A Standards-based, Structured Data Approach to Maintaining C2 Agility in the Mission Partner Environment

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Pilot Schedule
15 September 2013 to 15 January 2014
C2 Agility is the ability to maintain mission effectiveness proactively in the face of changing circumstances and stresses, including the ability to conceptualize, design, create and deploy a successful endeavor (Source: NATO Studies, Analyses, and Simulation (SAS) Research Study Group 065, 2006 - 2009)

* Emphasis on capability to successfully cope with changes in circumstances

* Attributes include patterns of interaction, distribution of information, and allocation of decision rights
C2 Approach Space

In more capable C2 approaches:

- Decision rights are more broadly allocated to the collective;
- Interaction patterns among entities are less constrained;
- Information is more broadly distributed among entities;

leading to higher levels of shared awareness and understanding and increased effectiveness.
The Problem
Expressed another way....

Joint Operations Area
Military Forces — Peak Level

GROUND
- INT’L Non-MINUSTAH+: Strength:
  - Canadians ~2000
  - Japanese ~100
  - French ~615
  - Colombia ~55
  - Nicaragua ~40
- Haitian National Police ~ 7,000
- UN Police ~ 2,000

JTF-H Forces (As of 2100, 31 JAN 10):
- Total: 22,268
- Afloat: 15,400
- Ground: 6,868

MINUSTAH Total Force Strength:
6,931 Troops throughout Haiti
The Critical Path

Comprehensive Approach to CIM Information Sharing

NIEM Mediation Web Service

Coalition MIL

MIL

CIV-MIL UIS

GOV

CIV VOSOCC

Open Source Crowd Source

WCID Geo-database

CIM DPS

Sahana

Ushahidi

Open Street Maps
Purpose of Pilot

• Joint Civil Information Management for operations such as Stab Ops, HA/DR, HCA will involve structured and unstructured data.

• While work is underway on the unstructured world of Big Data through the Information Volume and Velocity JCTD, this pilot focused on structured data.

• Structured coming from agreed assessment forms from the JCIM Joint Test and Evaluation as well as design rules of the National Information Exchange Model.
The National Information Exchange Model defines a data schema for real world objects and activities. There is also governance on how to modify, extend, and utilize the model for information exchange.

Information Exchange Packages (IEPs) are the XML messages that are used to exchange information.

IEPs are defined by Information Exchange Package Documentation (IEPDs). IEPDs subset and extend the core model and provide a schema for the messages.

DoD CIO March 2013 issued guidance to consider for implementation. DoD is creating the MilOps domain to define military specific information.
NIEM Domains include mission specific data that is managed through independent stewards.

Future Domains are added to NIEM as necessary based on an established need.

NIEM Core consists of data elements that are commonly understood across domains.
Port IEP
Port IEP

- XML message that contains objects about the port, POCs, orgs, etc. The message is derived from the CIM DPS Port assessment category.
- The port object extends the maritime domain port (which is an extension of the core Facility), adding:
  - schedule, commercial activities, etc.
  - commercial/subsistence fishing facilities/activities
  - recreational facilities/activities
  - general military information
  - security information
- Defined by IDA, then evolved by CSC
NIEM Information Server

• Persists information in a structured format that facilitates mutability (changes to objects), aggregation (merging of information from multiple sources), and searchability. More than just a message caching service.
• RESTful Web Services providing Create/Read/Update/Delete (CRUD) and query operations.
• Mediation services add translations to/from legacy systems (if they don’t produce/consume NIEM natively).
UNCLASSIFIED
• Provides for effective information exchange and collaboration between the United States Department of Defense (DOD) and any external country, organization, agency or individual that does not have access to traditional DOD systems and networks.
• Civil Information Environment utilizes SharePoint Lists and ESRI ArcGIS WebParts.
• Unclassified Information Sharing Services is a suite of systems/services facilitating the sharing of civ-mil info.
SOA Applications

<table>
<thead>
<tr>
<th>CIORT Data Service</th>
<th>CIORT Processor Service</th>
<th>KUL Cache Service</th>
<th>CS Data Connector</th>
<th>CS Repository Service</th>
</tr>
</thead>
<tbody>
<tr>
<td>Configuration Service</td>
<td>Alert Suite</td>
<td>Kinematic Alerting Service</td>
<td>Geo Event Service</td>
<td>Tracking Service</td>
</tr>
<tr>
<td>Service Discovery</td>
<td>Transformation Service</td>
<td>NOAA Weather Service</td>
<td>Alert Collector Service</td>
<td>AIS Connector</td>
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<tr>
<td>SIMON Authentication &amp; Authorization UI</td>
<td>State of the Port Service</td>
<td>PONTS Web Service</td>
<td>Camera Control Service</td>
<td>COMRIC Connector</td>
</tr>
<tr>
<td>System UI</td>
<td>Simple Scheduler Service</td>
<td>Video Manager Service</td>
<td></td>
<td>Radar Control Service</td>
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Data Sharing Communities

- **DHS S&T:** DHS; CBP; DoD; Local, State & Federal Agencies
- **IOC:** USCG; CBP; ICE; Local, State & Federal Agencies; Port Authorities
- **SOUTHCOM:** DoD; JIATF-South; Partner Nations
- **CS-JCTD:** DoD; DoS; USAID; Partner Nations; NGOs; IOs
The COCOMs have identified high priority deficiencies resulting from lack of unclassified information sharing capability which cut across four Joint Capability Areas; Battlespace Awareness, Building Partnerships, Command and Control and Net Centric.

RDA JCTD directly addresses the shortfalls in COCOM capability requirements by integrating air, land, and sea sensor data and databases to enable multi-domain situational awareness

- RDA will strengthen situational awareness regionally by integrating information from existing partner systems and providing a composite data product to authenticated users
- RDA will leverage existing GOTS capabilities to improve integration and reduce cost

**RDA JCTD CUSTOMERS**

- Oversight Executive: Office of the Secretary of Defense – ASD(R&E)
- Operational Sponsors: USSOUTHCOM (Lead), USNORTHCOM, USPACOM and USAFRICOM
- Operational Manager: USSOUTHCOM
- Technical Manager: Naval Research Laboratory (NRL)

**CUSTOMER CONTACT**

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**RDA JCTD STAKEHOLDERS**

- USSOUTHCOM
- USNORTHCOM
- USAFRICOM
- USPACOM
- NAVAF
- NAVEUR
- Partner Nations (i.e. UK)
The goal of the project is to provide a standard infrastructure for fast and effective integration of new technologies and data sources in order to illuminate small dark targets in coastal environments.

The CSS prototype establishes a universal suite of applications available to stakeholders involved in maritime operations to address issues included but not limited to metrics derived from the maritime interdiction mission context.

The prototype system leverages existing information-based technologies currently in operation integrated through the SIMON platform to provide a common coastal maritime view.

Coastal Surveillance System Stakeholders

- DHS Science and Technology
- United States Coast Guard
- Custom and Border Protection
- Fish and Wildlife
- Local Law Enforcement
CS is defined as the set of continuous, long-term, integrated, comprehensive actions among a broad spectrum of U.S. and international governmental and non-governmental partners that maintains or enhances stability, prevents or mitigates crises and enables other operations when crises occur.

The Unity System enhances CS by enabling data from disparate sources to be viewed in a single user interface. Key Capabilities:

- Shared, mutually visible data, tools and planning frameworks
- Ingestion and crosswalk of divergent planning data
- Collaboration for CS Community of Interest
- Improved coordination across CS mission space
- Efficient data capture

CS JCTD CUSTOMERS

Oversight Executive: Office of the Secretary of Defense – ASD(R&E)
Operational Sponsor: U.S. Southern Command (USSOUTHCOM)
Operational Managers: USSOUTHCOM/ U.S. European Command (USEUCOM)/ U.S. Agency for International Development (USAID)
Technical Managers: U.S. Army Corps of Engineers (USACE) / USAID

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UNITY SYSTEM STAKEHOLDERS

- USAID
- USSOUTHCOM
- USNORTHCOM
- USAFRICOM
- USIP
- NGO
Scenario

• The Jan 2010 earthquake in Haiti posed a significant challenge to relief efforts because the port at Port-au-Prince was unusable.
• CIM DPS has assessments about ports which are shared through a NIEM Information Server.
• The port information is accessible by any APAN user in the Civil Information Environment.
• Regional Domain Awareness and Cooperative Security system users access the information internally.
<ns6:PortAdditionalComments />
</ns6:Port>
- <ns6:FishingPortInformation ns:id="13">
  - <ns6:FishCategoryCode>SALT WATER</ns6:FishCategoryCode>
  - <ns6:CommercialFishingBoatsIndicator>YES</ns6:CommercialFishingBoatsIndicator>
  - <ns6:CommercialFishingBoatCategory>SEINERS</ns6:CommercialFishingBoatCategory>
  - <ns6:CommercialFishingBoatConditionCode>POOR</ns6:CommercialFishingBoatConditionCode>
</ns6:FishingPortInformation>
- <ns6:PortSecurity>
  - <ns6:PortPatrolTypeCode>LAND BASED</ns6:PortPatrolTypeCode>
  - <ns6:PortSecurityTeamResponseTimeMeasure>10.0</ns6:PortSecurityTeamResponseTimeMeasure>
  - <ns6:PortPiracyProblemIndicator>YES</ns6:PortPiracyProblemIndicator>
  - <ns6:PortPiracyDeterrenceText>SPORADIC PATROLS BY THE COAST GUARD</ns6:PortPiracyDeterrenceText>
</ns6:PortSecurity>
</ns6:PortExchange>
CSS Map View Showing NIEM Object Geolocations
CSS Map View Showing Port Condition Data for Port-au-Prince
CSS Map View Showing Port Condition Data for Cement Plant Port
RDA-Lite Map View Showing
NIEM Object Geolocations
RDA-Lite Map View Showing Port Security Data for Port-au-Prince
RDA-Lite Map View of Port Security Data for Cement Plant Port
Unity Map View Showing NIEM Object Geolocations
Unity Map View Showing Port Condition Data for Port-au-Prince
Findings

- Civil Information is critical to successful HA/DR and Stab Ops generally
- Consideration for sharing in the unclassified non-PKI /CAC is critical to the MPE and therefore C2 Agility
- Fully integrating CIM DPS into this range of implemented systems informs a wide range of Mission Partners helping them cope with surprise and uncertainty
- NIEM is an excellent standards based approach for the definition of information objects that demonstrates your understanding of the security environment
- NIEM does not address numerous other information management issues necessary for interoperability
- The Port IEPD followed a focused process of implementing the CIM DPS Port Assessment answers in a NIEM compliant format. This was due to time and resource limitations. What the NIEM core and other domains offered did not map exactly to information elements of CIM DPS in most cases.
- Finding the appropriate objective sharing platforms was problematic and thought should be devoted to what DoD intends to offer concerning future pilots
Recommendations

- Processes and technology to address the issues of identity, mutability, aggregation, search-ability, persistence, etc. must be developed. Additional piloting efforts should be focused on addressing these issues.
- Data and operational SMEs should be involved in the development of further IEPDs to ensure technical and operational capabilities are maximized.
- DoD should establish a NIEM sandbox, with implementing systems available for integration testing.
- NIEM PMO should establish a registry of IEPDs along with the systems that support them and their associated POC. (That is proposed within DoD as reflected in DRAFT 8320.ff but this is only for DoD-developed IEPDs.)
- Support making the remaining 20 CIM DPS assessment areas NIEM conformant
- Embellish APAN to include assessment forms and technologies to address the information management issues listed above.
- Register all 21 CIM assessment areas in the MilOPs Domain
- Partner with PM Mission Command to determine how best to have CIM DPS NIEM objects ingested and consumed on the “dot mil.” Expand future pilot work to include the “dot mil” as well.
- Ozone Widget Framework should be leveraged to create reusable widgets in future pilot work
- Future research should consider NIEM conformant multimedia content. Pictures, video, audio are all captured by Civil Affairs personnel.
Backups
Facts

- NIEM enables (but does not ensure) the sharing of well defined and structured information to support rich display and minimal machine processing.
- NIEM is a messaging standard not an information management standard.
  - NIEM’s focus on message definition does not address broader information management issues, such as processing that requires information spanning several messages, is not supported (e.g. current state of an object after it has changed, merging of information about the same object from multiple sources, etc.).
  - The NIEM Information Server stores objects (not messages). This will allow an updated and aggregated view of an object, removing the need for a staff officer having to query multiple data sources and build slides or spreadsheets manually merging and updating the data.