides all users (human and systems) to interact in a predictable way with the system in question. This will reduce risk and therefore cost of the system as a whole.

This paper will present a view into the development of a process that will feed the operator with the information needed to take the correct action in any conceivable situation. It will discuss how to determine impact on stakeholders, how to guarantee system survival and how to take translate data in such a way that each operator is guided towards the correct course of action.