Space Cyber Metrics

Steve Parr  
Branch Supervisor  
Information Systems Branch – SI

PIs: Tara Anderson, Eric Klatt

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Agenda

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Executive Summary

- This presentation describes
  - Space Cyber Metrics research and development efforts at the Johns Hopkins University Applied Physics Laboratory

- This work defines a common set of system- and mission-level Space Cyber metrics

- Common metrics allow architectures to be evaluated and traded off

- Metrics facilitate higher reliability against cyber-attacks and increasing survivability
  - Thereby enabling mission success.
Goals

- Define a framework for architecture definition in the cyber domain
  - Refine use cases
  - Define system-level metrics
  - Define mission-level metrics
  - Create models to link the above

- Assess system compromise impact to mission performance through federated modeling
  - Leverage cyber & space modeling
  - Reduce reliance on qualitative analysis by imposing systems engineering process on the space cyber problem
Benefits

 A common set of metrics provide a foundation and up front systems engineering rigor

 Enables modeling of space cyber that is currently unavailable to acquisition, operational and strategic decision makers

 Allows architecture trades to define robust capabilities and increase survivability enabling mission success
Space Cyber Metrics Model Flow
System Architecture

Generalized architecture for basic modeling efforts

Easily refined for more specific situations
Use Cases

Use cases determine what needs are affected by a system change.

Failure of a use case is traced to a related performance metric.
System and Mission Measures of Effectiveness

Systems are defined by mission performance

Performance is broken into standard system engineering measures of effectiveness

System effects are traced to the overall effect on the mission
Milestones

- Identify system and mission metrics
- Refine use cases
- Define algorithms for mission impact analysis
- Assess metric and model performance
Progress

- Identified 2 mission sets
  - Communications
  - Sensing

- Defined top-level architecture for mission sets and built out space components using a visualization tool

- Identified preliminary set of system and mission MOEs for the mission sets

- Identified hardware in the loop simulator for practical applications