



U.S. ARMY  
**RDECOM**

Novel Applications for Advanced and Tactical  
High-Performance Computing

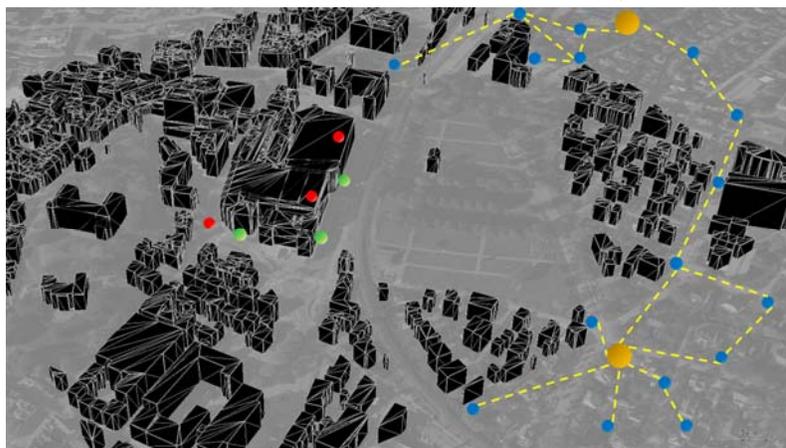
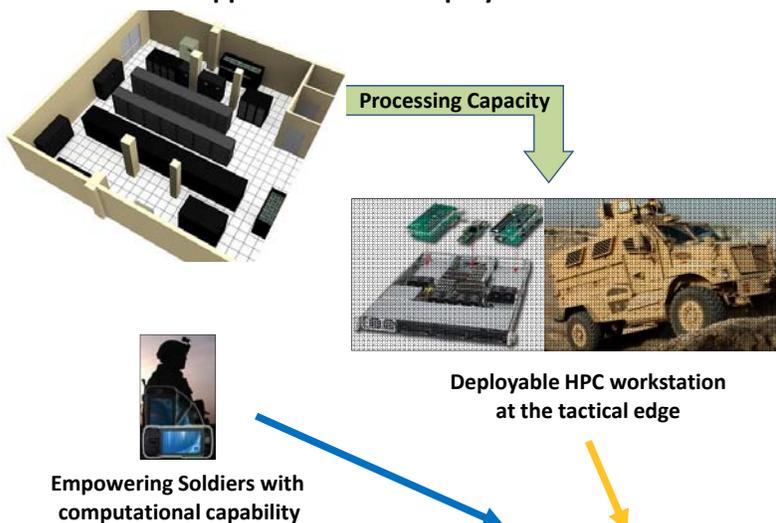


## S&T Campaign: Computational Sciences Computing Sciences

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### Research Objective

- Deliver enabling computational capabilities (situational awareness, in-situ data processing, real-time analysis, cognitive computing, modeling) with mobile supercomputing at the tactical edge
- Innovate applications for a deployable HPC-in-a-box



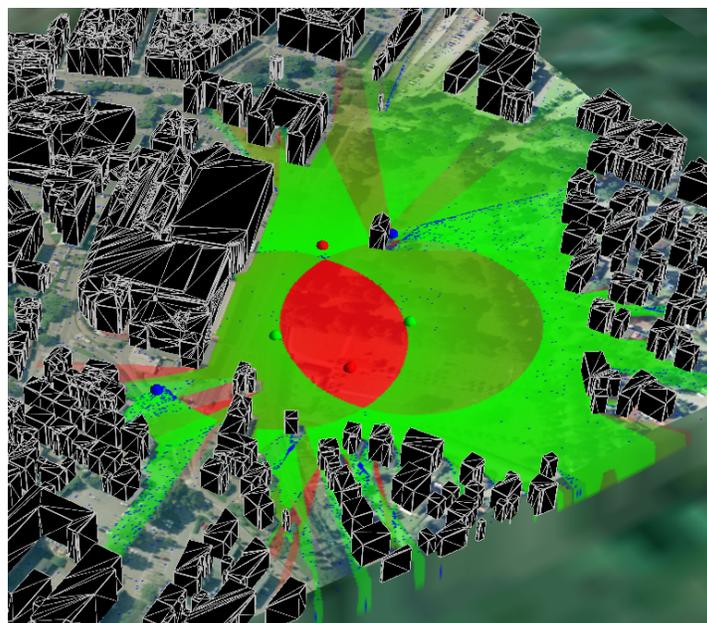
Tactical edge is complex, uncertain, and dynamic, hence a big potential exists for real-time on-field processing.

### Challenges

- Effective programming model amid hardware specialization
- Performance portability in emerging architectures and for future systems
- Aggregate computing with heterogeneous collection of compute resources

### ARL Facilities and Capabilities Available to Support Collaborative Research

- Experimental systems
  - 64-node Xeon Phi/Kepler cluster
  - Nvidia Tesla cluster (456 GPU cards)
  - ARM server
  - Epiphany Parallella boards
- Publication
  - Richie, D.A.; Ross, J.A.; Park, S.J.; Shires, D.R., "Ray-Tracing-Based Geospatial Optimization for Heterogeneous Architectures Enhancing Situational Awareness," in *Computational Science and Engineering (CSE), 2013 IEEE 16th International Conference on*, pp.81-86, 3-5 Dec. 2013
- Capability of calculating the line-of-sight cooperative reconnaissance under ballistic threat demonstrated leveraging four GPU accelerators



Demonstrated compute intensive ballistic threat geospatial optimization at interactive speed.

### Complementary Expertise/ Facilities/ Capabilities Sought in Collaboration

- Integrating HPC and data analytics
- Failure aware software
- Advanced memory technologies