Systems engineers must acknowledge the difficulty in creating robust systems and formulate a framework for robust systems development – a framework that includes the development of robust requirements. In addition to nominal system behaviors, robust requirements consider off nominal behaviors due to degradation, failure, or anomalies, and include calculated responses.

**Goal Function Tree**

The method proposed is a top down hierarchal decomposition of system goals called the Goal Function Tree. GFT employs state variables that define the success of the goal as well as the off nominal state. State variables link the physics and behavior logic of the system to the hierarchal decomposition. Exemplified by the inability to achieve system goals moving from the bottom of the tree to the top will mirror the effect of a real-life system failure.

**Impact**

Systems lacking robustness if tested will fail under situations outside of their prescribed environment. A framework that enables the development of robust systems is needed. The GFT provides a path forward in the event of system degradation, the goal of robust requirements. System designers can learn from mission constraints to build margins or systems that overcome those constraints. Mission planners can learn from the GFT the limitations of their system to plan more ideal operations in the future.

**Acknowledgements**

Johnson 2013, Goal-Function Tree Modeling for Systems Engineering and Fault Management

Breckenridge and Johnson 2013, Implementation of a Goal-Based Systems Engineering Process Using the Systems Modeling Language (SysML)