S&T Campaign: Computational Sciences
Tier 2 Advanced Computing Architectures

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Research Objective

• Refine and demonstrate advances in computer science that support the development of Modeling & Simulation (M&S) architectures required to support the M&S Communities (Acquisition, Test & Evaluation, Intelligence, Experimentation, Analysis and Training) in the future.
• Research under this effort is a forward looking approach, working to identify concepts for investigation that will be used to accomplish Army M&S 3-5 years in the future.

ARL Facilities and Capabilities Available to Support Collaborative Research

• ARL HPC infrastructure
• Numerous legacy Army and Department of Defense simulations for use in demonstrating new computing concepts
• Access to models and unclassified empirical data for incorporation into new simulation architectures
• Geographically distributed networking infrastructure to demonstrate new computing concepts over long haul networks
• Subject Matter Expertise covering all six M&S Communities

Challenges

• Existing simulation systems are black boxes that interface externally allowing internal computations to be non-standard between model representations, introducing fair fight issues and additional inconsistencies
• A service-oriented concept or functional programming paradigm may introduce scalability disruptions as the scale and complexity of what is to be simulated is increased
• Current authoring approaches make simulation a specialized discipline vice being able to better incorporate model developers and domain experts input through easy to use interfaces in the creation of a simulation environment and execution

Complementary Expertise / Facilities / Capabilities Sought in Collaboration

• Computing architecture concepts and application to the M&S domain
• Computational expertise for exploring distributed computing concepts
• Methods to provide multi-resolution M&S to diverse user interfaces without introducing fair fight issues and other simulation inconsistencies
• Computing techniques relevant to real-time and non-real-time complex M&S
• Relevant non-military M&S expertise and simulation architecture concepts

The Future Army Training Concept Desires a Paradigm Shift From Simulations Interoperating to a Single Synthetic Environment