Net-Centric Test & Evaluation

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Purpose

- Develop an approach for test and evaluation in a net-centric environment
- Use a realistic case as an example:

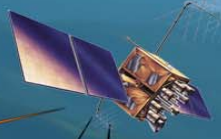
  Joint Fires and Time Sensitive Targeting
  Rosetta STONE Single Integrated Picture Enabling Technology Demonstration (ETD)

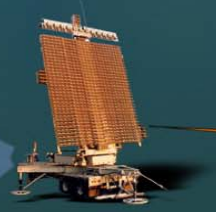
Problem

- How do you verify that a proposed solution is net-centric and solves a warfighter's problem?

Operational View

Wideband Networking
IDM-AFAPD
JVMF





Sensor Data Posting

Rosetta
Mirror

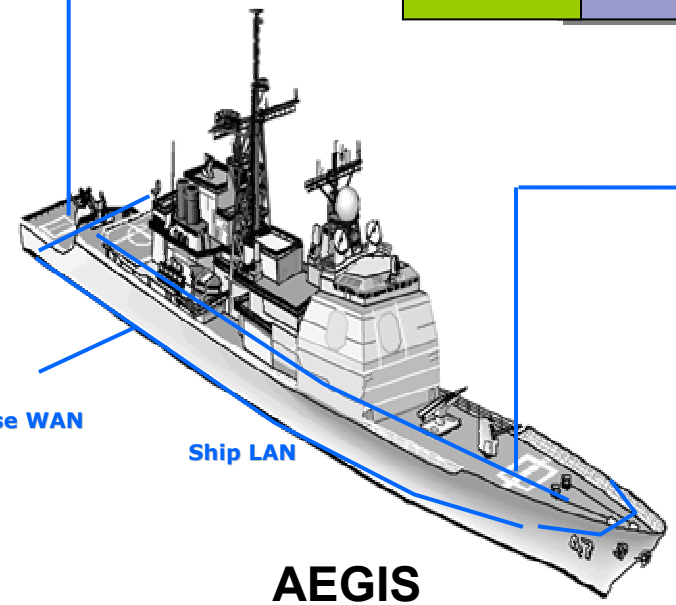
TACP Smart Pull
Prioritized L-16
AFAPD to F-16
JVMF to F/A-18

Network Centric Services
- **Rosetta Gateway**
- **STONE Correlation/Fusion**
- **Battle Manager**

Critical Operational Issues

- Ability to decrease engagement decision time by enhancing the accuracy of sensor data
- Ability to enhance TST and other missions' accuracy and precision by combining data from disparate sensors
- Migration and scalability of horizontal integration of networks
- Ability to get correlated track information to the shooter
- Ability to increase the quality and speed of distributed situational awareness
- Ability to perform gateway functionalities including correlation, fusion, translation, forwarding, and dissemination.

System Description



Enterprise WAN

Ship LAN

AEGIS

Corba

STONE

Corba

Rosetta

NTDS Ethernet Converter

SLQ-32 ESM

IFF

SPY-1 Radar

Link-11

Link-16

CEC

Joint Military Utility Assessment

- Can it meet specified performance requirements?
  - Use measures of performance
- Is it useful in the conduct of military operations?
  - Use measures of effectiveness
- *Is it Net-Ready?*
  - Use measures of performance & effectiveness
- Joint Forces Command Role
- Joint Interoperability Test Command Role

Emergent Net-Centric Technical Requirements

- DoD Net-Centric Data Strategy
- Net-Centric Data Visibility: Tagging and Advertising Data Assets with Discovery Metadata
- Net-Centric Checklist
  - Data, Services, Information Assurance, Transport
- Net-Centric Attributes

Net-Centric ≠ Network-Centric

Net-Centric Attributes

Title	Description	Metric	Source
Internet Protocol (IP)	Data packets routed across network, not switched via dedicated circuits	**IP as the Convergence Layer** Net-Centric Operations and Warfare Reference Model (NCOW RM), Technical View compliant with Joint Technical Architecture (JTA)	NCOW RM, GIG Arch v2, IPv6 Memos (9 Jun 03 and 29 Sep 03), JTA Memo 23 Nov. 04, JTA v6.0
Secure and available communications	Encrypted initially for core network; goal is edge-to-edge encryption and hardened against denial of service	**Black Transport Layer** Transformational Communications Architecture (TCA) compliance; Technical View compliant with JTA	TCA; IA Component of Assured GIG Architecture; JTA Memo 23 Nov. 04, JTA v6.0
Only handle information once (OHIO)	Data posted by authoritative sources and visible, available, usable to accelerate decision making	**Reuse of existing data repositories**	Community of interest policy (TBD)
Post in parallel	Business process owners make their data available on the net as soon as it is created	**Data tagged and posted before processing** NCOW RM, Technical View compliant with JTA	NCOW RM, DoD Net-Centric Data Strategy (9 May 03) JTA Memo 23 Nov. 04, JTA v6.0
Smart pull (vice smart push)	Applications encourage discovery; users can pull data directly from the net or use value-added discovery services	**Data stored in public space and advertised (tagged) for discovery** NCOW RM, Technical View compliant with JTA	NCOW RM; DoD Net-Centric Data Strategy (9 May 03); JTA Memo 23 Nov. 04, JTA v6.0
Data centric	Data separate from applications; apps talk to each other by posting data	**Metadata registered in DoD Metadata Registry** NCOW RM, Technical View compliant with JTA	NCOW RM; DoD Net-Centric Data Strategy (9 May 03); JTA Memo 23 Nov. 04, JTA v6.0
Application diversity	Users can pull multiple apps to access same data or choose same app (e.g., for collaboration)	**Apps posted to net and tagged for discovery** NCOW RM, Technical View compliant with JTA	NCOW RM; JTA Memo 23 Nov. 04, JTA v6.0
Assured Sharing	Trusted accessibility to net resources (data, services, apps, people, collaborative environment, etc.)	**Access assured for authorized users; denied for unauthorized users**	Security/IA policy (TBD); IA Component of Assured GIG Architecture; JTA Memo 23 Nov. 04, JTA v6.0
Quality of service	Data timeliness, accuracy, completeness, integrity, and ease of use	**Net-ready key performance parameter**	Service level agreements (TBD); JTA Memo 23 Nov. 04, JTA v6.0

DOD Interoperability Guidance (Technical + Operational)

- Joint Ops, Functional, Enabling Concepts
- Information Support Plan
- Net-Ready Key Performance Parameter
  - Net-Centric Operations and Warfare (NCOW) Reference Model
  - Integrated Architecture
  - Key Interface Profiles (KIPs)
  - Information Assurance

Measures

- STONE Corrrelator/Fusion MOPs
  - Completeness, Accuracy, Loading, P(false alarms), time, etc
- Rosetta Translator/Forwarder MOPs
  - Ability to correctly and completely translate tactical data link message sets IAW specs
- Network service and data interfaces - TBD
- Capability MOEs through TST mission threads
  - Quality of info (e.g., completeness, continuity, timeliness, accuracy)
  - Degree of shared situation awareness (consistency of picture among variety of users)
  - Degree of M2M connectivity, AKA scale of collaboration or extent of reach (% of total message types/versions, % platforms, % C2 nodes)
  - Time sensitive target location accuracy and time to achieve
  - Quality of target identification achieved
  - Time sensitive target - % successful targeting delivery to shooter
  - Degree of smart pull achieved for low bandwidth users
  - Time sensitive target - time to detect, decide, deliver, assess
  - % successful time sensitive target missions

Conclusion

- DoD has issued guidance and criteria in the form of joint concepts, net-centric checklists, and interoperability and supportability instructions for use in program assessments, capability analyses, experimentation, and interoperability testing
- These criteria, comprised of attributes derived largely from network-centric warfare concepts and commercial standards, are not yet in a form suitable for immediate and widespread use for test and evaluation
- Specifically, the detailed interface and environmental requirements for systems to successfully function with and within the global information grid are not compiled in a comprehensive form
- Net-Centric Requirements are evolving and are sufficient to characterize Rosetta STONE as network enterprise services
- Need an Information Support Plan to document the architectures, interfaces, and preliminary net-ready key performance parameter for T&E planning.

Lessons Learned

- Until such time as net-ready requirements are available for widespread use, the T&E planners must tailor their approach based on accepted precedence and emerging criteria.
- Specific net-centric requirements needed for Rosetta STONE Enabling Technology Demonstration can be developed by use of an Information Support Plan, which can further assess and determine the details of net-ready key performance parameter.
- The Net-Centric T&E approach needs a lot more definition and will certainly create a lot more challenges for the testing communities.
- The immediate demand for Net-Centric testing will require an increased emphasis on conformance to standards.
- There will be more reliance on a distributed net-centric test-bed infrastructure
- Future Net-Centric test and evaluation will be more concern with services rather than systems.
- Future interoperability assessments will deal with new Net-Centric attributes such as data posted on the network for immediate use before it has been processed, and only handling information once

Questions?

Reference Sources:

http://www.horizontalfusion.dod.mil/fy05/ref_docs.html
http://www.dtic.mil/jointvision/
http://www.dod.mil/nii/doc/
http://www.dtic.mil/cjcs_directives/