

# Mission Planning Analysis using Decision Diagrams

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**Abstract**—Many military and space operations are phased missions, which contain non-overlapping phases. One approach for assessing phased mission system reliability is to apply binary decision diagrams (BDD's). While the BDD is an efficient structure for probability analysis, it cannot accurately represent all aspects of complex systems and processes as it assumes all phases follow binary logic. It is of great interest to ascertain if a system or process is to be successful during the planning and design stage. The concept and assessment of partial success when a system or process is in a degraded state is desirable and an objective of the methods presented here. To address the limitation of current analysis methods, we introduce the application of multiple-valued logic models to phased mission system analysis. These models identify the various levels of system operations and yield more information about the overall system operating states.

**Keywords**—*decision diagram, mission analysis; fault tree analysis; reliability; probability analysis*

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