



**DSI International
presents...**

STAGE

What is STAGE?

- STAGE is a turn-key engineering solution for System Health Management and Support, providing simulation-based assessments of the combined effects of different approaches to Design, Test, Diagnostics, Prognostics, Maintenance and Support.



STAGE

STAGE Benefits

- Provides information for Business Case Decisions
- Assures rapid turnaround and high confidence of Trade Studies
- Supports the reuse of Diagnostic Engineering data within multiple applications



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Why choose STAGE?

- Because STAGE has been specifically designed to simulate System Health Management and Support, it can easily outperform custom simulation solutions (which may require hundreds of hours to set up).



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DiagML—Your Ticket to STAGE

- Design, Diagnostic and Maintenance data are all loaded into STAGE using DiagML—the format used by *eXpress* to export diagnostic data—thereby greatly reducing the effort needed to set up a simulation study in STAGE.



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STAGE Managing

- Because all calculations performed by STAGE are scripted, analysts have complete control over the assessments performed.
- Because STAGE's simulations are based on phase modeling, analysts will also have full control over the nature of the simulation itself.



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Simplified Setup using Libraries

- Calculation Script Library
 - Scripted Calculations for Common Metrics
 - Parameter-based Control of Calculation Scripts
 - Mission Profile Library
 - Phase Definitions for Common Simulations
 - Mission Success Criteria
- ❖ DSI can supply custom scripts and/or mission profiles for customer-specific applications



STAGE

STAGE, ACT I

The Initial Release

The word "STAGE" is rendered in a large, bold, 3D font. The letters are yellow with a gradient to orange and have a dark shadow underneath. The background is a dark blue/purple gradient with a grid of glowing lines and a reflection of the word on the surface below.

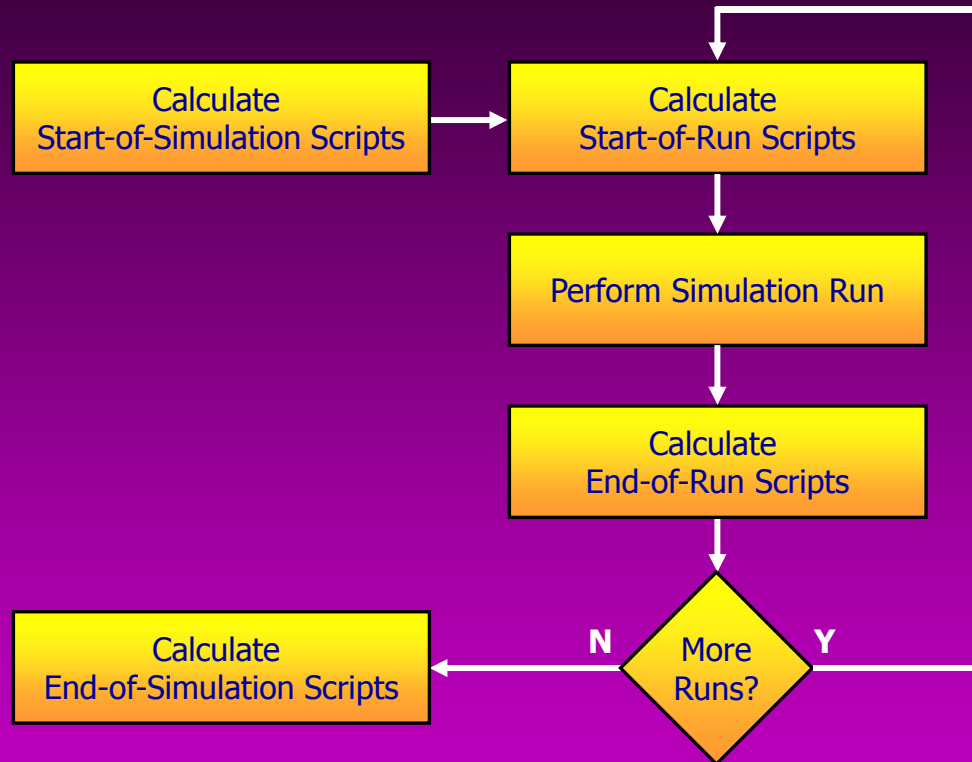
STAGE Simulations

- Discrete Event Simulation / Monte-Carlo Process
 - Failure Events
 - Diagnostic/Prognostic Events
 - Maintenance Events
- Simulation Control Options
 - Number of Simulation Runs
 - Length of Each Simulation Run
 - Simulation Seed



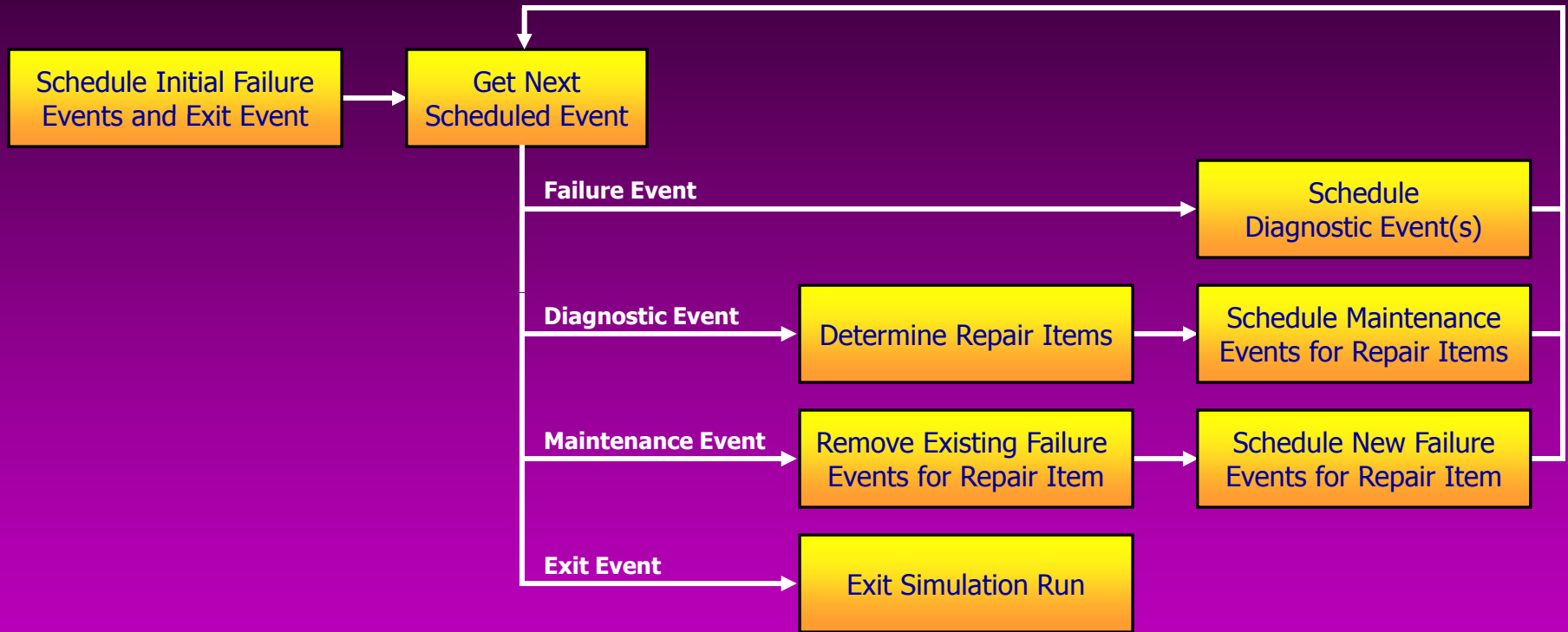
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Basic STAGE Simulation



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Basic STAGE Simulation Run



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STAGE, ACT I – Capabilities 1

- Simulation-based Logistical Analysis
 - Reliability, Testability, and Maintainability Metrics
 - Statistics Mapped over Time
 - Probability Distributions Accounted for in Calculations
 - Maintenance-Driven Deferment of Failure



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STAGE, ACT I – Capabilities 2

- Simulation-based Failure / Replacement Metrics
 - Failure Severity over Time, etc.
 - Failure Frequency over Time (by Item or by Fault), etc.
 - Spare Consumption over Time, etc.



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STAGE, ACT II
(coming December 2008)

Phase Modeling



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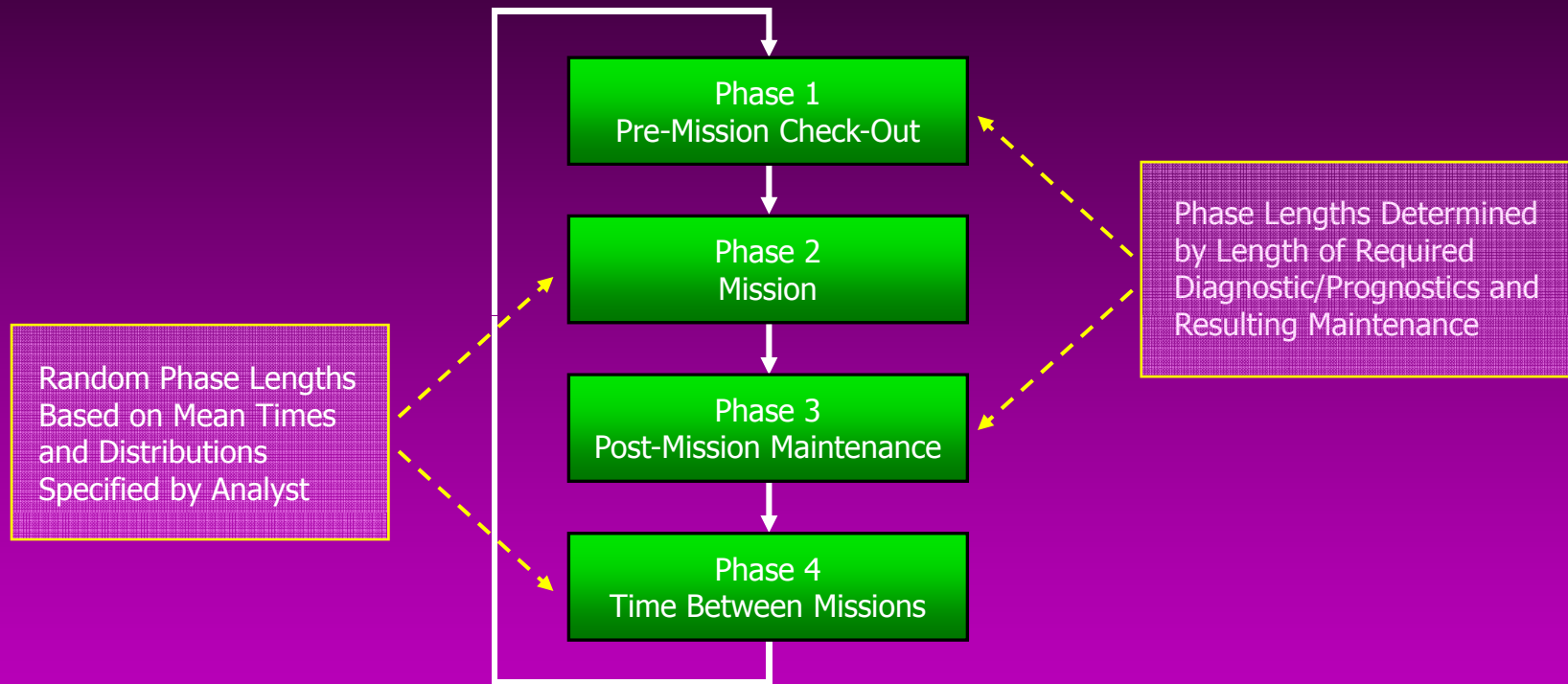
Phase Modeling - Concepts

- User-Specified Phases/Phase Transitions
- Random Phase Lengths (based on Distribution/Mean)
- Failure Rates can be modified as Phases shift
- Diagnostics/Prognostics associated with specific phases
- Maintenance actions constrained to specific phases
- Phase Transitions can be constrained by Current Failures



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Phase Modeling – Support Phases



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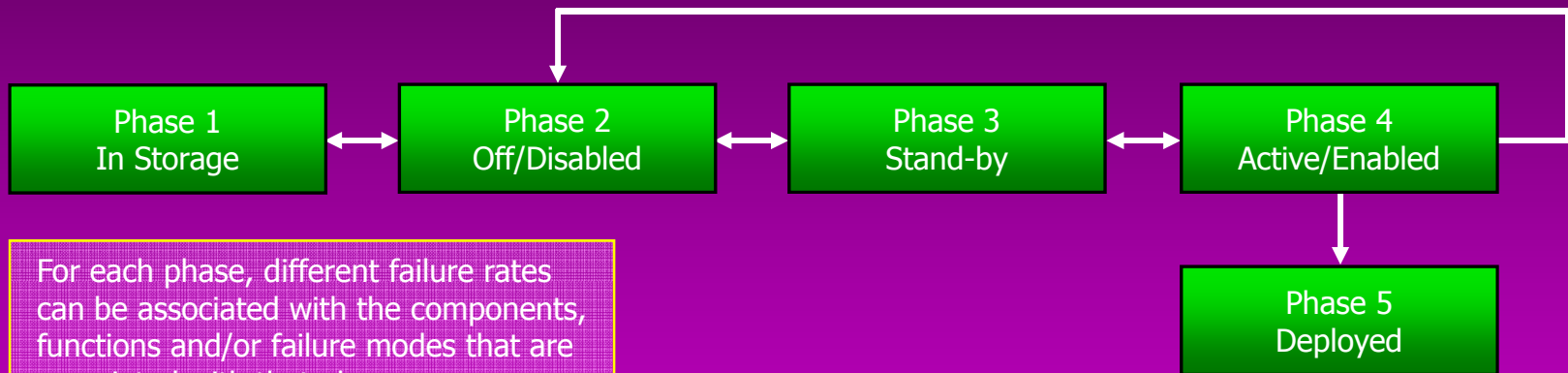
Phase Modeling – Support Phases

Phases	Failures	Diagnostics	Maintenance
Phase 1 Pre-Mission Check-Out		Pre-Mission Diagnostics "Readiness" Prognostics	Priority Maintenance
Phase 2 Mission	Changing Failure Rates (based on Mission Profile)	Embedded Diagnostics Crew Diagnostics	System Reconfiguration Modify Mission Objectives
Phase 3 Post-Mission Maintenance		Ground Diagnostics "Prevention" Prognostics	Ground Maintenance
Phase 4 Time Between Missions	Reduced Failure Rates		Scheduled Maintenance

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Phase Modeling – Usage Phases

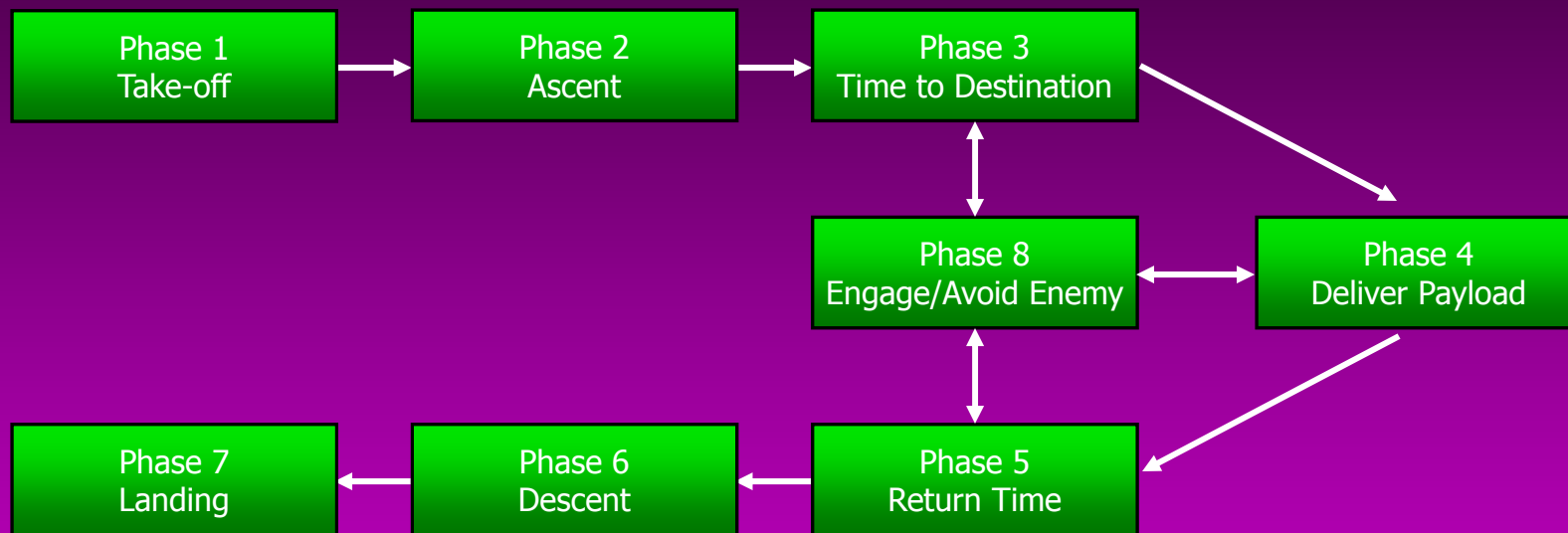
When a phase has multiple, alternative phases to which it can transition, the analyst can define the relative likelihood to be associated with each transition.



For each phase, different failure rates can be associated with the components, functions and/or failure modes that are associated with that phase.

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Phase Modeling – Mission Phases



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STAGE, ACT II – Capabilities 1

- Trade Studies comparing Different “Mixes” of Health Management and Support Techniques
 - Embedded Diagnostics
 - Pre- and Post-Mission Maintenance
 - Prognostics
 - Scheduled Maintenance



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STAGE, ACT II – Capabilities 2

- Prognostics Analysis
 - Percentage of Failures Prognosed (over Time), etc.
 - Degree Mission Readiness is Impacted by Prognostics, etc.
 - Impact of Premature Replacement (due to Prognostics) upon Inherent Availability / Cost of Ownership, etc.
- Simulation-based Maintenance Schedules



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STAGE, ACT II – Capabilities 3

- Phase-Driven Support for Operating Modes
 - Exclusion of Certain Failures during Certain Phases (Subsets)
 - Failure Rate Modification based on Operating Mode (Duty Cycles)
- Support for Double Simulations
 - Calculate the Delta between Two Mixes of Combined System Health Management and Support Techniques



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