Design for sustainment based on expected reliability

**The Problem:** One of the goals of the design process is to ensure a reliable system. But, reliability targets specified in the design requirements are typically high-level and system oriented. Given system reliability itself is typically defined from the bottom-up there can be a disconnect between component level design and system level requirement, leading to operational risk associated with system availability, maintenance and support costs.

**The Solution:** MADe Reliability Allocation apportions top-level reliability down to the system’s constituent components and parts based upon the system’s use case (or mission profile). This provides granular and actionable reliability requirements for each item. Utilised with the model-based environment of MADe reliability can be tracked and as the design progresses, can be assessed against the as-designed and as-maintained performance of the system.

### Key benefits
- Generation of reliability targets / requirements
- Comparison of requirements to design/operational reliability
- Analysis in context of the mission profile
- Traceable data thread over design and operation lifecycle

### Key features
- Model-based reliability allocation
- Equal and multiple weighted analyses
- Rapidly define system reliability requirement

### How does Reliability Allocation fit into system design?
Reliability Allocation allows high level reliability targets to be broken down and applied to the subsystem, component or part level. Using specific targets as requirements during the system engineering process allows engineers to confidently design or acquire items to meet reliability targets. When items are later integrated into the wider system, less deviations from reliability targets are encountered leading to a reduction in redesign risk and costs.

### Which methods of allocation does MADe support?
MADe provides the following industry standard allocation methodologies:

- **Weighted Allocation methods:**
  - **State of the Art** – Items are ranked based upon level of technological development with undeveloped items being set lower targets
  - **Hardware Complexity** – Items are ranked based on complexity of the physical hardware with complex items being set lower targets
  - **Functional Complexity** – Items are ranked based on the complexity of functions with more complex items being assigned lower targets
  - **Historical Reliability Data** – Items are ranked on historical reliability data providing lower targets to historically less reliable items
- **Equal Allocation** – Item reliability is allocated equally at each level of indenture in order to meet the parent item's target reliability with no weighting or bias

Figure 1: System reliability allocated using hardware complexity as a weighting criteria
Reliability Allocation within the design process

Generating Reliability Allocation Analyses

1) A Reliability Block Diagram (RBD) is created in MADe
2) An Allocation analysis is conducted
3) Allocated values are to the system model as applied targets or baseline reliability state

Comparing operational data to target reliabilities

1) As design of system develops input new data into model
2) Assess expected reliability of the system
3) Run comparison between target and current reliability performance

Reliability Allocation

- Equal Allocation within MADe
- State of the Art, Weighted Allocation within MADe
- Reliability captured within the RBD system structure
- Comparison between target and operational reliabilities

To arrange for a demonstration, please contact us at info@phmtechnology.com
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