



AFCEA TECHNET LAND FORCES EAST

**“Toward a Tactical
Common Operating Picture”**

LTC Paul T. Stanton

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***“Transforming Cyberspace While at War...
Can’t Afford Not To!”***

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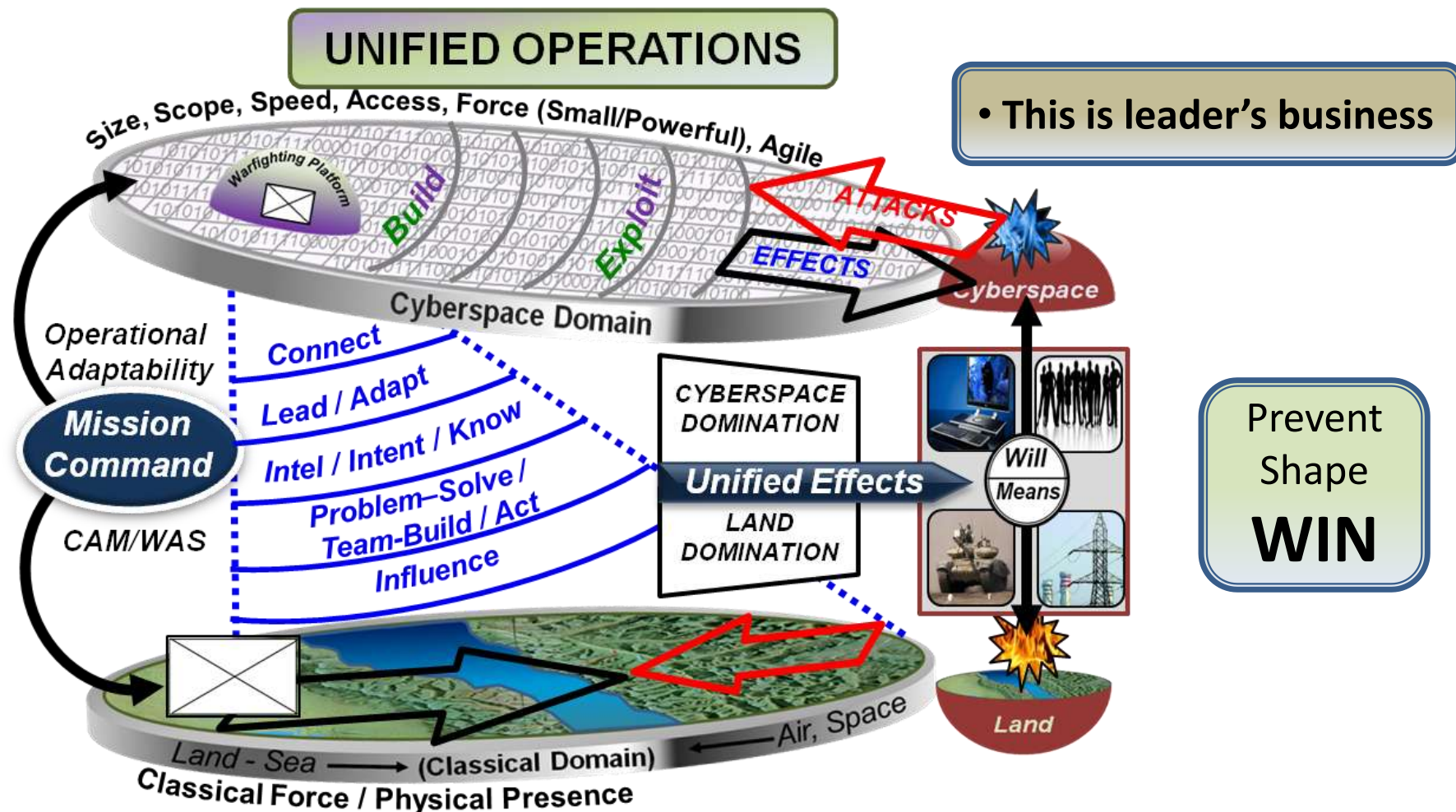
- Why a new COP?
- Unified Land/Cyber operations
- Distributed analytics and COP
- Consistency and commonality
- Considerations for tactical edge
- Questions and discussion



- Operations in the Unified Land/Cyber domain require effective Mission Command
- Mission Command is enabled by analyzing and visualizing the operational environment to provide **situational understanding** that supports **leader decision-making** in real-time
- Existing approaches lack integration

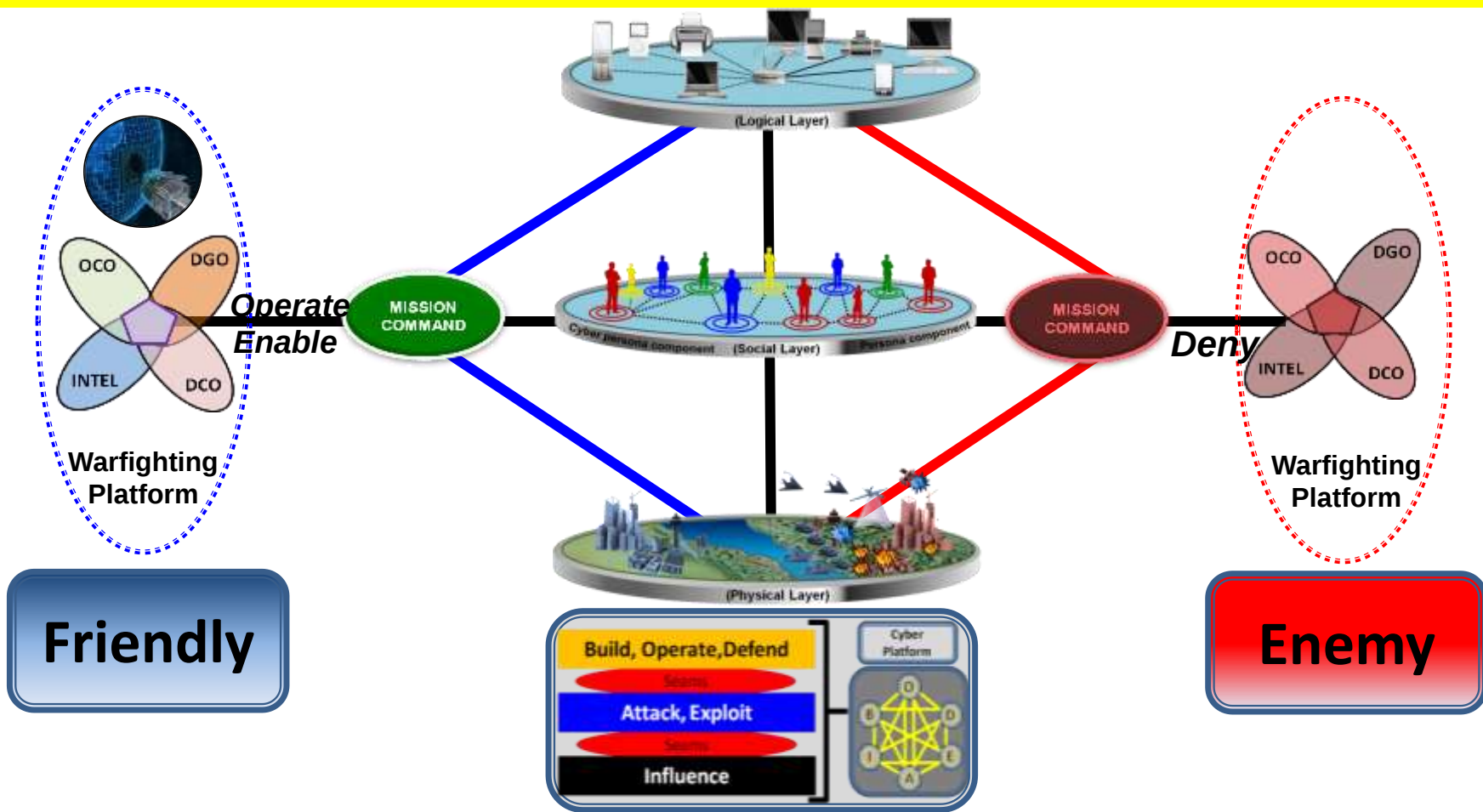
“Mission command supports our drive toward operational adaptability by requiring a **thorough understanding of the operational environment...**”

- GEN Dempsey



Mission Command applies **unified force** (Land and Cyber) to establish optimal combination of effects to achieve objectives

"Second to None!"



- Treat the network as a Weapon System
- Embrace cyberspace as a contested domain
- Strong 2-3-6 integration

"Second to None!"



Adversary

- Malware
- Malware developers
- Malware protocols
- Exploits
- Exploit developers
- Origin networks
- Callback domains
- Botnets
- Compromised credentials
-

Political
Military
Economic
Social
Information
Infrastructure
Physical Environment
Time

Common

- Hosts
- Network Infrastructure
- Operating system
- Applications
- Architecture
-

Friendly

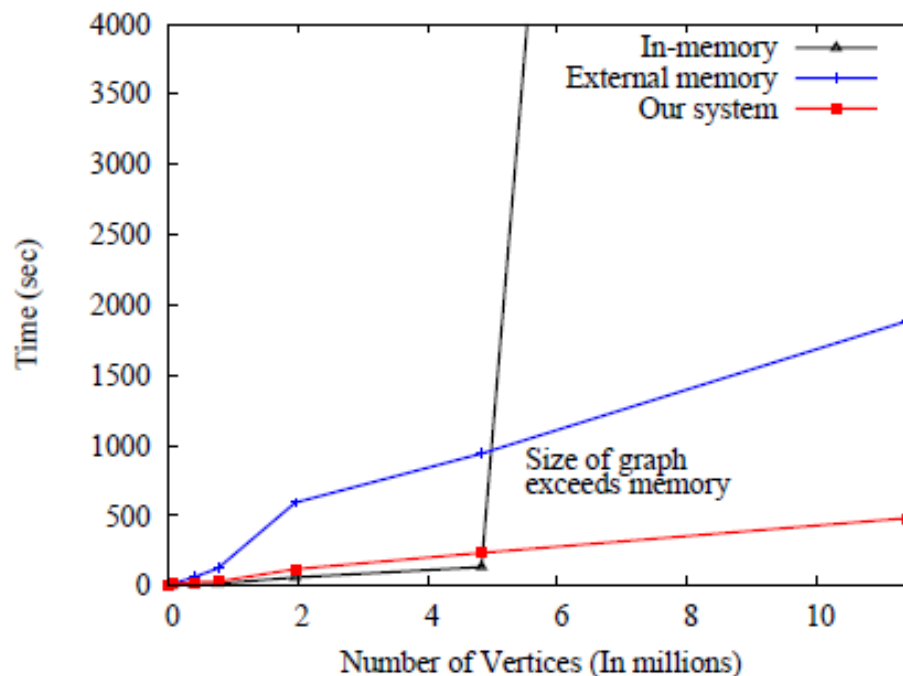
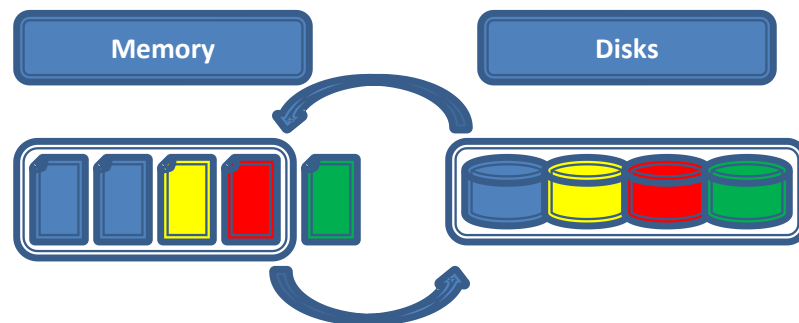
- Host-based protection
- Sensors
- Offensive capabilities
- Incident responders
- Users
- Perimeter protection
- Points of presence
- Operators
- Passwords, CAC, PKI
-

Big data, complexity of interaction / relationships

“Second to None!”



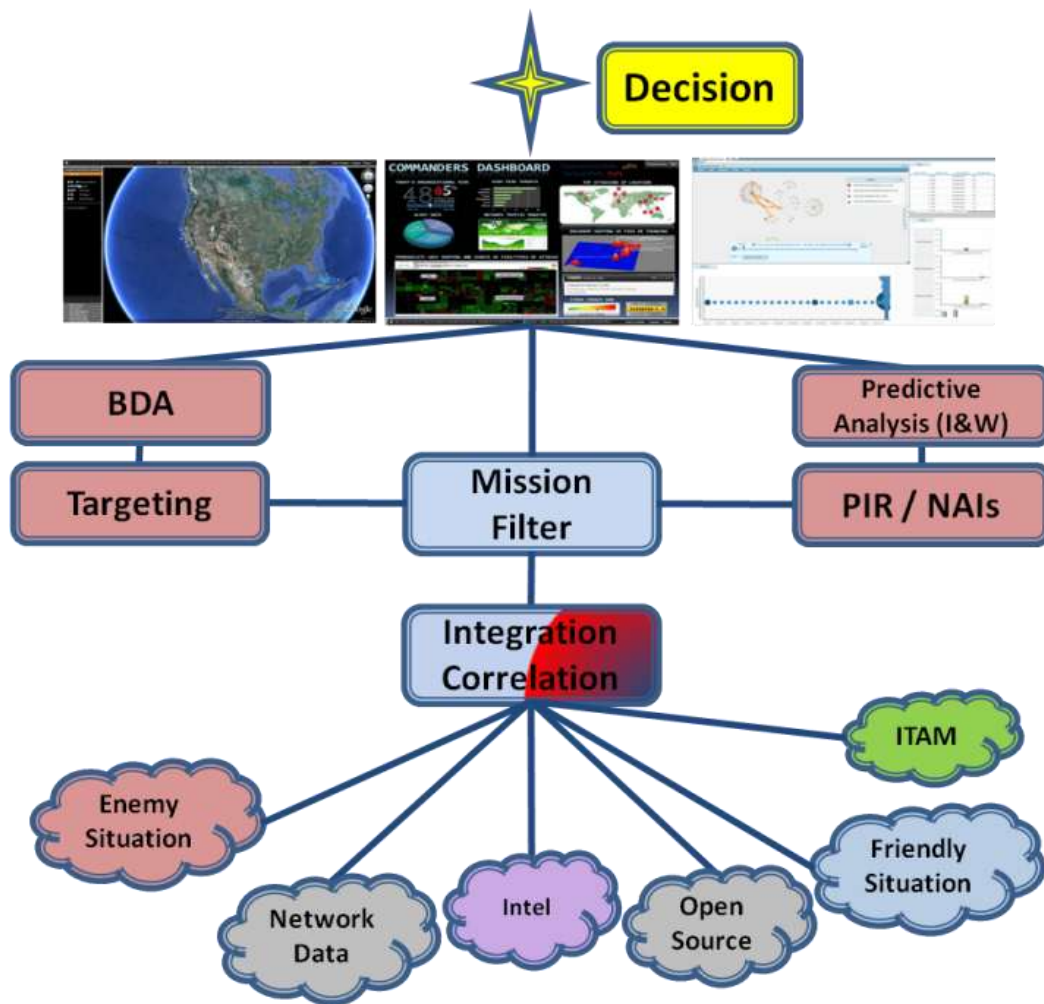
- “Seeing” the battlefield requires cloud Big Data analytics
 - Terrain is data
 - Terabytes daily, petabytes of historic data
 - Distributed data collection and computation
- Cloud vs Database
 - Databases optimize storage efficiency
 - Cloud uses “cheap” hardware to process in parallel





Visualization that supports leader decisions

• This is leader's business

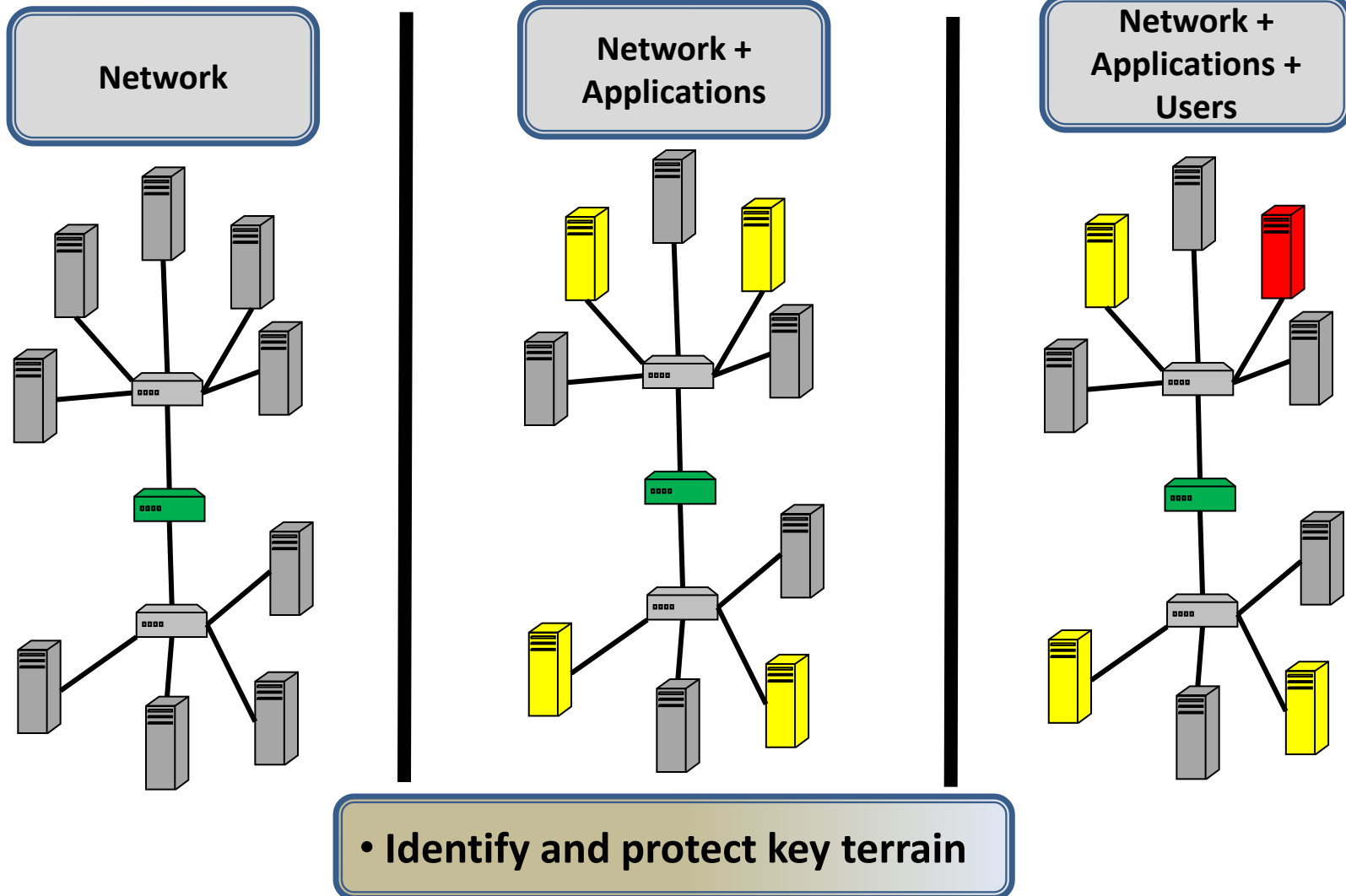


“Mission command emphasizes the importance of context ...”
- GEN Dempsey

“Second to None!”



- Mission focused overlays





"It really is the commander's *coup d'ceil*, his ability to see things simply, ... that is the essence of good generalship." -- Clausewitz

Indicators & warnings

The diagram illustrates a causal network for a car, showing the relationships between various components and their states. The nodes and their associated data are as follows:

- Main fuse**: avg: 90.0, std: 10.0, fault: 0.0
- Battery age**: avg: 40, std: 40, fault: 0.0
- Alternator**: avg: 90, std: 10, fault: 0.0
- Charging system**: avg: 40, std: 40, fault: 0.0
- Distributor**: avg: 90, std: 10, fault: 0.0
- Voltage at plug**: avg: 17.5, std: 1.5, fault: 0.0
- Battery voltage**: avg: 17.5, std: 1.5, fault: 0.0
- Spark plugs**: avg: 17.5, std: 1.5, fault: 0.0
- Headlights**: avg: 17.5, std: 1.5, fault: 0.0
- Spark switch**: avg: 17.5, std: 1.5, fault: 0.0
- Fuel system**: avg: 90, std: 10, fault: 0.0
- Air filter**: avg: 10.0, std: 10.0, fault: 0.0
- Air system**: avg: 90, std: 10, fault: 0.0
- Spark filter**: avg: 90, std: 10, fault: 0.0
- Starter system**: avg: 90, std: 10, fault: 0.0
- Car starts**: avg: 40, std: 40, fault: 0.0
- Car stalls**: avg: 90, std: 10, fault: 0.0

The network shows how these components interact, with arrows indicating the direction of causality. For example, the Main fuse and Battery age influence the Voltage at plug, which in turn affects the Spark plugs and Spark switch. The Spark switch and Fuel system both influence the Car starts node.



Msn Manager

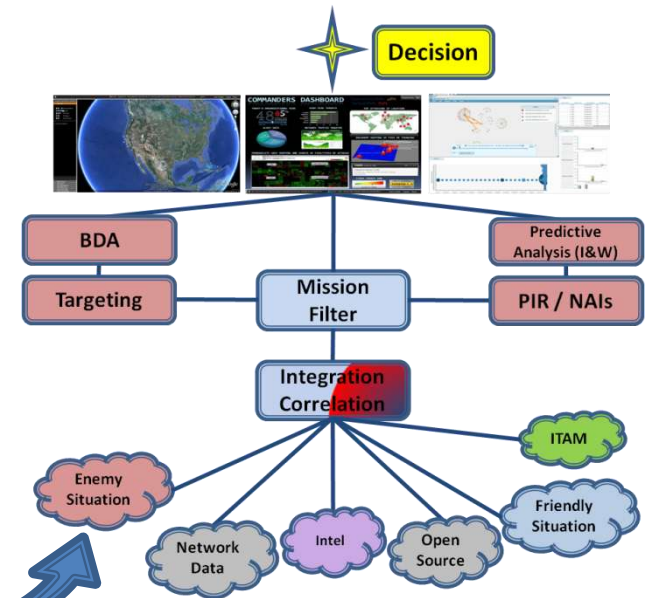
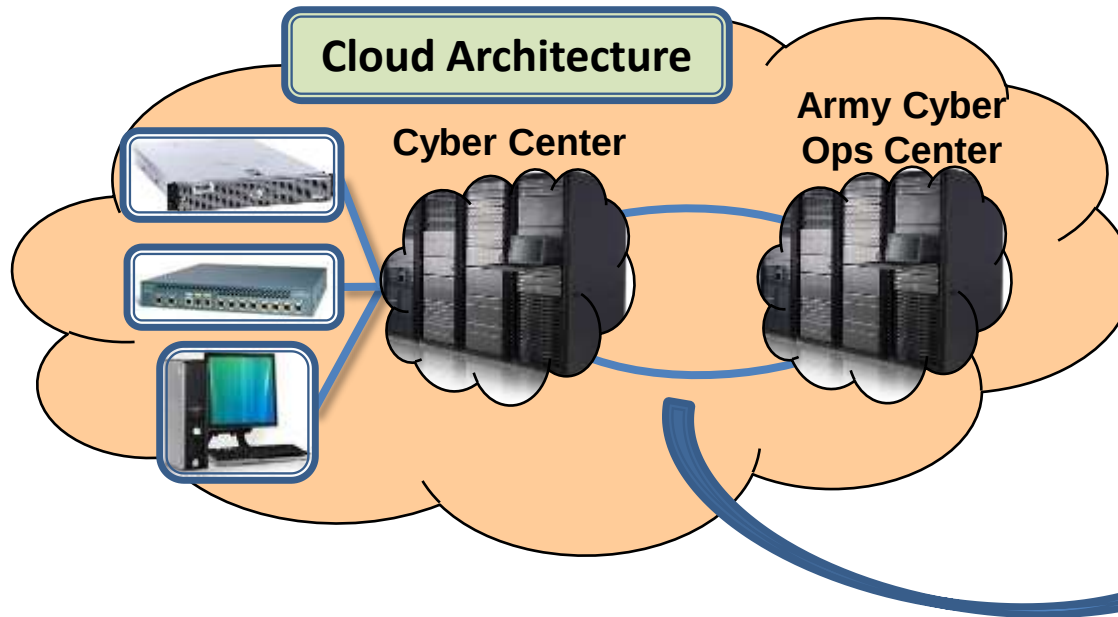
Analyst

- Data fidelity
- Scope of responsibility
- Data quantity / access

“Second to None!”



- Enforce compliance with basic standards
- Support IT reform

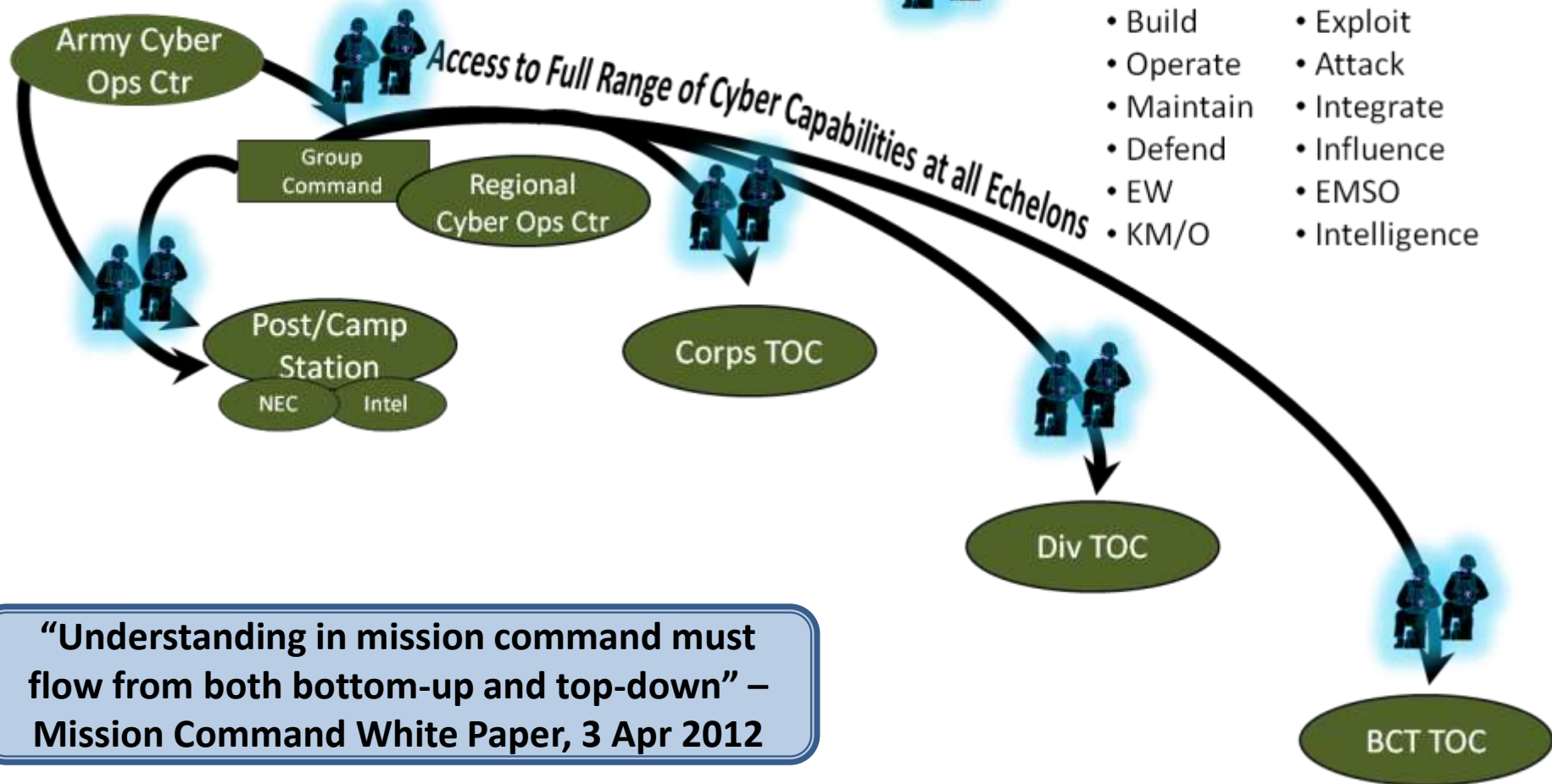


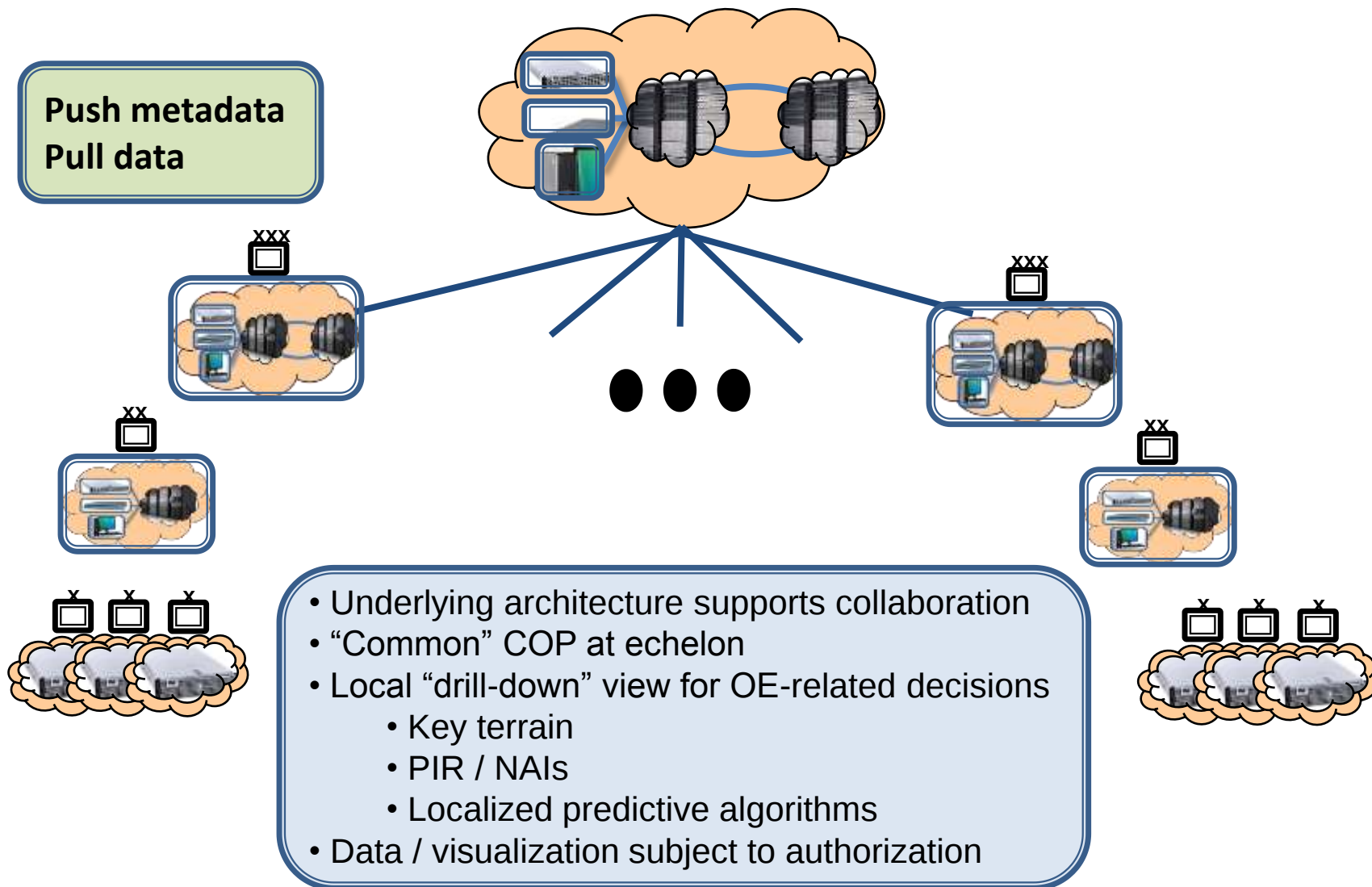
***Common architecture, common data,
common suite of pluggable visualization tools***

"Second to None!"



Extended Cyber Enterprise by Echelon



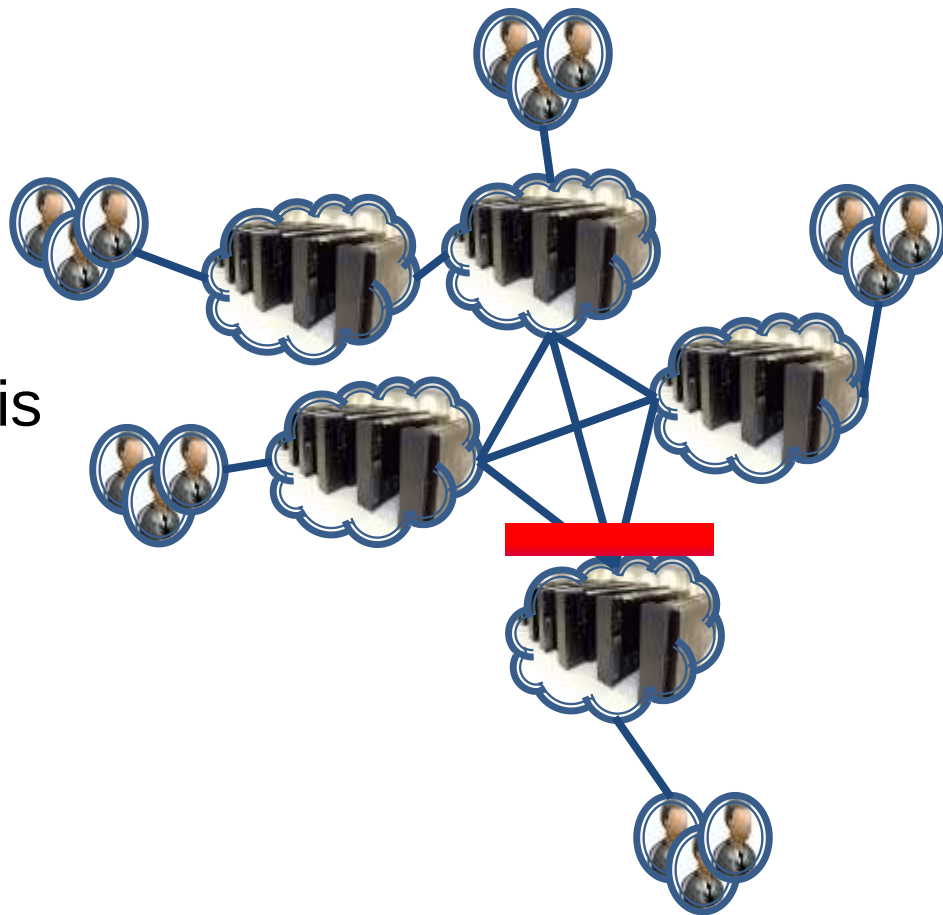




- Transition networks to a warfighting platform
- Workforce
 - Soldier and leader education and training
 - Manpower
 - Conduct training and leader development
 - Make people the centerpiece
- Physical limitations: bandwidth, power, connectivity
- Authorities
- Security
- Cost



- CAP Theorem
 - Consistency
 - Availability
 - Partition Tolerance
- Cloud storage – solution is mission dependent
 - Facebook
 - Military mission

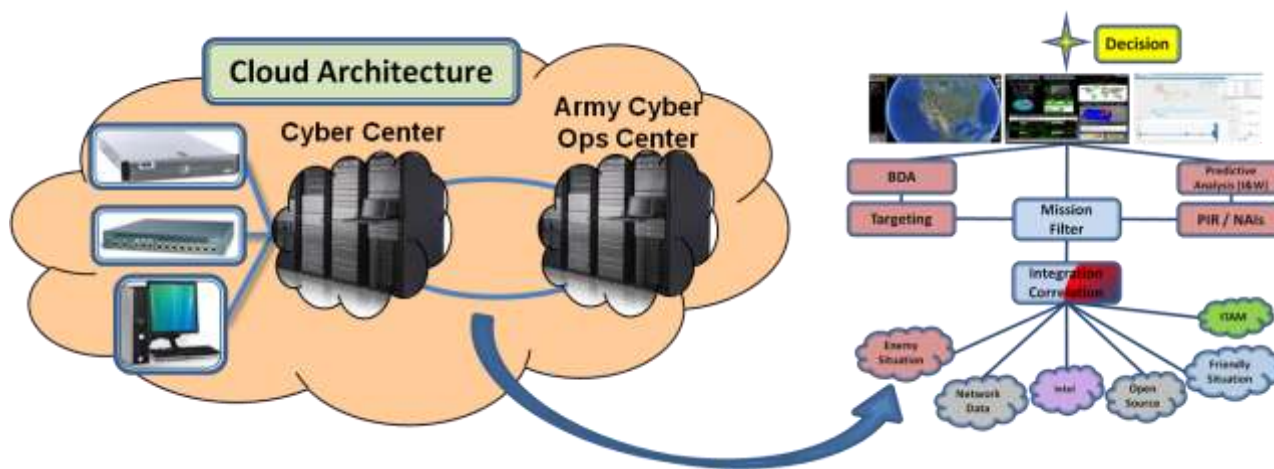


System design must account for network partitions that will be common in tactical environments



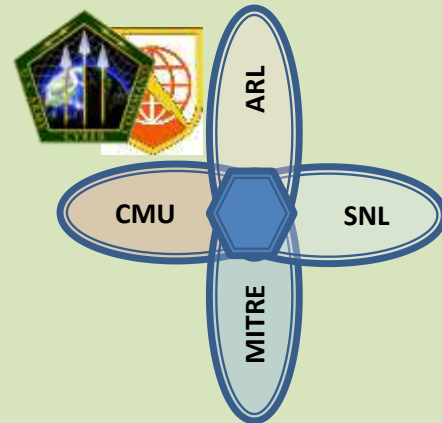
Goal

Analyze and visualize the operational environment to provide situational understanding that supports leader decision making in real-time



Army Cyber and NETCOM Initiative:

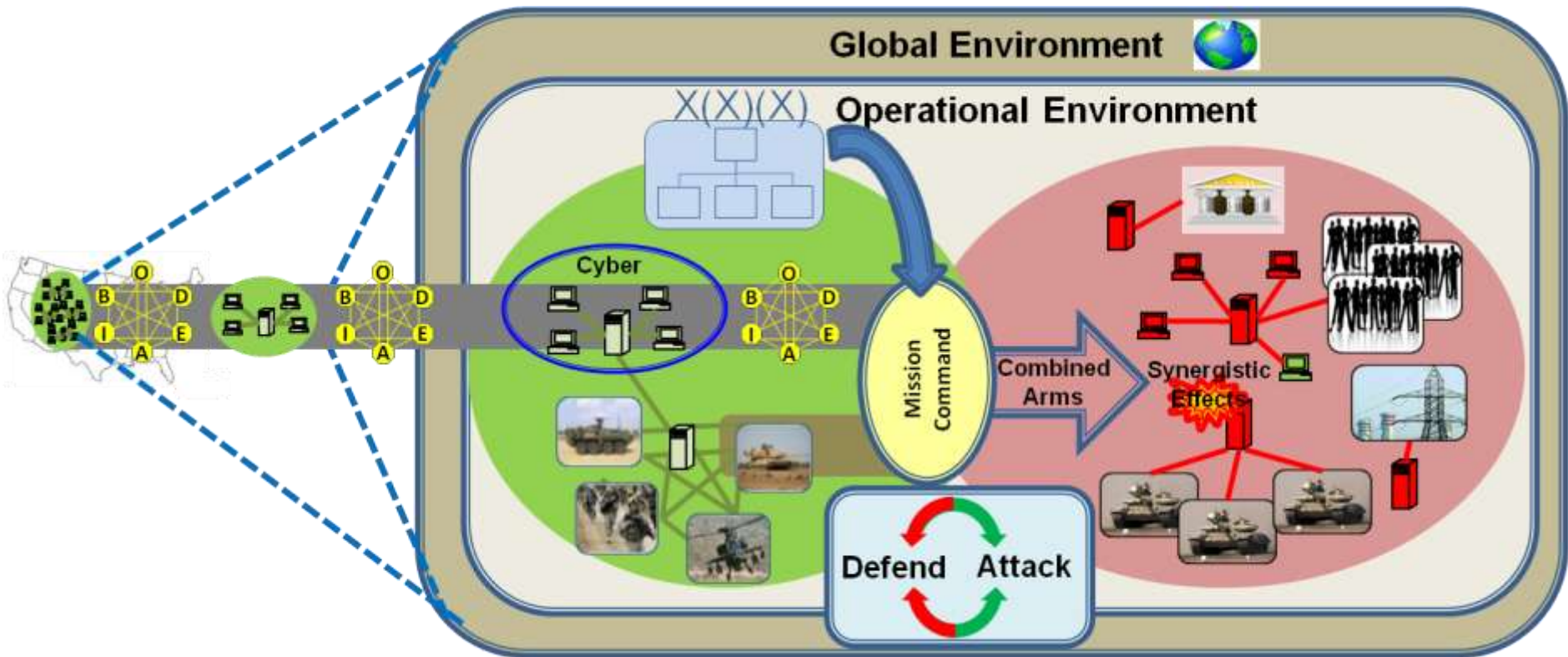
- 2 node proof of concept
- Support to an Army Command
- Participation from:
 - Carnegie Mellon University / Software Engineering Institute
 - MITRE
 - Sandia National Laboratories
 - Army Research Laboratories



“Second to None!”



Decision support to
Prevent, Shape, **Win**





- A tactical COP must account for unified Land/Cyber operations
- Cloud-enabled commonality stems from data, architecture, and pluggable visualization tools
- Tactical deployment must account for hard distributed system problems



QUESTIONS AND DISCUSSION