Time-Sensitive & Distributed Data Analytics

S&T Campaign: Computational Sciences
Data Intensive Sciences

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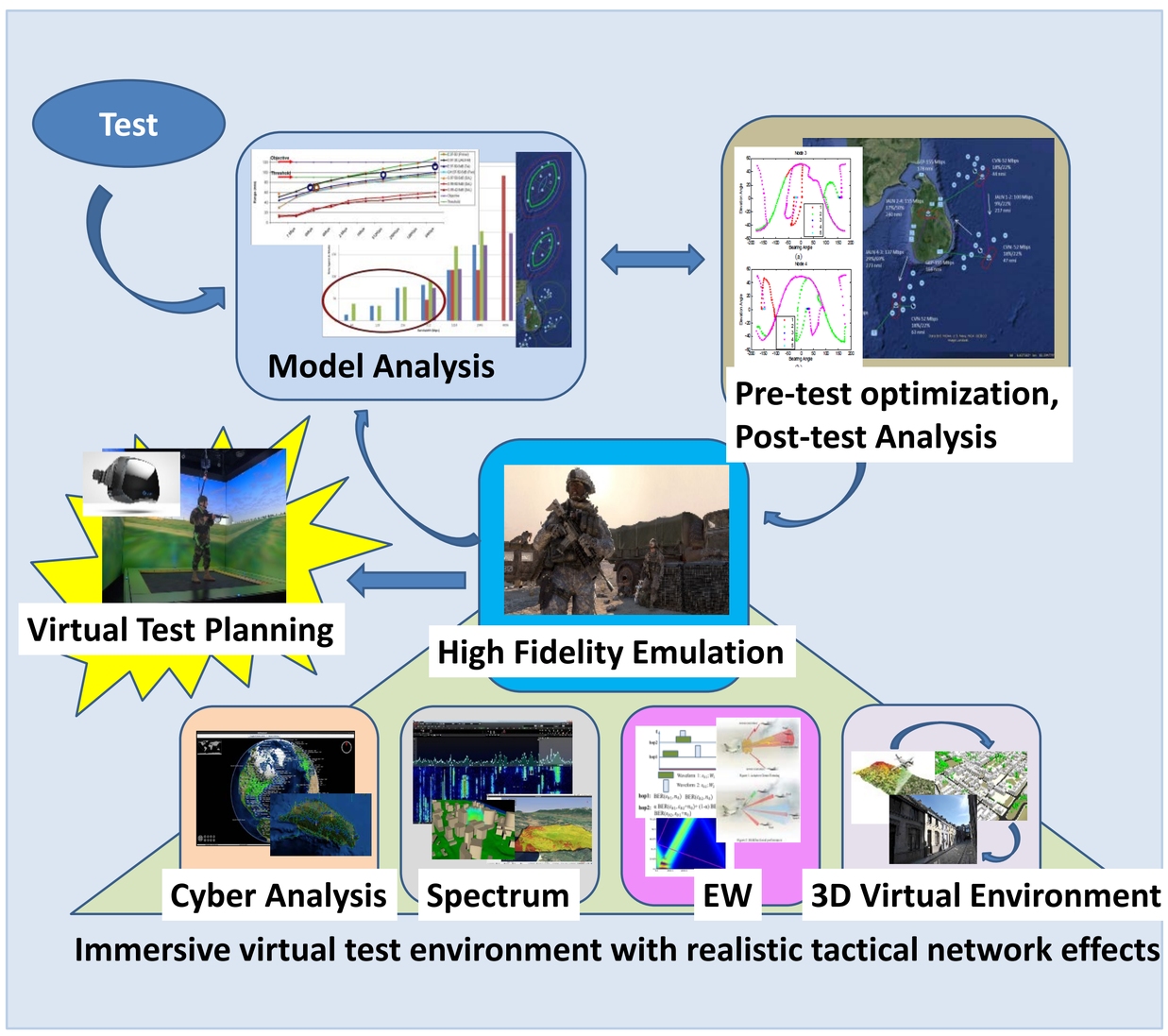
Research Objective

- Investigate approaches for real-time data validation for quantitative and subject test data
- Apply stream processing for time-critical data analysis and evaluation
- Employ machine learning for object identification and classification
- Improve data archiving for more effective discovery and reuse



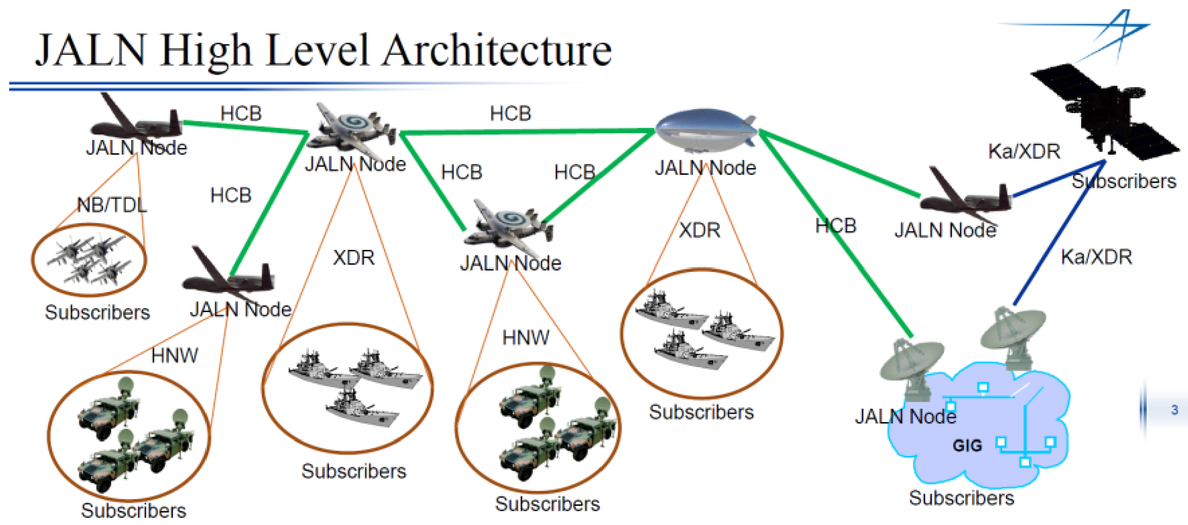
Immersive virtual test environment with realistic tactical network effects

Challenges

- Must be responsive to three disparate time scales:
  - Real-time ~ milliseconds
  - Time-critical ~ seconds
  - On-demand ~ minutes to hours
- Integrating highly heterogeneous and distributed platforms
- Minimize human-in-the-loop for automatic data validation
- High accuracy time synchronization and geo-registration
- Automated metadata generation
- Integrating machine learning with quantitative data analysis

Facilities and Capabilities Available to Support Collaborative Research

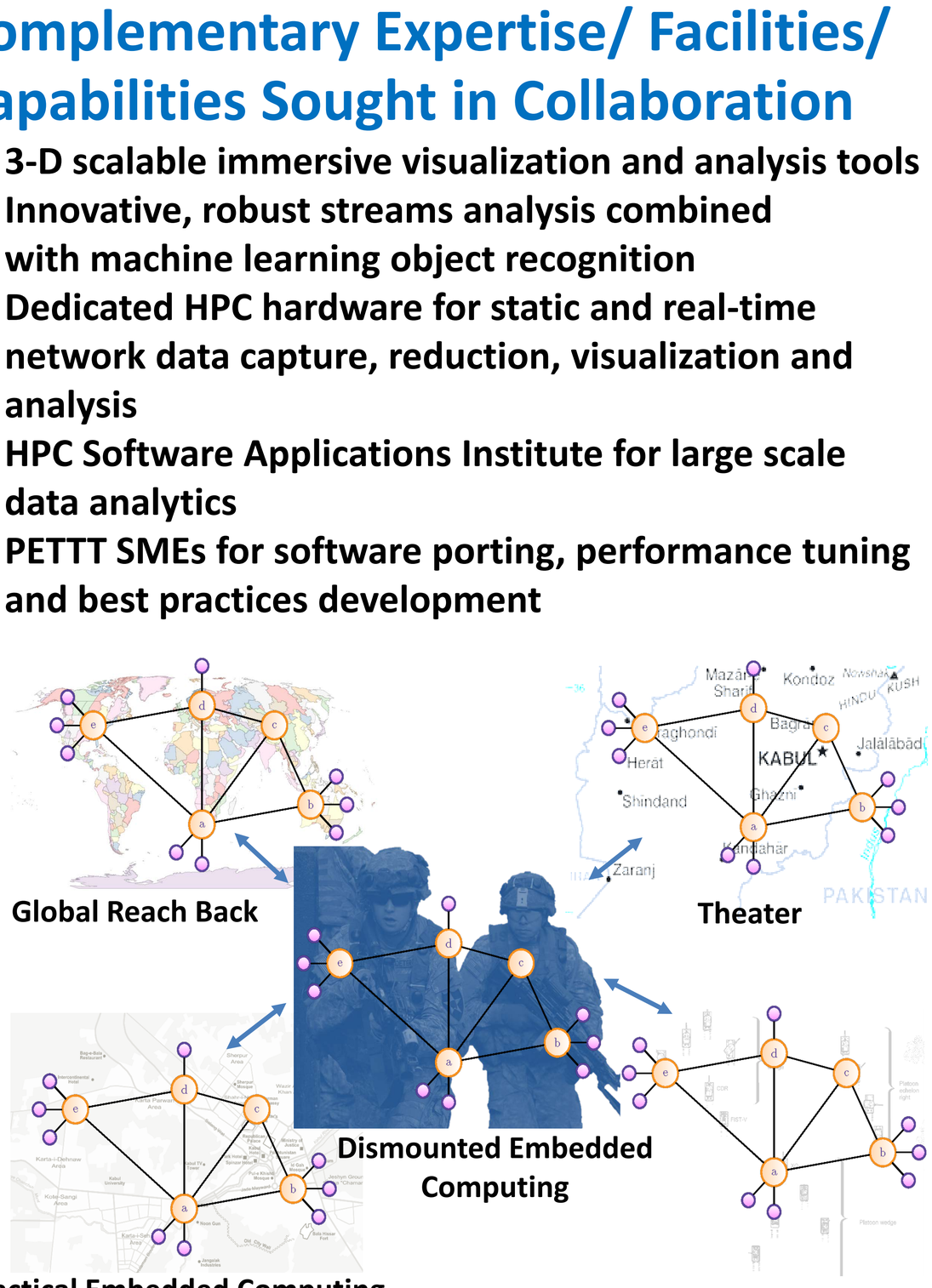
- HPCMP/ARL-DSRC supercomputer facility DSP (Dedicated Service Partition) provides computation and storage
- Spark open source stream processing software
- Unclassified and Classified computing environments depending on sensitivity of data being analyzed
- Neuromorphic computing laboratory for machine learning
- EMANE high fidelity event simulation in lieu of live events



Notional scenario using Joint Aerial Layer Network (JALN) example

Complementary Expertise/ Facilities/ Capabilities Sought in Collaboration

- 3-D scalable immersive visualization and analysis tools
- Innovative, robust streams analysis combined with machine learning object recognition
- Dedicated HPC hardware for static and real-time network data capture, reduction, visualization and analysis
- HPC Software Applications Institute for large scale data analytics
- PETTT SMEs for software porting, performance tuning and best practices development



Data analytics produced by tactical, operational, and strategic sources

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