Annual Report: IMT002 - Deployment Logistics Planning Optimization

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Statement of the Problem: The Logistics Common Model (LCOM) is system engineering and supportability analysis simulation tool that provides a composite assessment of weapon system capabilities based on reliability, maintainability, and supportability characteristics. LCOM models the interactions among operations, maintenance, and supply and tracks over 140 built-in statistics, such as sortie generation rate (SGR) and resource utilization rates. LCOM is both a legacy model, (300,000 source lines of Simscript) and an evolving model (currently being enhanced through the addition of GUIs) with new capabilities being added as requirements are defined. It is the model of choice within the defense community for supportability analyses, but such analysis usually takes several weeks to complete and this time frame needs to be reduced to one or two days to fully impact acquisition and planning operations.

Method of solution: The project team, NCSA- ASC/ENM, completed in FY01 a PET-1 funded project that developed an LCOM optimization strategy (procedures, policies, and algorithms), and performed verification testing for procedures that minimizes the number of spares and manpower resources needed to meet multiple Sortie Generation Rate (SGR) constraints. In the current effort, our objective is to implement the infrastructure components needed to bring current capabilities into general DoD use and demonstrate optimization runtimes of one to two days.

Ac**complishments:** The LCOM package is a Monte-Carlo style queuing simulation which operates only on Sun Unix and PC platforms and only in a single processor mode. Currently, we have enhanced our optimization capability using HPC style computer hardware, without requiring the LCOM source code to be modified by utilizing the National Center for Supercomputing Applications (NCSA) Secure Active Metadata Catalog (SAMCat) software to

script execution of LCOM code, to mask the complexity of input/output operations, and to allow the optimization wrapper to operate independently of the LCOM simulation.. This approach successfully generated efficient parallel operation for either a small number of processors, < 10, each running an optimization sub-problem or for larger number of processors, > 100, each running individual LCOM runs on a single Monte-Carlo seed. This approach was successful in meeting our objective of reducing optimization execution times to the one or to day level.

In addition, the our wrapper approach is sufficiently generic that it can be applied to any simulation package that can be configured to communicate through normal input/output mechanisms such as network connections, files, pipes, or shared memory connections.

Plans: In the remainder of the contract period, we will complete development of a simplified user interface to the optimization wrapper, develop a web-based distribution capability for the wrapper software, and develop new user guides and training materials for the optimization package. This training package will allow users beyond the development team to benefit for the enhance LCOM optimization capabilities.

DoD Impact: The LCOM optimization wrapper provides weapon system Single Managers (SM's) new tools to determining an appropriate maintenance concept that provides the greatest logistics performance for their weapon system in a greatly shortened time frame. They can prioritize investment alternatives and then invest in those areas, which they believe can provide the biggest "pay-back" for their dollars invested. In addition, optimal weapon system deployment packages, spares and maintenance requirements, can be determined in days rather than weeks.