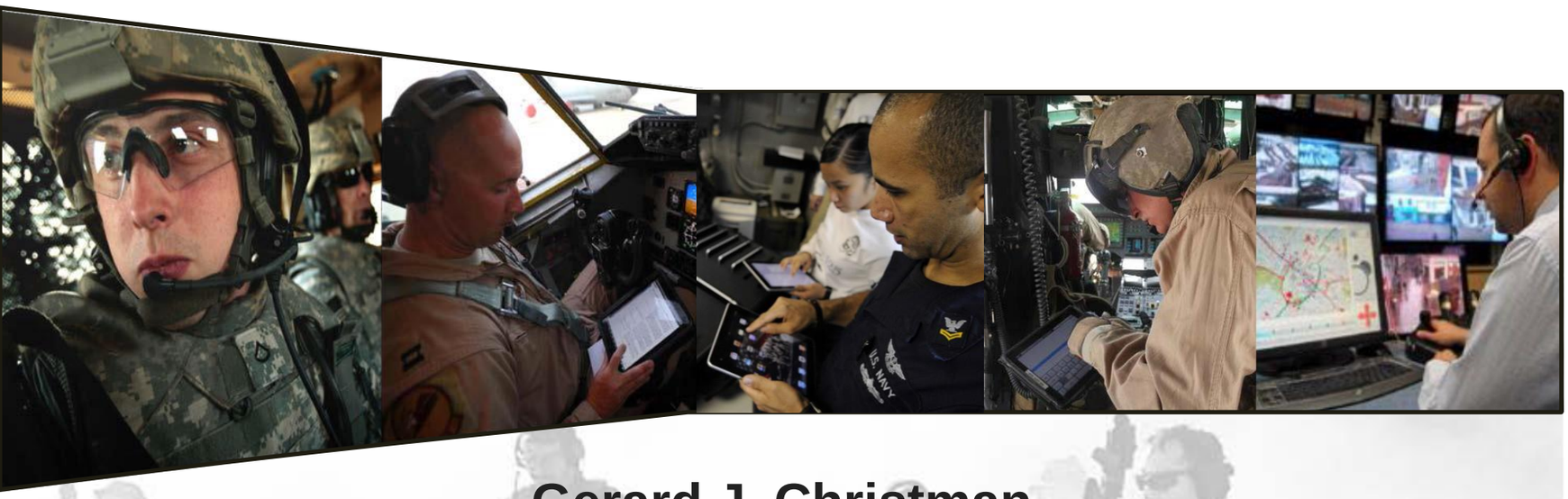
A Standards-based, Structured Data Approach to Maintaining C2 Agility in the Mission Partner Environment



Gerard J. Christman

Technical Manager

Femme Comp Inc.

CTR Support to the
Department of Defense
Chief Information Officer

6/06/14

Pilot Team

DoD CIO, Information Enterprise, Strategy and Policy Directorate – Bill Barlow (Gov Lead)

Gerry Christman (Technical Manager)

Tim Friest & Dave Vincent (Developers)

Mike Carnevale, Ximena Avila, Shane Mason (Data and Services Integration)

Brian Haugh & Steve Wartik (IEP Developers)

Pilot Schedule

15 September 2013 to 15 January 2014

C2 Agility

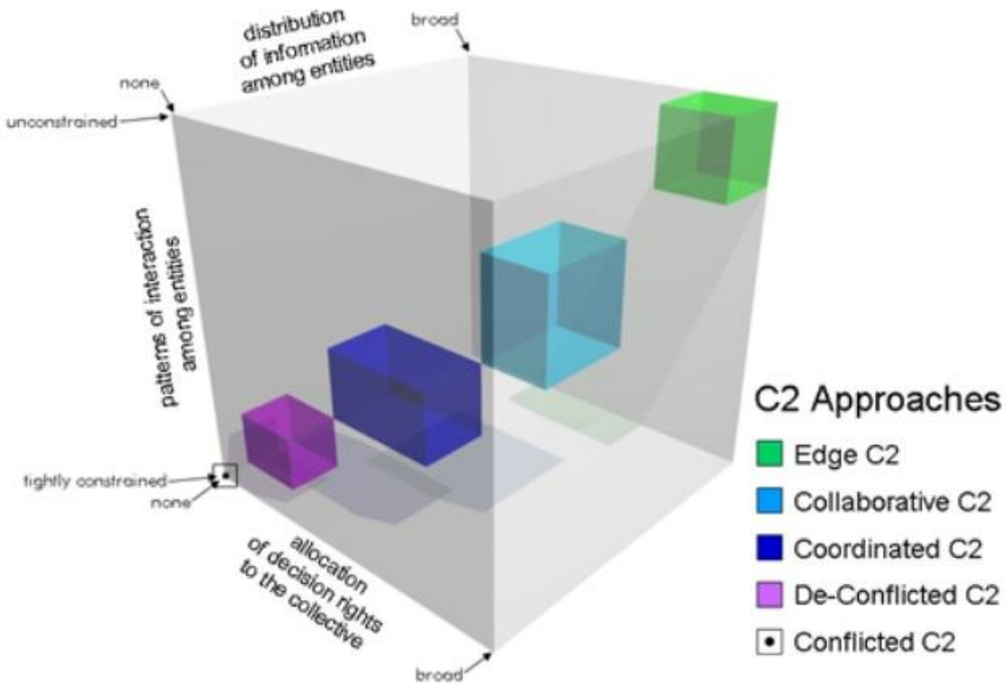
Institute for Defense Analyses, The Agility Imperative: Expanding Operational Adaptability, 01 FEB 13

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

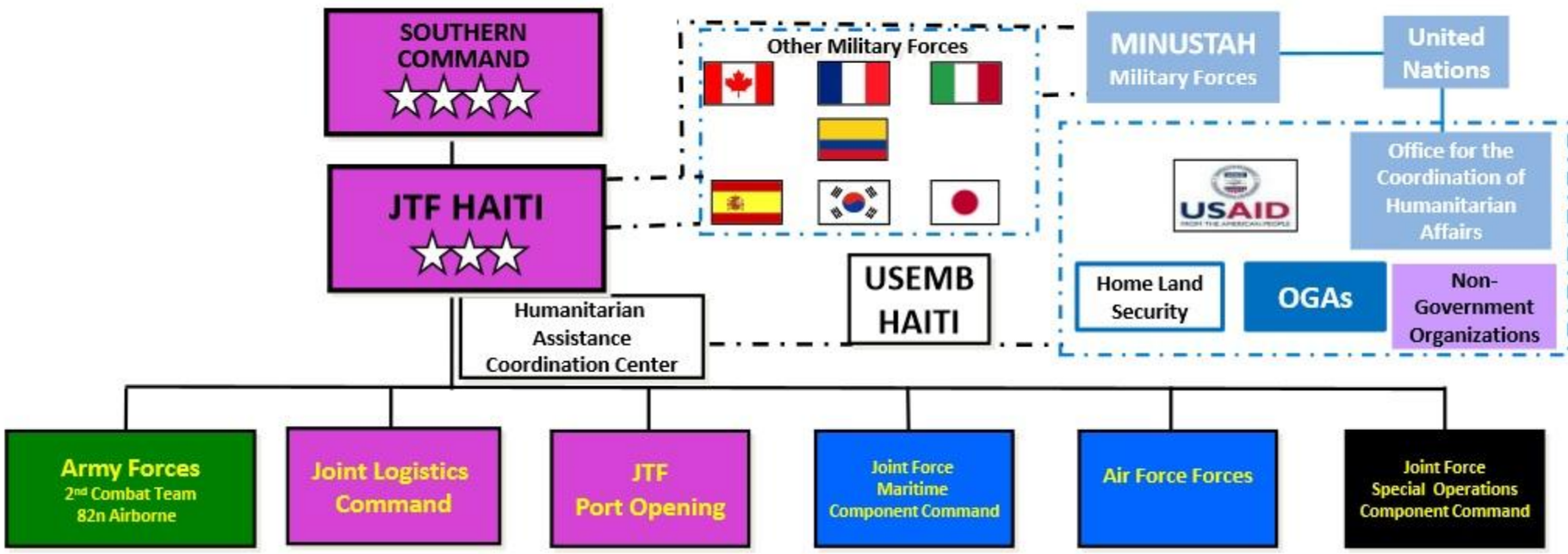


In more capable C2 approaches:

- 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


SOUTHERN COMMAND
JTF HAITI
Other Military Forces
MINUSTAH Military Forces
United Nations
USAID
Office for the Coordination of Humanitarian Affairs
USEMB HAITI
Home Land Security
OGAs
Non-Government Organizations
Humanitarian Assistance Coordination Center
Army Forces
2nd Combat Team
82n Airborne
Joint Logistics Command
JTF Port Opening
Joint Force Maritime Component Command
Air Force Forces
Joint Force Special Operations Component Command

Expressed another way….

Joint Operations Area
Military Forces — Peak Level

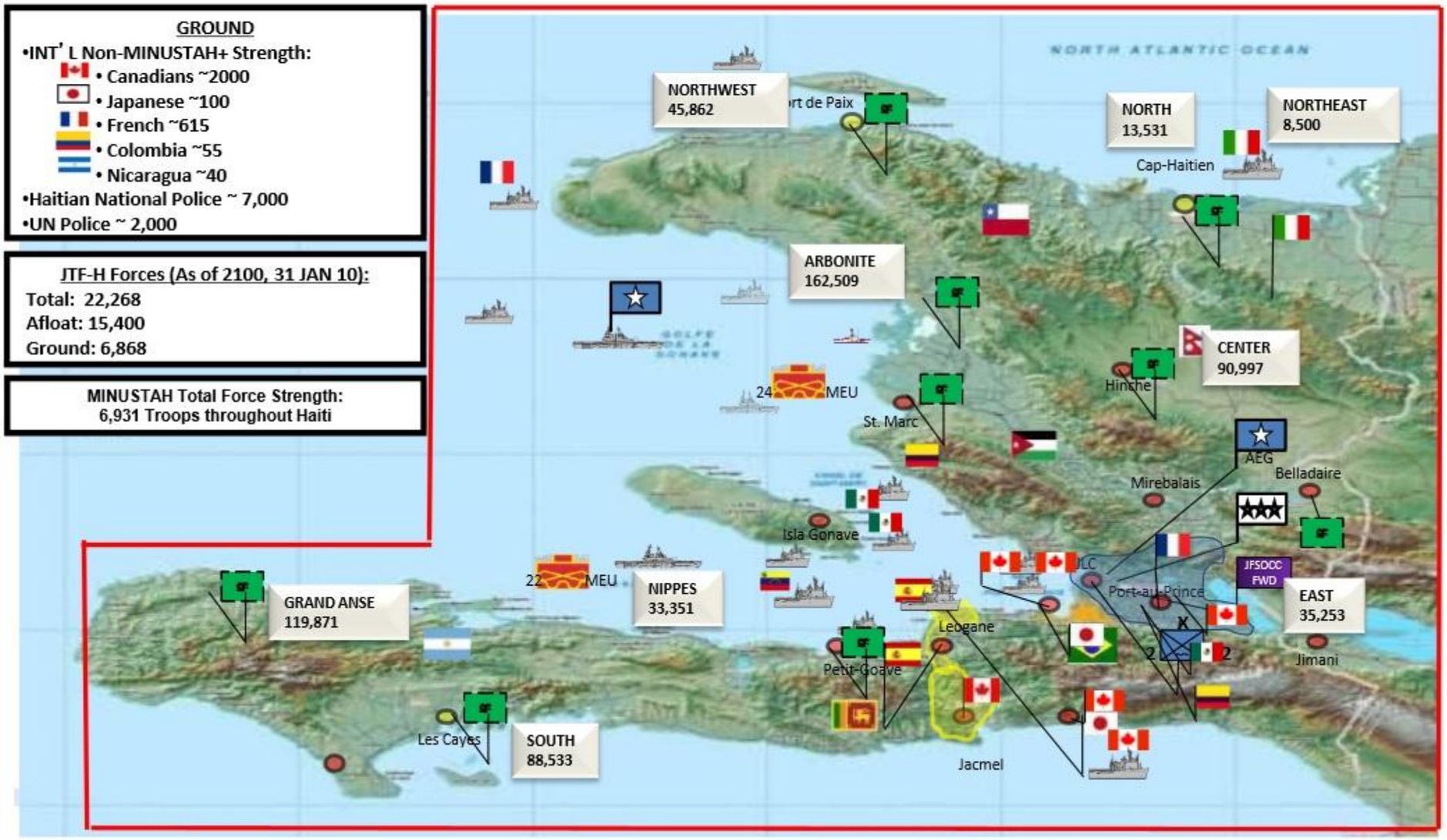
GROUND

- 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):

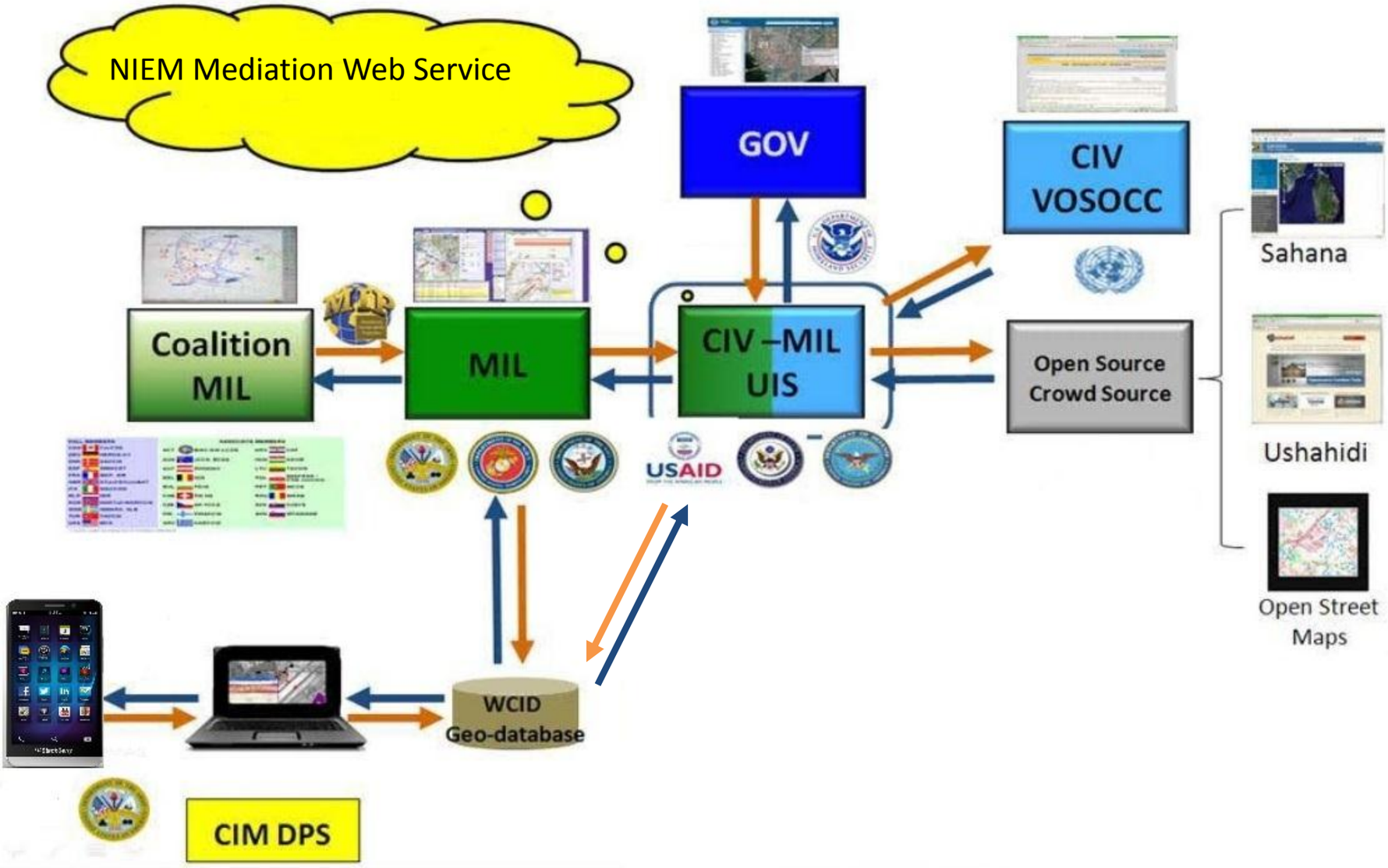
Total: 22,268
Afloat: 15,400
Ground: 6,868

MINUSTAH Total Force Strength:
6,931 Troops throughout Haiti



The Critical Path

Comprehensive Approach to CIM Information Sharing



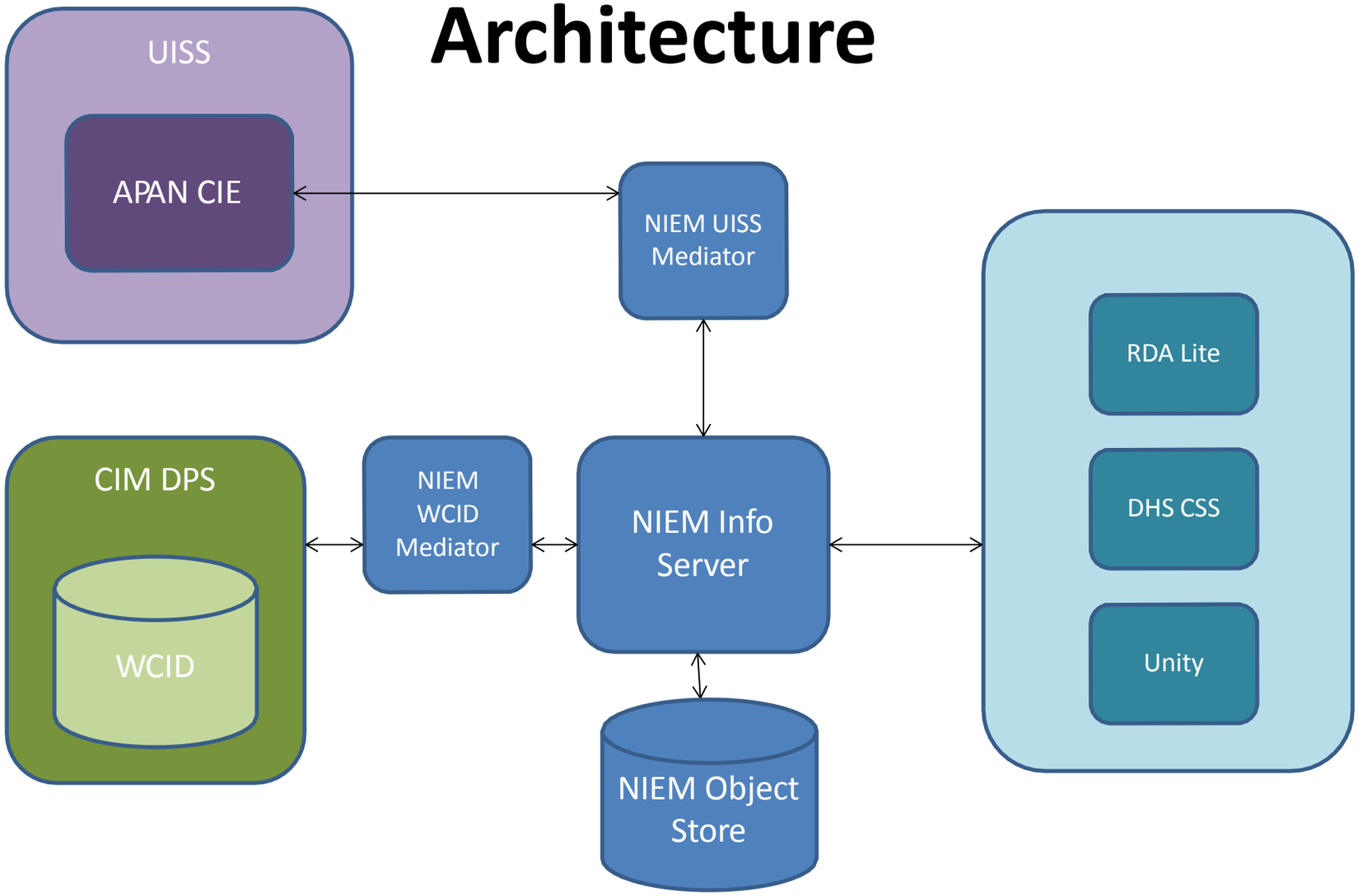
Purpose of Pilot

- 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.

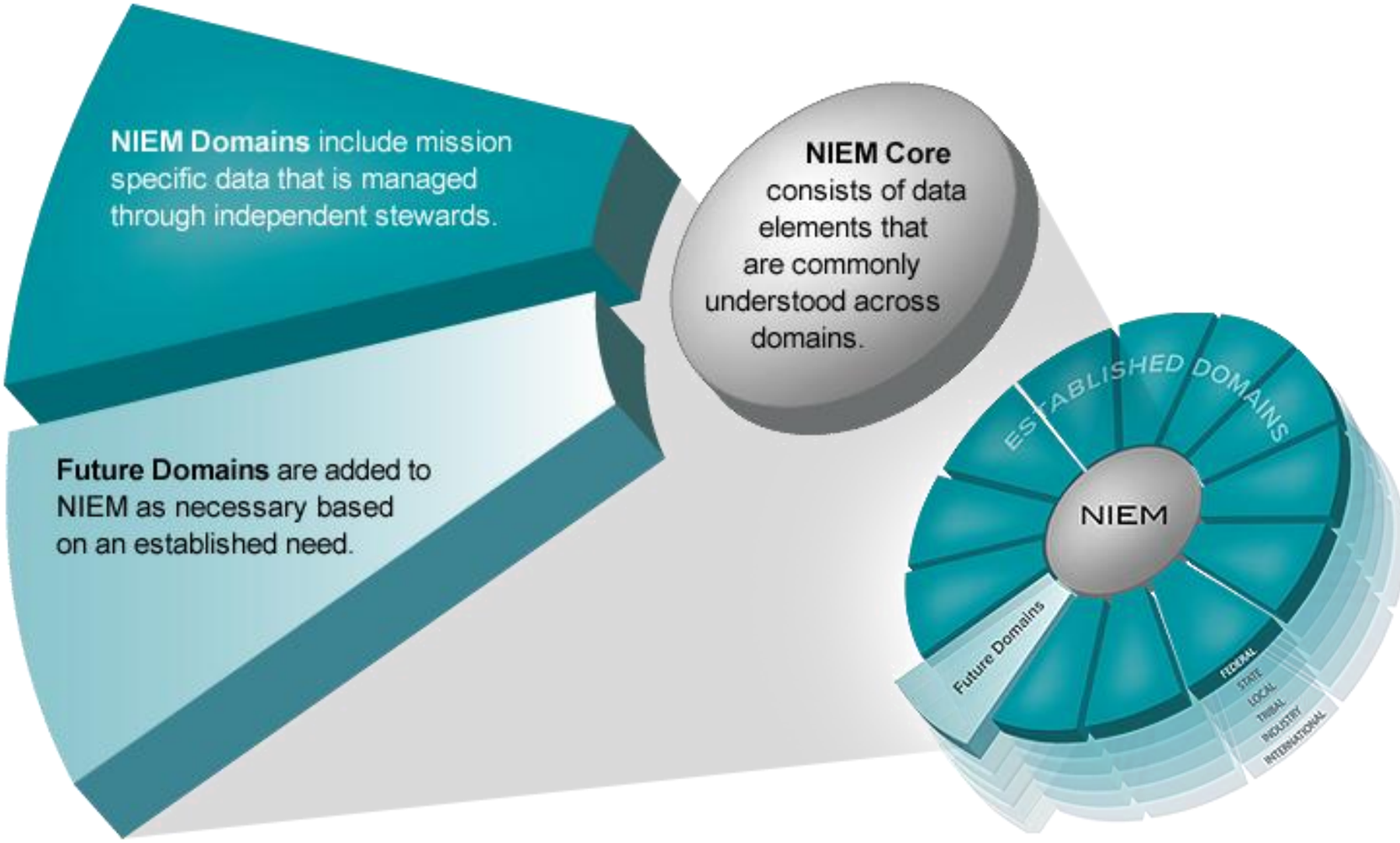
Architecture



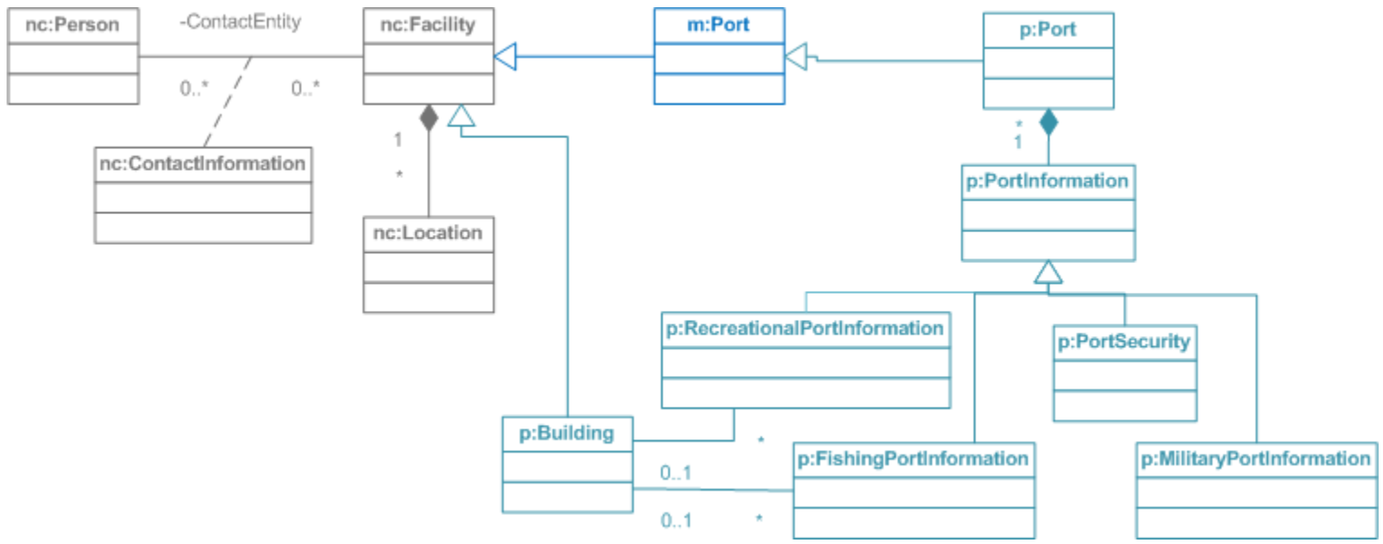
NIEM

- 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 Overview

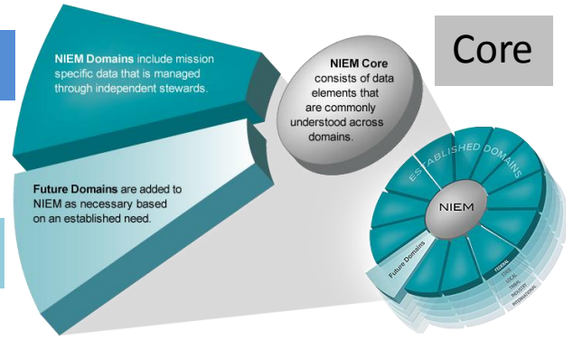


Port IEP



Maritime Domain

CIM specific



Core

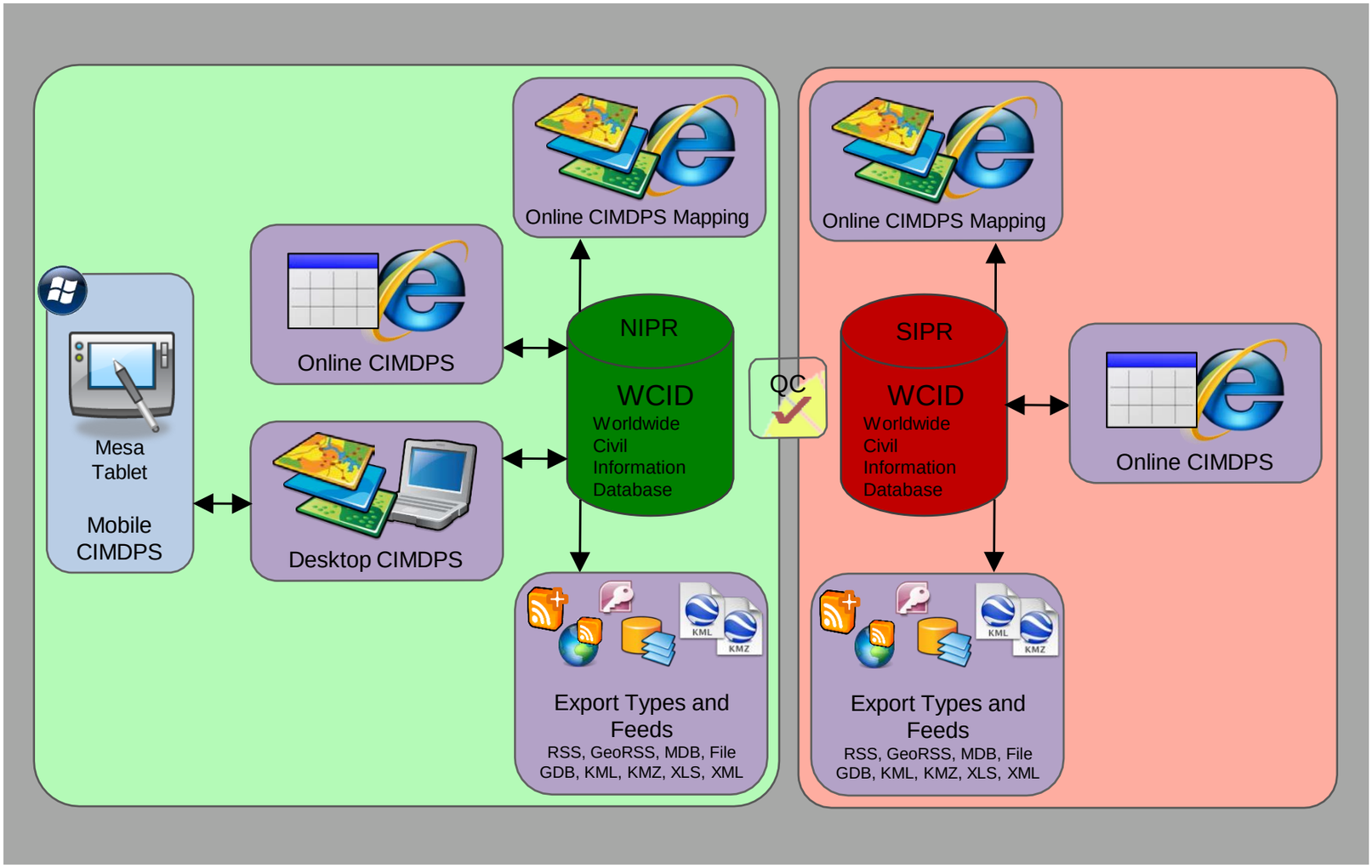
Port IEP

- 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).

CIMDPS Business Process

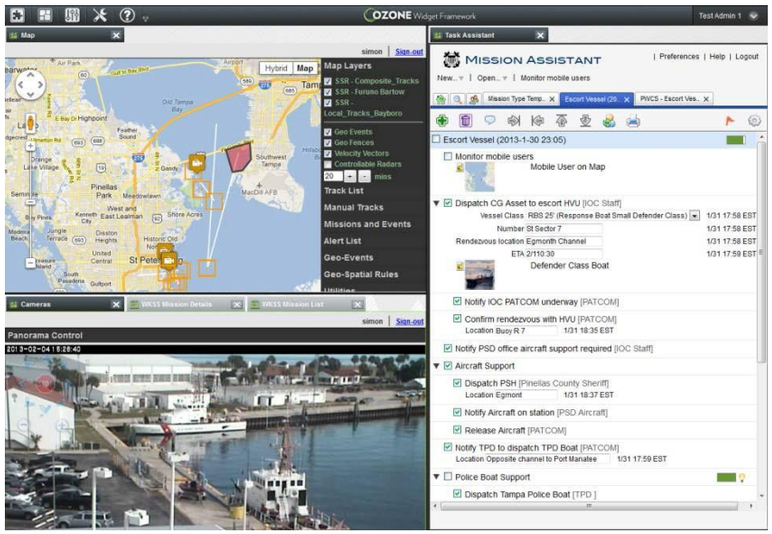


UNCLASSIFIED

APAN CIE & UISS

- 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



	Chat Service	KML Provider Service	Track Consumer	SIMON Authentication & Authorization UI	
	Discovery Service	Transformation Service	Integration Service		
CIORT Data Service	Configuration Service	Alert Suite	State of the Port Service	System UI	
CIORT Processor Service	Logging Service	GCCS Connector	Simple Scheduler Service		
KML Cache Service	Auditing Service	Kinematic Alerting Service	NOAA Weather Service	PORTS Web Service	Vessel Federation Service
CS Data Connector	Monitoring Service	Geo Event Service	Alert Collector Service	Camera Control Service	Video Manager Service
CS Repository Service	Reporting Service	Track Manager	AIS Connector	COMRIC Connector	Radar Control Service

NAVAIR

United States Coast Guard
U.S. Department of Homeland Security

UNITED STATES SOUTHERN COMMAND
PARTNERSHIP FOR THE AMERICAS

CIOERT
COOPERATIVE INSTITUTE FOR
Ocean Exploration, Research & Technology

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

REGIONAL DOMAIN AWARENESS JCTD

RDA JCTD
System

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

Scott Elliott, RDA JCTD Technical Manager
Naval Research Laboratory, Washington DC
Scott.Elliott@nrl.navy.mil (202) 404-5872

RDA JCTD STAKEHOLDERS

- USSOUTHCOM
- USNORTHCOM
- USAFRICOM
- USPACOM
- NAVAF
- NAVEUR
- Partner Nations (i.e. UK)

Department of Homeland Security Coastal Surveillance System (DHS CSS)

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.

DHS CUSTOMER

Department of Homeland Security S&T
245 Murray Lane, Building 410
Washington DC 20528
Contract Number HSHQDC-10-C-00193

CUSTOMER CONTACT
Tom Tomaiko
DHS MSTP COTR
thomas.tomaiko@hq.dhs.gov (202) 254-5681

Coastal Surveillance System Stakeholders

- DHS Science and Technology
- United States Coast Guard
- Custom and Border Protection
- Fish and Wildlife
- Local Law Enforcement

COOPERATIVE SECURITY JCTD

CS JCTD Unity System

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

CUSTOMER CONTACT

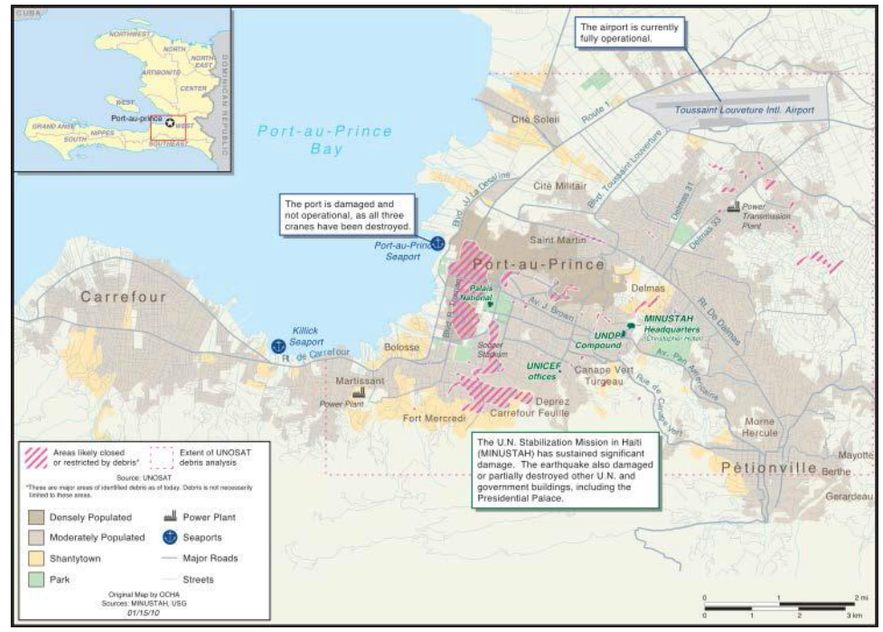
Mark Hainsey, CS JCTD Technical Manager
US Army Corps of Engineers Headquarters, Washington DC
Mark.A.Hainsey@usace.army.mil (202) 761-7638

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.



Port-au-Prince, Haiti

```
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  xmlns:ns3="http://niem.gov/niem/niem-core/2.0" xmlns:nsS="http://nlemgov/niem/domains/maritime/21"
  xmlns:ns6="http://www.example.org/port" xmlns:ns7="http://niem.gov/niem/appinfo/2.0">
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     <ns6:0therCommerclaJActivltiesCode>WAREHOUSES</ns6:0therCommercia lActlvitlesCode>
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     <ns6:CritlcalIssuesExplanatJon>FACILIT ESARE N DISREPAIR AND MAINTENANCE S LAX</ns6:Critical ssuesExplanation>
```

```
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- <ns6:FishingPortInformation nsl:id="13">
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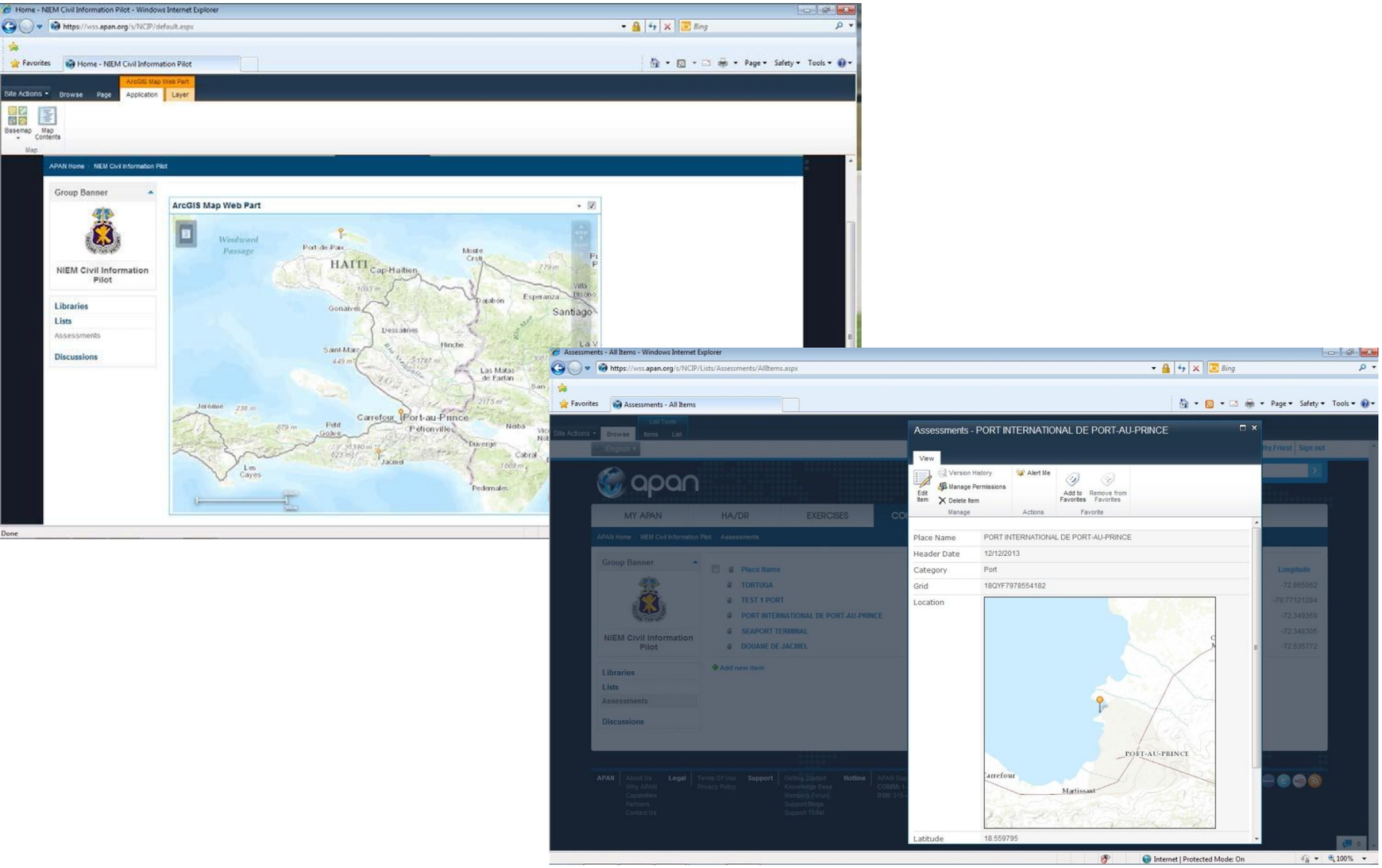
APAN CIE


Home - NIEM Civil Information Pilot - Windows Internet Explorer
Group Banner
NIEM Civil Information Pilot
Libraries
Lists
Assessments
Discussions
ArcGIS Map Web Part
HAITI
Cap-Haïtien
Port-de-Paix
Gonaïves
Dessalines
Saint-Marc
Carrefour
Port-au-Prince
Pétionville
Jacmel
Les Cayes
Jérémie
Santiago
Assessments - All Items - Windows Internet Explorer
Assessments - PORT INTERNATIONAL DE PORT-AU-PRINCE
MY APAN
HA/DR
EXERCISES
Place Name
TORTUGA
TEST 1 PORT
PORT INTERNATIONAL DE PORT-AU-PRINCE
SEAPORT TERMINAL
DOUANE DE JACMEL
Header Date
12/12/2013
Category
Port
Grid
18QYF7978554182
Location
Latitude
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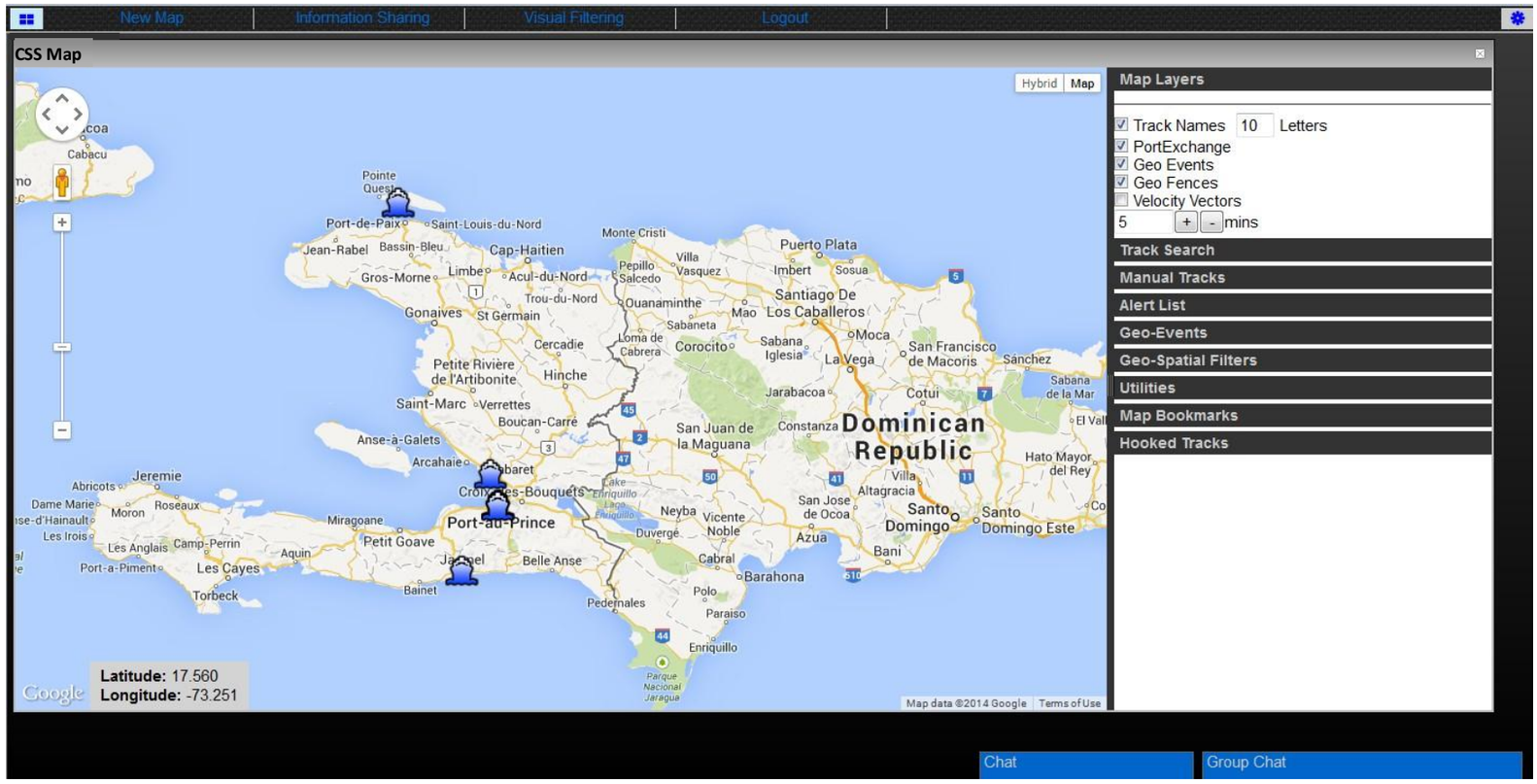
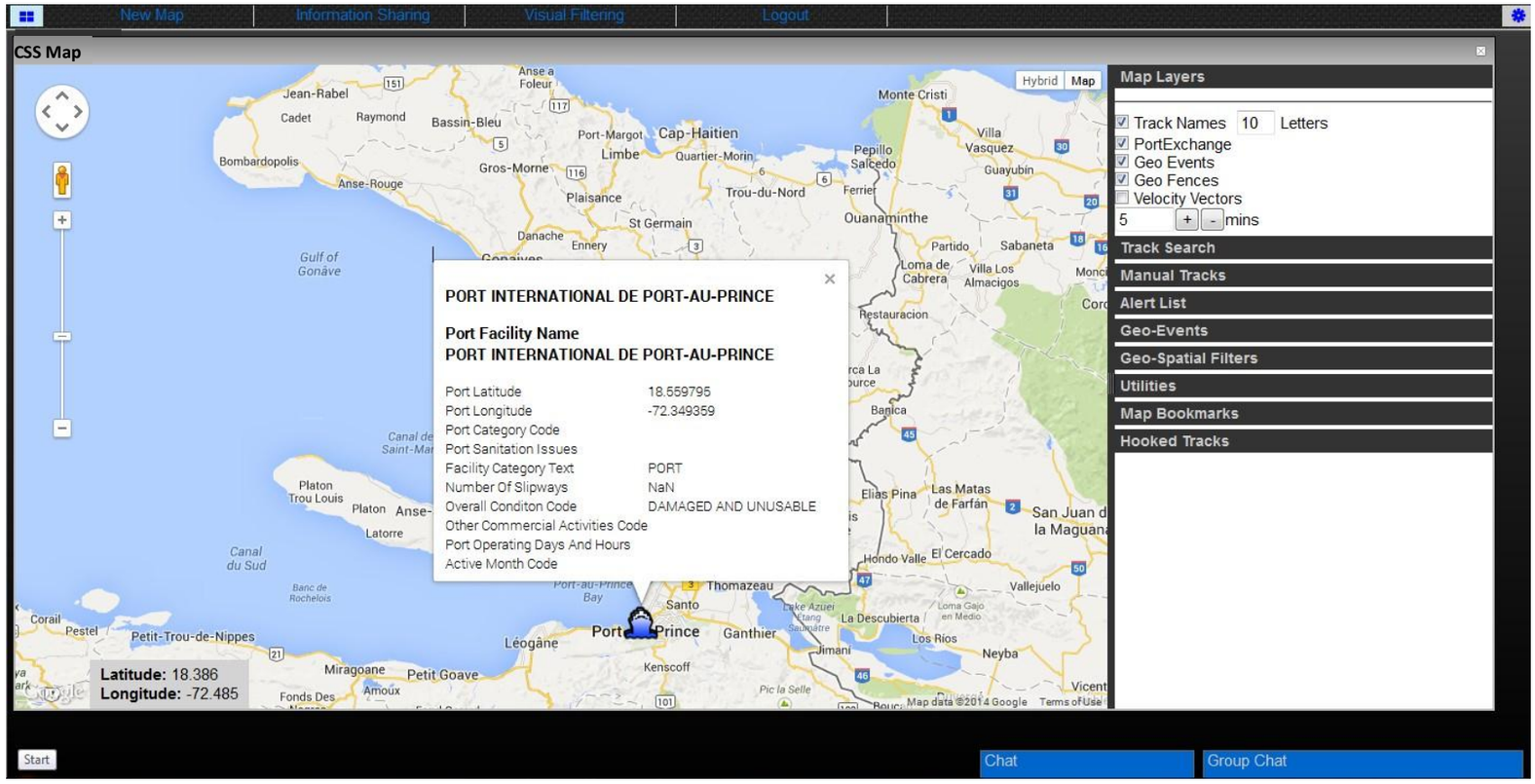
POET-AU-PRINCE
Martissant

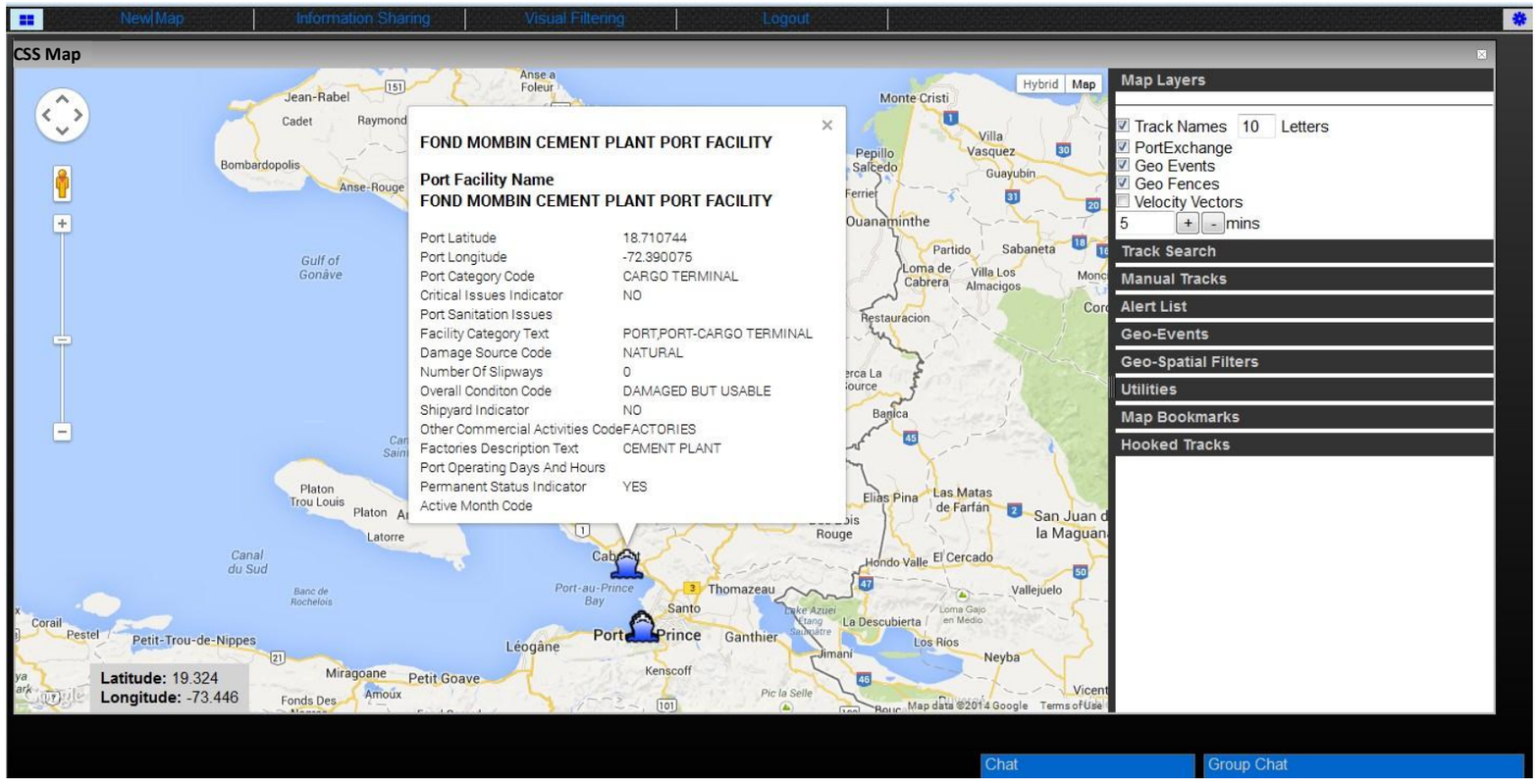
CSS Map View Showing NIEM Object Geolocations



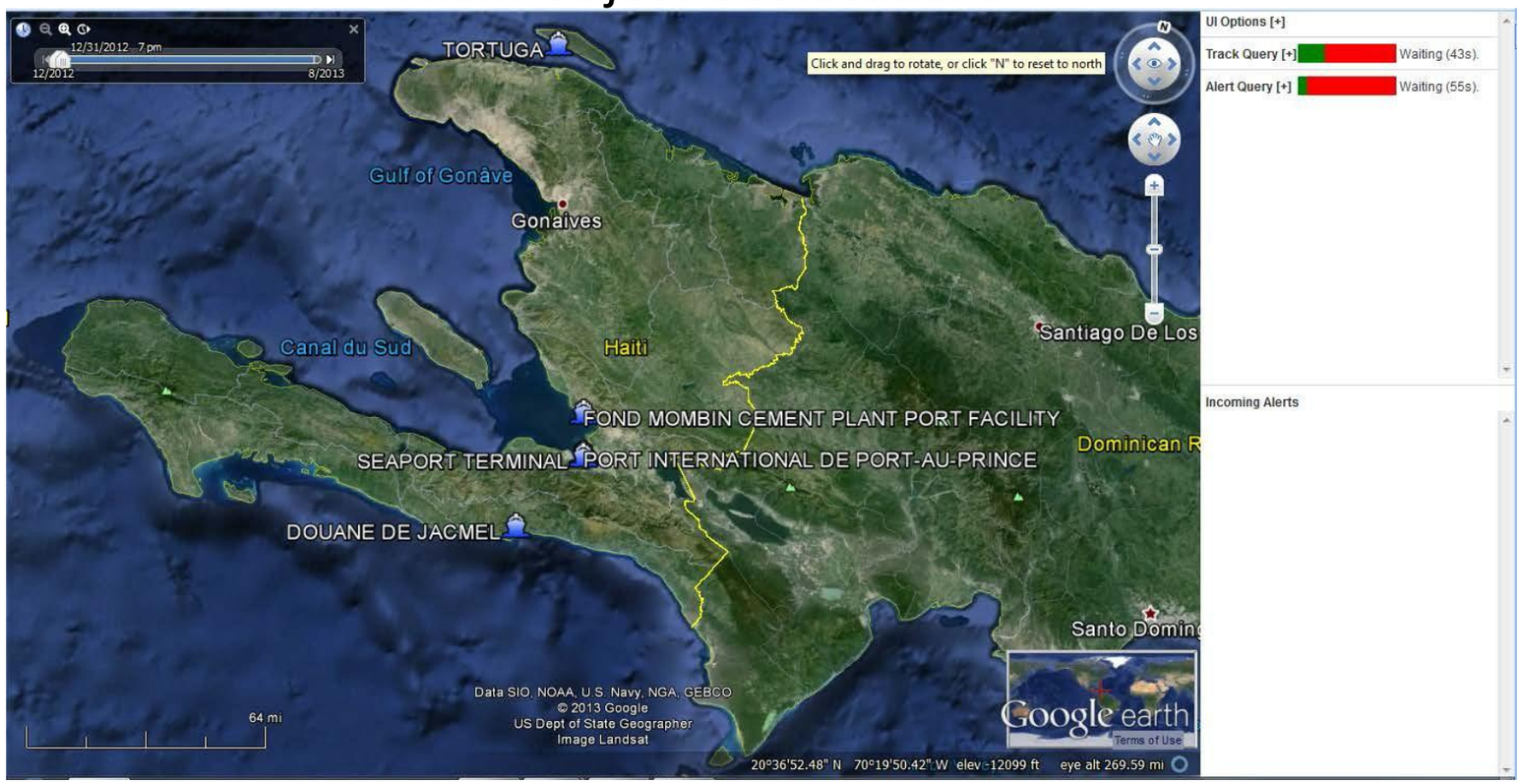
CSS Map View Showing Port Condition Data for Port-au-Prince



CSS Map View Showing Port Condition Data for Cement Plant Port



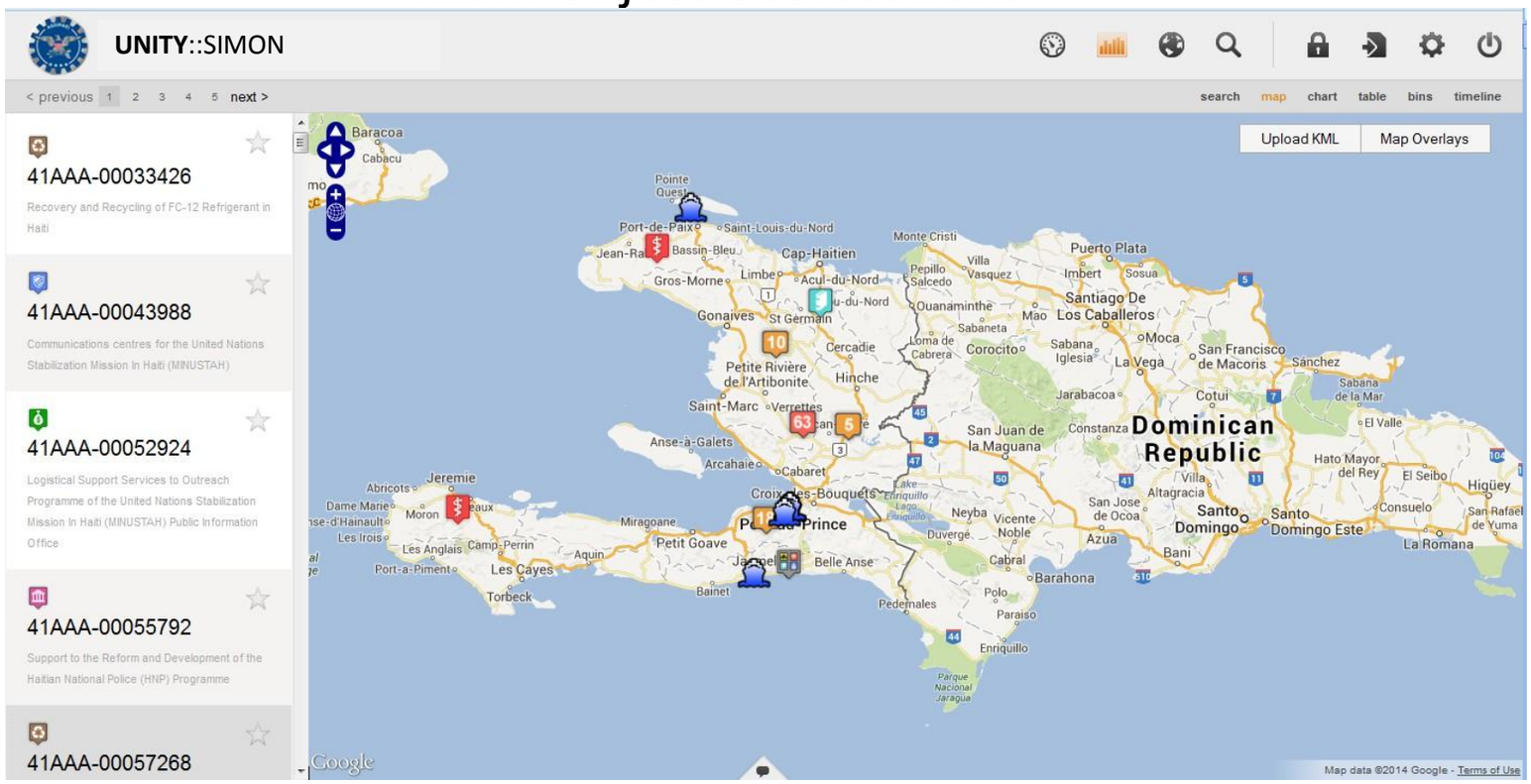
RDA-Lite Map View Showing NIEM Object Geolocations



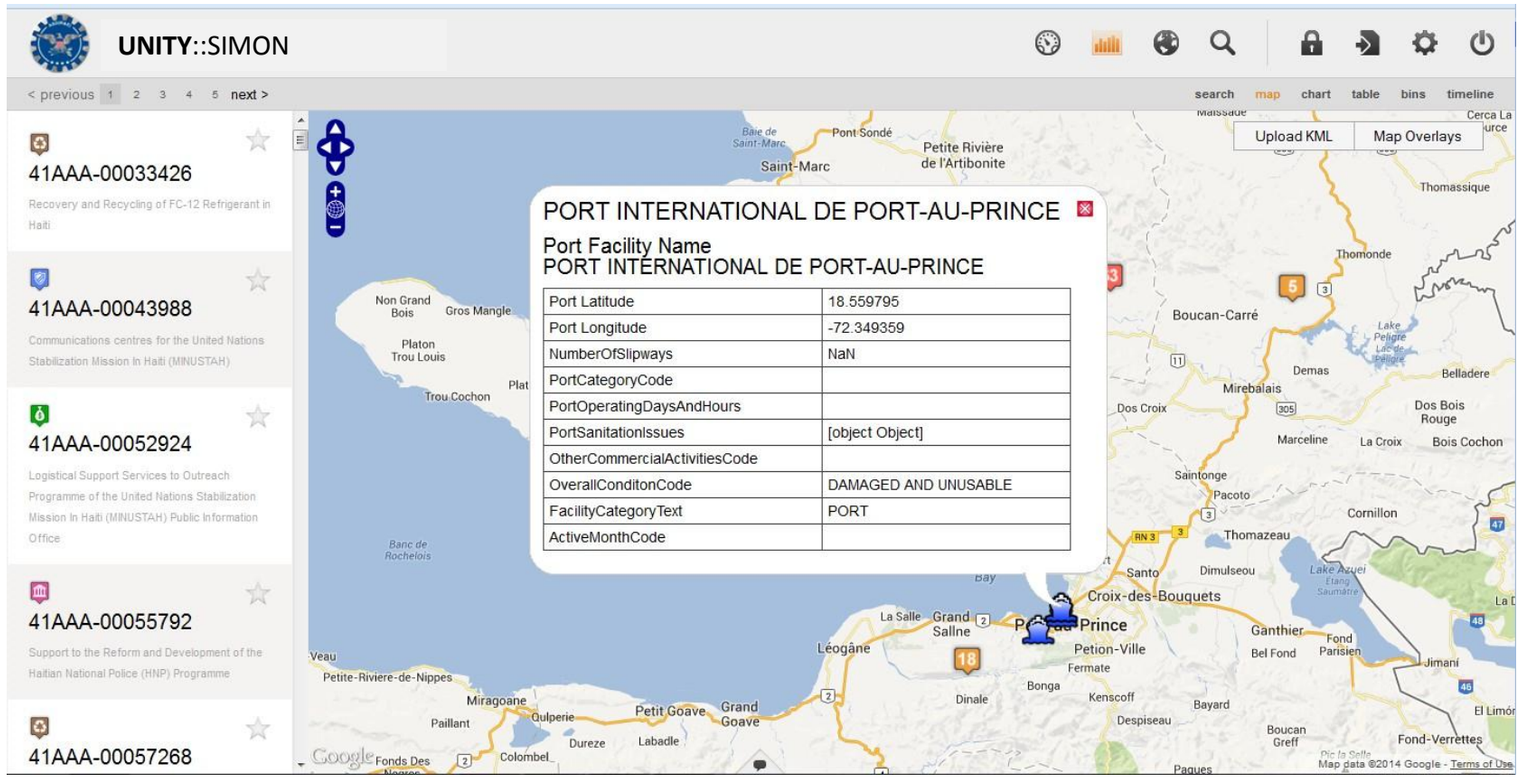
RDA-Lite Map View Showing Port Security Data for Port-au-Prince

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.