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