CIO/NII
Enabling Net-Centric Operations

Transforming the Way the DoD Manages Data

Office of the DoD CIO

Information Management Directorate

Collected Slides

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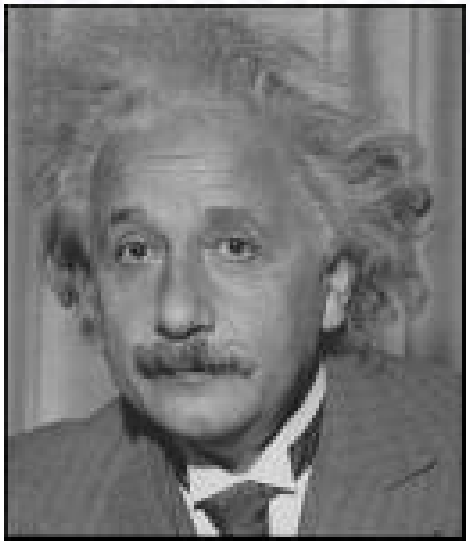
Contents



We can't solve problems by using the same kind of thinking we used when we created them.

Albert Einstein

National Defense Strategy

- March 2005, National Defense Strategy:
  - Identifies a critical needed capability to "conduct network-centric operations."
  - Explicitly recognizes the need for fundamental change to processes, policy, and culture.

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Net-Centricity Objectives

- Deliver capabilities-based service infrastructure for ubiquitous access to timely, secure, decision-quality information by edge users
- Enable information providers to post and share any information they hold
- Enable edge users to:
  - rapidly and precisely discover and pull information resources
  - dynamically form collaborative groups for problem solving
- Provide security for, and coordinated management of, netted information resources
- Supports transition towards Service-Oriented Architectures (SOAs) which, in turn, supports the shift towards ‘data interoperability’ versus ‘application interoperability’

Better information for better decisions

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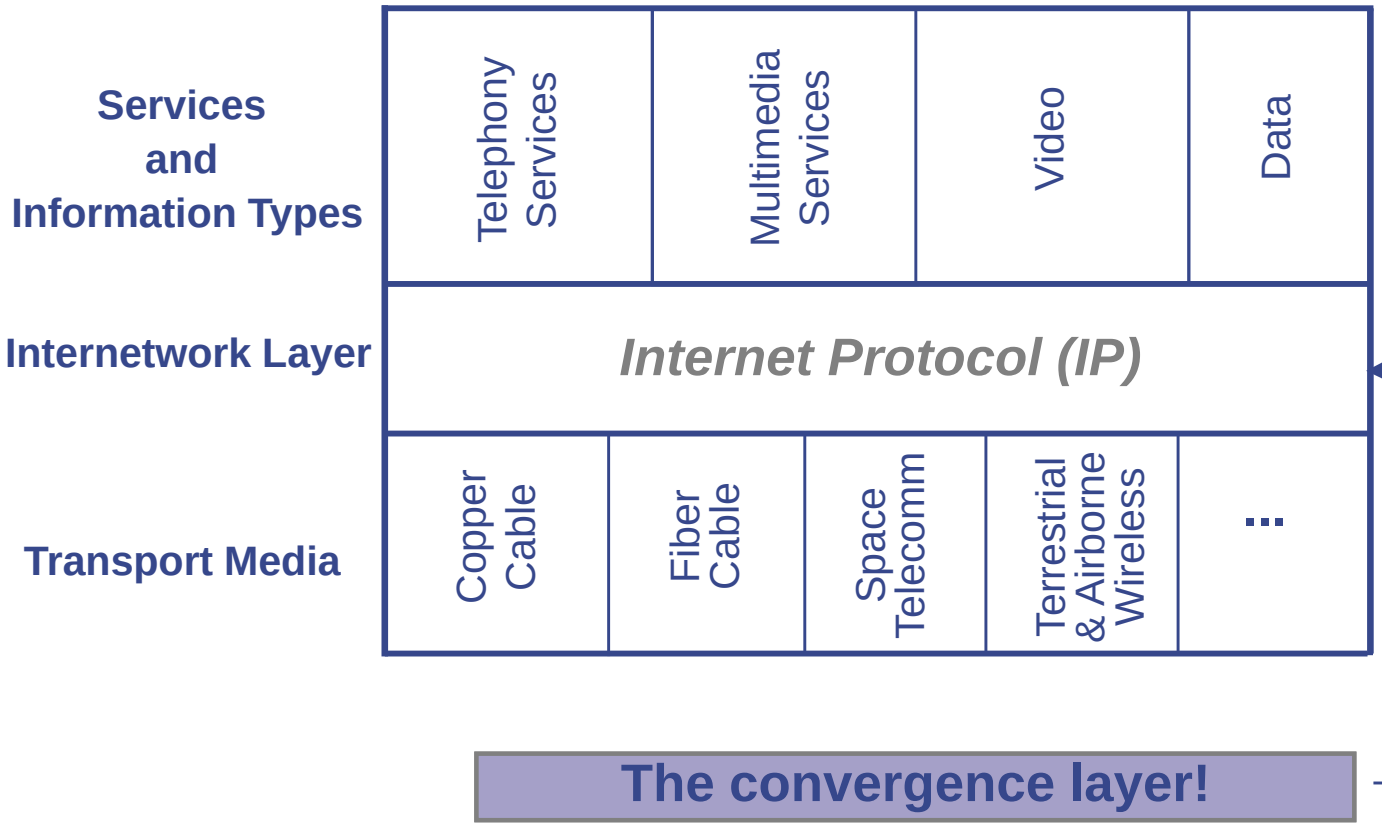
Net-Centric Attributes

- **IPv6** – IP, not point-to-point
- **Security** – IA enabled and encrypted communications
- **Dynamic allocation of access** – trusted access to net resources
- **Only handle information once** – data posted by authoritative sources and visible
- **Post in parallel** – data posted as it is created
- **Smart pull** – applications encourage data discovery
- **Data centric** – data separate from applications
- **Application diversity** – applications posted for use
- **Quality of service** – data timeliness, accuracy, completeness, ease of use

Global Information Grid: IP Based



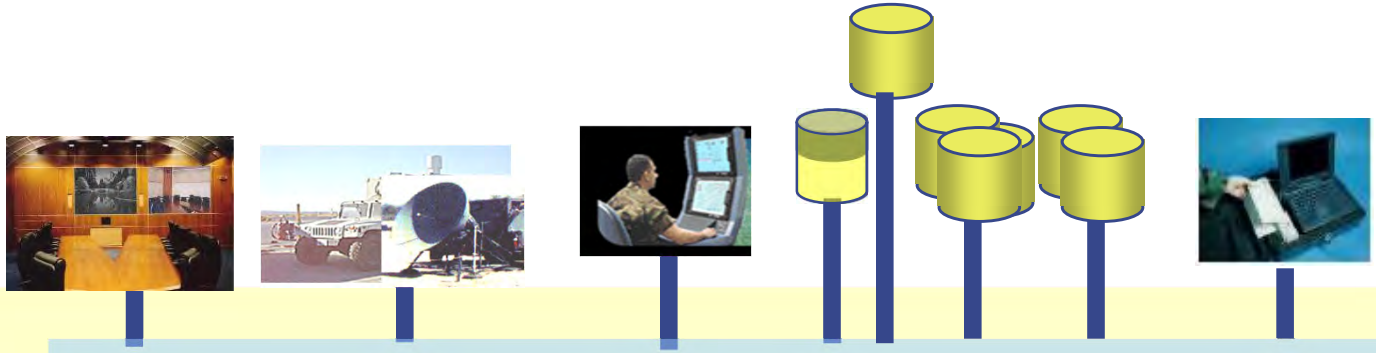
- *World-wide* acceptance and *use*
- *Packet-switched* Internet transport
- Provides *common-user,* integrated services framework
- Provides *standardized interface* between Application and Transport Services
- Used over many network-level protocols (Ethernet, ATM, WAP…)

Net-Centric Enterprise Services (NCES)

Part of the Global Information Grid

Net-Centric Enterprise Services (NCES) provide a common set of information capabilities for timely, secure, ubiquitous edge user access to decision-quality information within the GIG.

GIG Applications and Data



Net-Centric Enterprise Services

9 Core Enterprise Services + APIs

- Enterprise Systems Management - Messaging - Discovery - Mediation
- User Assist - IA/Security - Storage Services - Application - Collaboration

GIG IP-based Transport

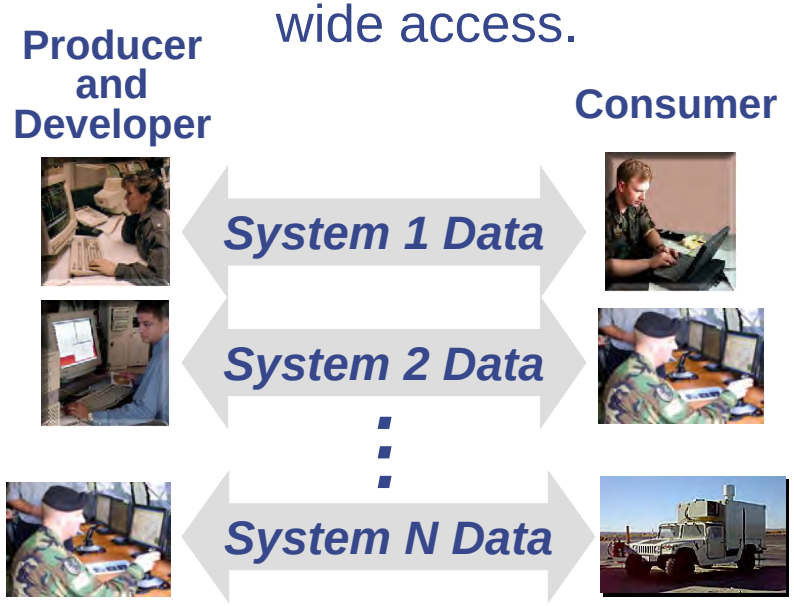
Transformational Communications System (TCS)
Joint Tactical Radio System (JTRS)
Global Information Grid –Bandwidth Expansion (GIG-BE)

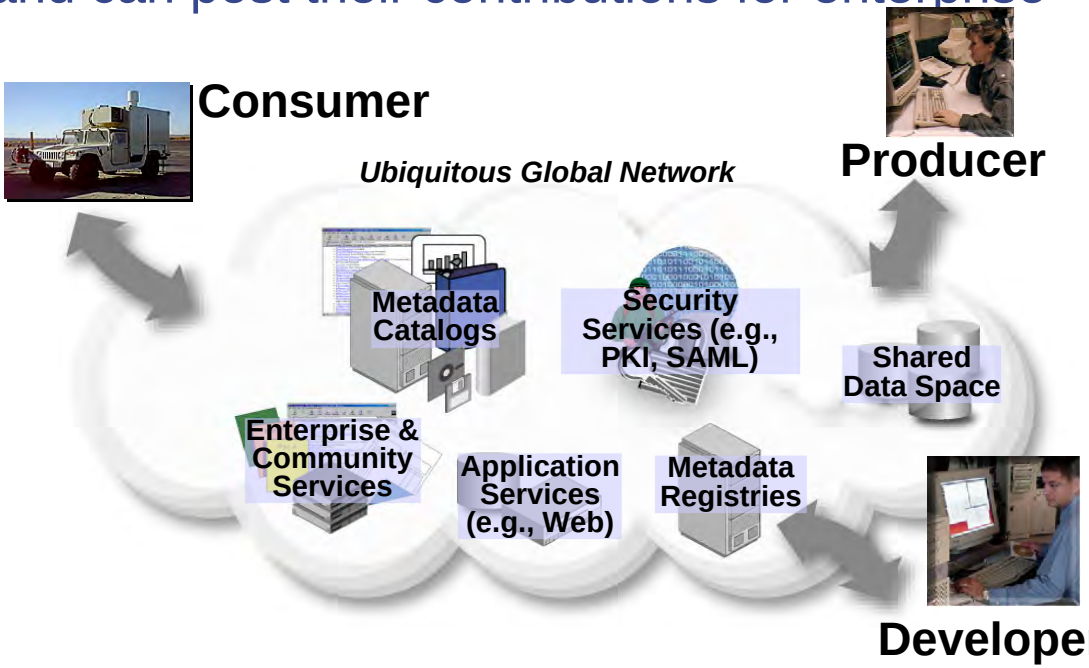
IA/Security
Enterprise Service Management

Enabling Net-Centricity → *Data Strategy*

The Department's Strategy

To move from privately owned and stored data in disparate networks and within legacy systems/applications to an enterprise information environment where authorized known and authorized unanticipated users can access any information and can post their contributions for enterprise-wide access.





From *Producer-centric:*

- Multiple calls to find data
- Private data – only supports planned consumers
- Data translation needed for understanding when pulled from multiple sources

To *Consumer-centric:*

- Data is visible, accessible and understandable
- Shared data – supports planned and unplanned consumers
- Shared meaning of the data enables understanding

Data Sharing in a Net-Centric DoD

- DoDD 8320.2 (signed Dec 2, 2004) directs implementation of the Net-Centric Data Strategy
- The Net-Centric Data Strategy (signed May 9, 2003) is a key enabler of the Department's transformation
- The Strategy provides the foundation for managing the Department's data in a net-centric environment, including:
  - Ensuring data are **visible, accessible,** and **understandable** when needed and where needed to accelerate decision making
  - "Tagging" of all data (intelligence, non-intelligence, raw, and processed) with **metadata to enable discovery** by known and unanticipated users in the Enterprise
  - Posting of all data to **shared spaces** for users to access except when limited by security, policy, or regulations
  - Organizing around **Communities of Interest** (COIs) that are supported by Warfighting, Business, Enterprise Information Environment, and Intelligence **Mission Areas** and their respective **Domains**.

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In a Net-Centric Environment

Data is separate from Applications, and

Data, Value-Added Services, and Applications are:

- Visible – must be discoverable by a person (or machine) who is searching for it
- Accessible – available to someone (or machine) for use
- Understandable – so that it can be acted upon

Data Tagging

Post Data Assets

Smart Pull

Support *Authorized* **Unanticipated User**

Barriers to Identifying, Accessing and Understanding Data

Defining The Data Problem

End-User Consumer

- "What data exists?"
- "How do I access the data?"
- "How do I know this data is what I need?"
- "How can I tell someone what data I need?"

End-User Producer

- "How do I share my data with others?"
- "How do I describe my data so others can understand it?"

BARRIER BARRIER BARRIER BARRIER

User is **unaware** this data exists

Organization "A"

Data Strategy Approach:

Discovery Metadata

User knows this data exists but **cannot access it** because of organizational and/or technical barriers

Organization "B"

Data Strategy Approach:

Web Enabling, Web-service Enabling

User knows data exists and can access it but may not know how to make use of it due to **lack of under-standing** of what data represents

Organization "C"

Data Strategy Approach:

Communities of Interest, Metadata Registry

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Make Data Visible

Tag with DoD Discovery Metadata Specification (DDMS) to aid Enterprise search

Data Catalog (historical)

DDMS Attributes	
Security	*
Title	*
Identifier	*
Creator	*
Publisher	
Contributor	
Date	
Rights	
Language	
Type	
Source	
Subject	*
Geospatial Coverage	
Temporal Coverage	
Virtual Coverage	
Description	
Format	

DDMS endorsed by Executive Order 13388

"Further Strengthening The Sharing Of Terrorism Information To Protect Americans"

* mandatory

DDMS: Leverages Industry Standard

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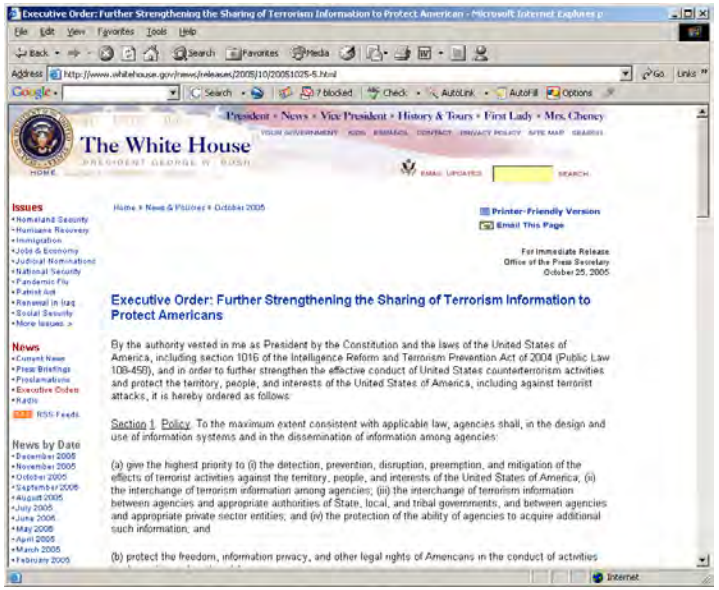
Make Data Accessible

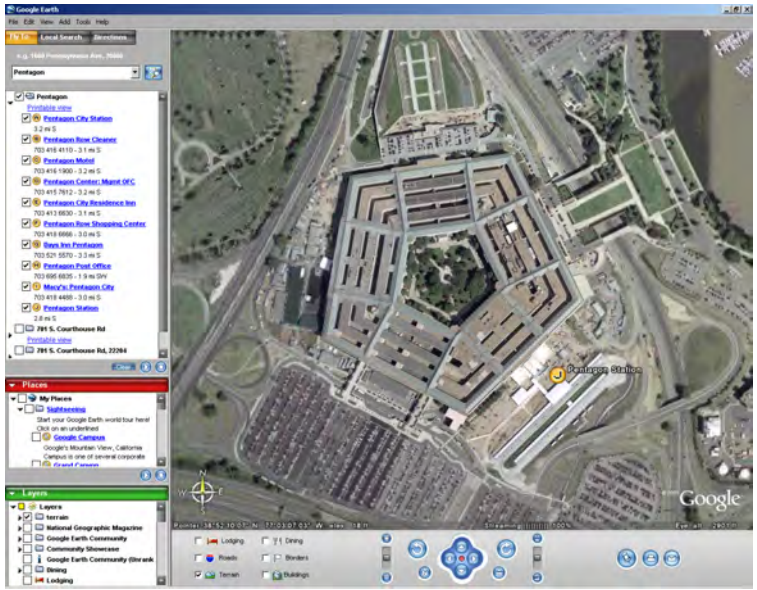
Documents

- Use common formats
- Store in shared spaces accessible via URL



Databases

- Expose data to applications via web services (application interface for the web)
- Expose data to authorized users via browser or thin-client application



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Enable Data To Be Understandable

One reason Government Agencies and Military Services have trouble operating jointly is that they speak different languages.

"Secure the Building!" What does it mean?

- Navy: "Turn off the lights and lock the doors."
- Army: "Surround the building, occupy, and control entry."
- Marines: "Call in close air support, assault with small team, neutralize occupants, fortify and hold at all costs until properly relieved. SEMPER FI!"

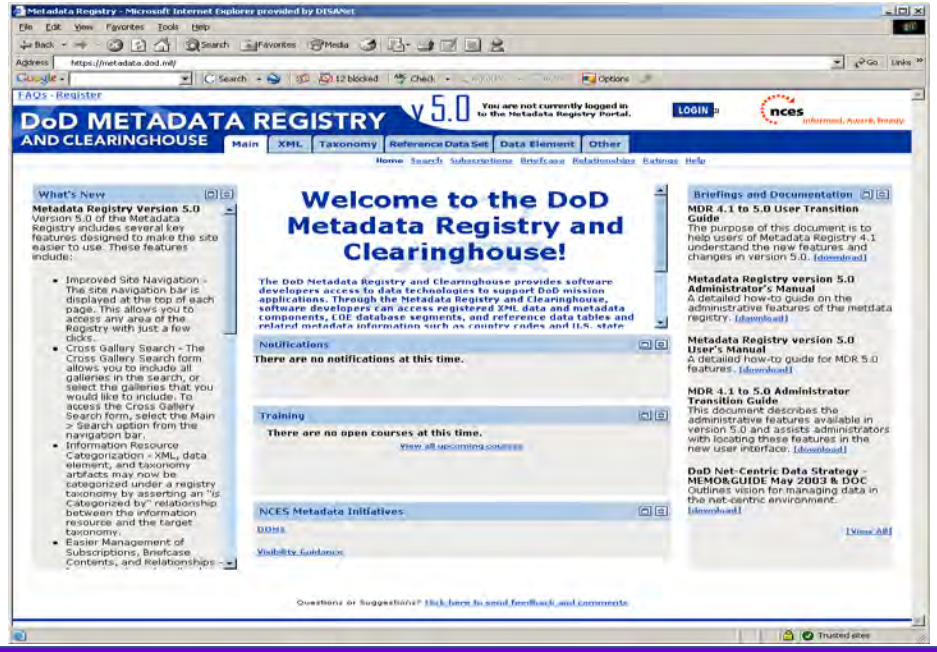
  and…

- Air Force: "Take out a three-year lease with option to buy."

Register Terms, Definitions, & Relationships

DoD Metadata Registry (MDR) and Clearinghouse

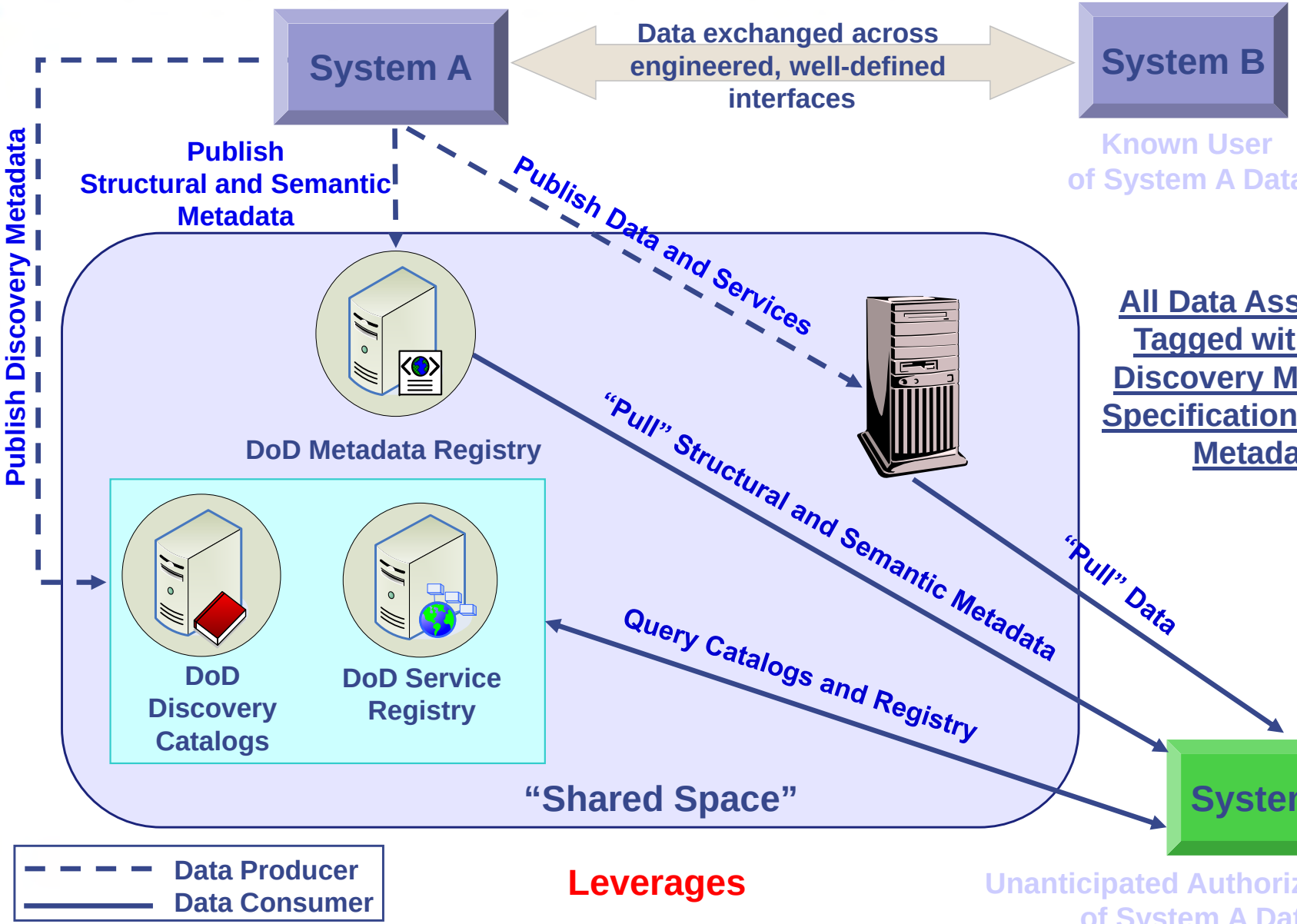
- "One Stop" Publish, Subscribe and Manage capabilities for reusable *structural* metadata components to aid understanding and translations among applications
  - Currently 118K XML items (schema, stylesheet etc) registered
  - 7175 Registered Users from DoD, IC, DHS, NASA and more
  - Unclassified, Secret and Top Secret instances operating
- Run Time support available
- User feedback driven
- Online user-to-developer
- DoD Metadata Working Group



http://metadata.dod.mil

Publishing and Subscribing of Data & Services

Supporting Both Known and Unanticipated Authorized Users



Leverages

Service Oriented Architecture

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Blue Force Tracking (BFT) COI Service

An Implementation of the DoD Net-Centric Data Strategy

BFT Content Providers

FBCB2/EPLRS

Tactical Internet → JVMF IP/MCG → FBCB2 → XML SOAP → BFT SVC

Air Feed

TADIL-J L-16 → ADSI → XML SOAP → BFT SVC

MDACT/USMC

EPLRS/ CNR → VDX IP → IOW → XML SOAP → BFT SVC

MMC

Ground Station → RM → MMC → XML SOAP → BFT SVC

FBCB2/MTS/L-Band

JVMF MTS → Ground Station → RM → FBCB2 → XML SOAP → BFT SVC

Efficient "on-demand" info service

BFT Service (www.bft.smil.mil)

BFT Service PI / CI

BFT Service PI / CI

BFT Service PI / CI

BFT Service PI / CI

BFT Service PI / CI

Ad/Sub Propagation

Info Delivery

Filtering

Query

QoS

Consolidation

NCES

Service Discovery

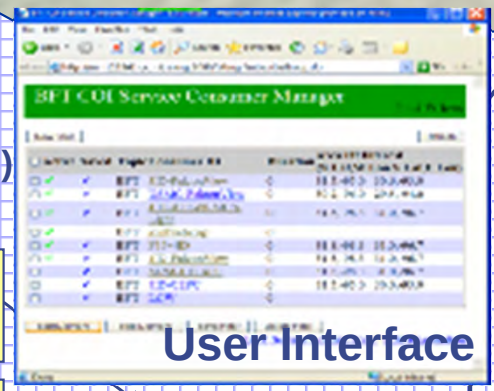
Security

Messaging

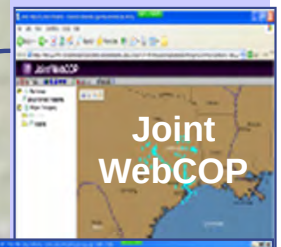
ESM

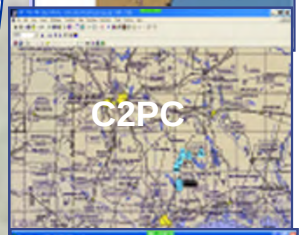
NCES Integration

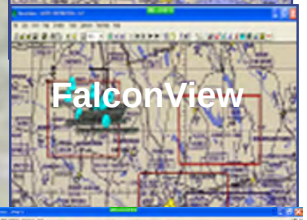
Web Services Info Grid

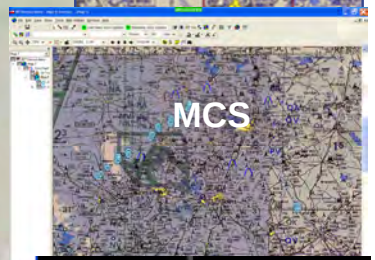


BFT Service Consumers









DoD Discovery Metadata Specification (DDMS)

Core Layer Category Set	Primary Category	Obligation
The Security elements enable the description of security classification and related fields	Security	Mandatory
Resource elements enable the description of maintenance and administration information	Title	Mandatory
	Identifier	Mandatory
	Creator	Mandatory
	Publisher	Optional
	Contributor	Optional
	Date	Optional
	Rights	Optional
	Language	Optional
	Type	Optional
	Source	Optional
The Summary Content elements enable the description of concepts and topics	Subject	Mandatory
	Geospatial Coverage	Mandatory unless not Applicable
	Temporal Coverage	Mandatory unless not Applicable
	Virtual Coverage	Optional
	Description	Optional
The Format elements enable the description of physical attributes of the asset	Format	Optional
The COI Extensible Layer elements enable Communities to define additional discovery metadata	COI defined	Optional

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BFT C2 COI – Content Provider Advertisement (DDMS)

```
<?xml version="1.0" encoding="UTF-8" ?>
- <ddms:Resource xmlns:ddms="http://metadata.dod.mil/mdr/ns/DDMS/1.3/" xmlns:ICISM="urn:us:gov:ic:isr
  xmlns:gml="http://www.opengis.net/gml" xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
  xsi:schemaLocation="http://metadata.dod.mil/mdr/ns/DDMS/1.3/ DDMS-v1_3.xsd">
  <ddms:identifier ddms:qualifier="http://metadata.dod.mil/mdr/ns/MDR/0.1/MDR.owl#URI"
    ddms:value="http://www.defenselink.mil/news/May2004/n05172004_200405174.html" />
  <ddms:title ICISM:classification="U" ICISM:ownerProducer="USA">BFT</ddms:title>
  <ddms:description ICISM:classification="U" ICISM:ownerProducer="USA">Troops on search and rescue</ddms:
  <ddms:language ddms:qualifier="http://metadata.dod.mil/mdr/ns/ExtStd/iso_639-2b.owl#en" ddms:value=
  <ddms:dates ddms:posted="2006-07-17" />
  <ddms:rights ddms:copyright="true" ddms:privacyAct="false" ddms:intellectualProperty="true" />
- <ddms:creator ICISM:classification="U" ICISM:ownerProducer="USA">
  - <ddms:Organization>
      <ddms:name>Army</ddms:name>
      <ddms:name>3ID</ddms:name>
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  </ddms:creator>
+ <ddms:publisher ICISM:classification="U" ICISM:ownerProducer="USA">
+ <ddms:format>
- <ddms:subjectCoverage>
  - <ddms:Subject>
      <ddms:category ddms:qualifier="http://metadata.dod.mil/mdr/ns/TaxFG/0.75c                owl" ddms:c
        ddms:label="Terrorism Event" />
      <ddms:category ddms:qualifier="http://metadata.dod.mil/mdr/ns/BFT/0.1/BFT                ction-task
        ddms:label="Search and rescue" />
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  </ddms:subjectCoverage>
- <ddms:temporalCoverage>
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  - <ddms:GeospatialExtent>
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        <ddms:name>Iraq</ddms:name>
        <ddms:countryCode ddms:qualifier="http://metadata.dod.mil/mdr/ns/ExtStd/1.0/FIPS10-4-2.owl#IZ" />
      </ddms:geographicIdentifier>
    - <ddms:boundingBox>
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        <ddms:EastBL>34.47</ddms:EastBL>
        <ddms:SouthBL>42.38</ddms:SouthBL>
        <ddms:NorthBL>41.48</ddms:NorthBL>
      </ddms:boundingBox>
    + <ddms:verticalExtent ddms:unitOfMeasure="Mile" ddms:datum="AGL">
    </ddms:GeospatialExtent>
  </ddms:geospatialCoverage>
  <ddms:security ICISM:classification="U" ICISM:ownerProducer="USA" />
</ddms:Resource>
```

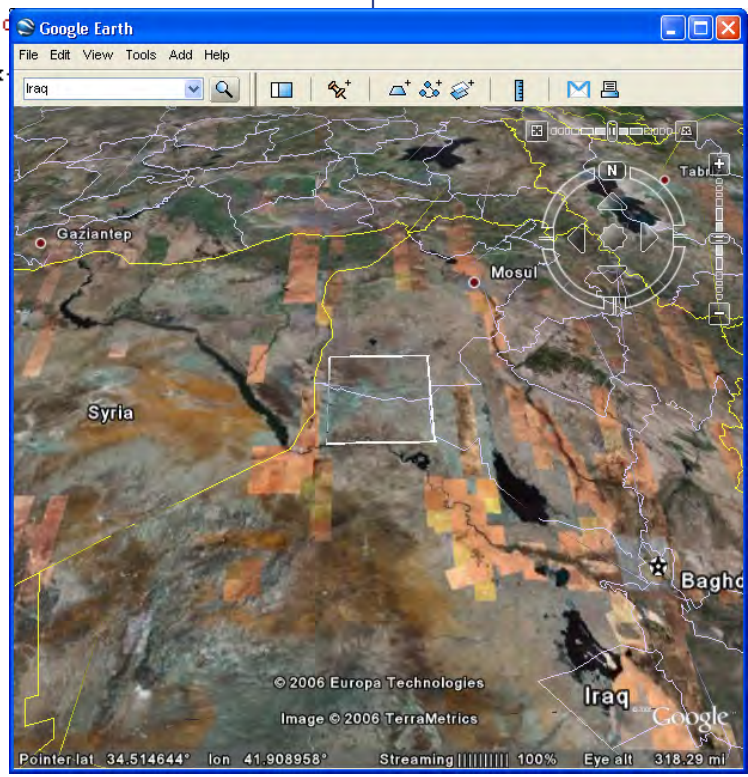
What

When

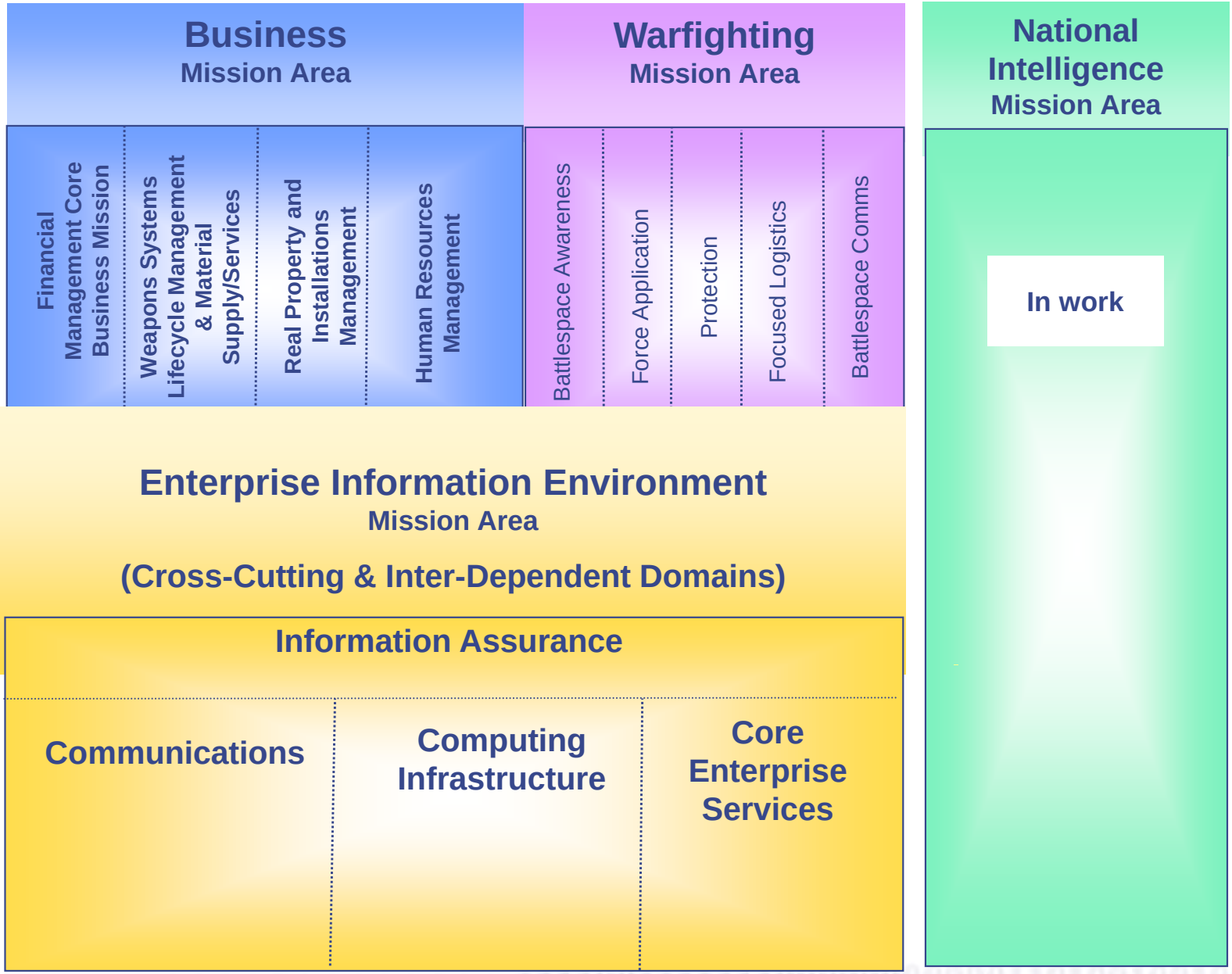
Where

BFT Content Provider Advertisements

“ Army 3rd Infantry Division Unclassified Search and Rescue in AOI1 …”



DoD and Related National Intelligence Information Portfolios



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29-Aug-05

Data Sharing Responsibilities

Key Goal of DoDD 8320.2	What is the Role of the Enterprise?	What is the Role of the COI?
Make data visible	• Maintain DoD Discovery Metadata Specification (DDMS) to facilitate DoD-wide search • Develop and maintain Enterprise search capability	• Tag data holdings with discovery metadata (DDMS) • Extend for COI specific search criteria • Register access services in Enterprise service registry
Make data accessible	• Maintain repository of acceptable commercial standards for web-based services • Develop and maintain Enterprise federated service registry	• Implement access services
Make data understandable	• Maintain DoD Metadata Registry • Develop and maintain federated metadata registry for semantic and structural metadata	• Develop and maintain vocabularies, taxonomies for data exchange • Register these agreements in DoD metadata Registry

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What is a COI?

- **A community formed to solve a data-sharing problem (per DoD Net-Centric Data Strategy)**
  - **"What is the information sharing problem we want to solve?"**
- **What does a COI do?**
  - **Work together to resolve the issues that affect their community**
  - **Establish community standards on how information will be exchanged within the COI**
- **What can't a COI do?**
  - **COIs do not operate systems or provide services**
  - **COIs do not submit POMs**
  - **COIs do not direct changes to ICDs, ORDs, CDDs, or CPDs**

However, *members* of COIs ***do!***

Steps to Implement Information Sharing

1. Describe in one sentence the community's information sharing problem
2. Identify information assets that must be accessed to solve that information sharing problem
3. Tag information sharing assets with DDMS compliant discovery metadata (DISA has an automated tool)
4. Register discovery metadata with Enterprise search service
5. Implement a service to make the information accessible to authorized users
6. Register metadata about the information asset in the DoD Metadata Registry
7. Develop a standards-based User Defined Operating Picture (UDOP) to view the information assets.

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Technology view of what does a COI does

- Make their data assets visible and accessible
  - Visible via service registry (WSDL), metadata registry (XSD), and data catalogs (DDMS)
  - Accessible via web services and common mime types
- Define COI-specific vocabularies and taxonomies
  - Vocabularies to improve data exchange within COI and among COIs
  - Taxonomies to improve precision discovery
- Register semantic and structural metadata to the DoD Metadata Registry (http://metadata.dod.mil)
  - XML Gallery for XML schemas, stylesheets, domain sets, samples
  - Taxonomy Gallery for discovery taxonomies (OWL syntax)

http://www.defenselink.mil/nii/org/cio/doc/COI_FAQ.doc

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Objectives

Purpose of the COI: One sentence that describes the information sharing problem that this community wants to solve.

Definition of a COI from DOD Directive 8320.2 –

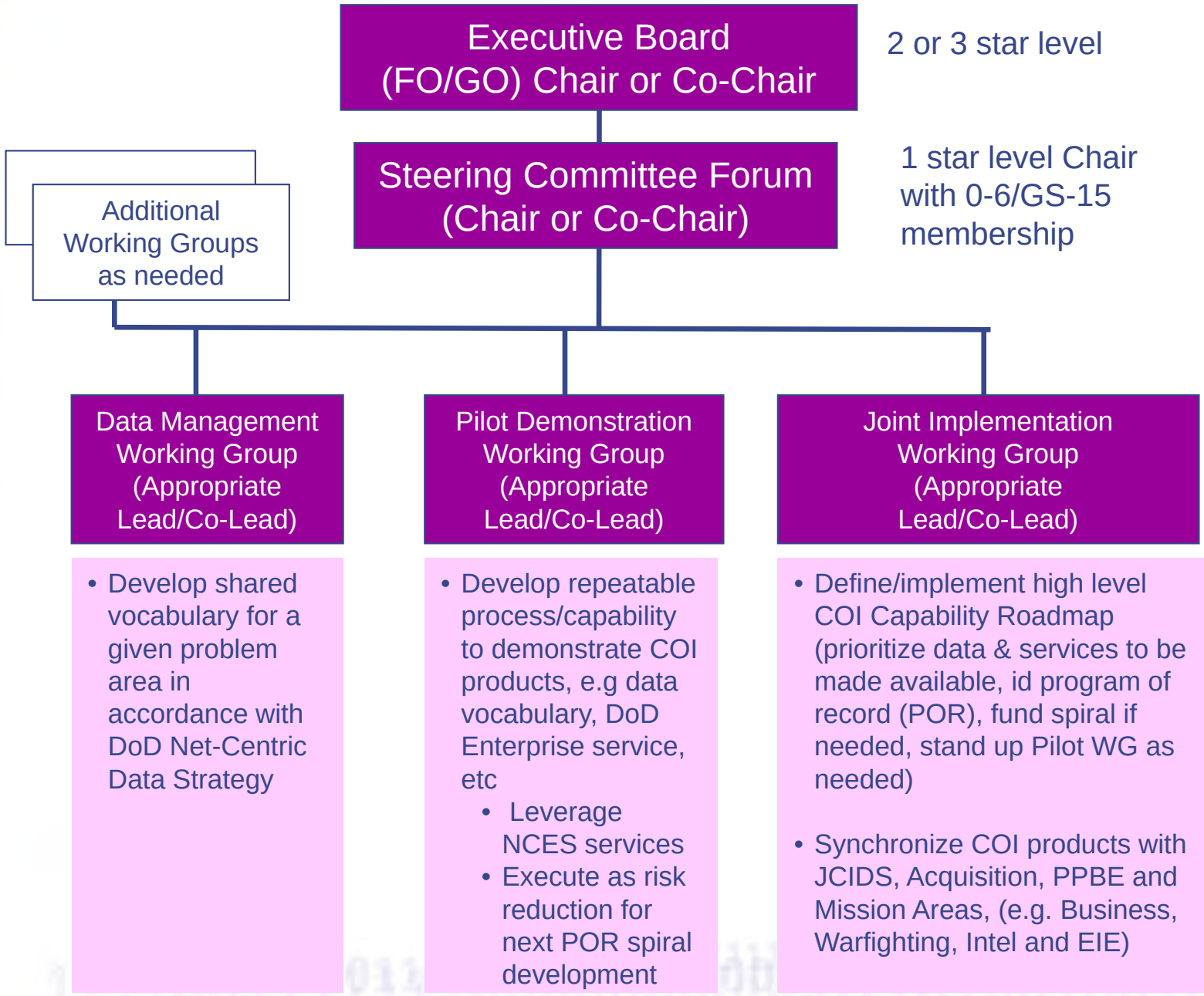
Community of Interest (COI). A collaborative group of users that must exchange information in pursuit of its shared goals, interests, missions, or business processes and therefore must have shared vocabulary for the information it exchanges.

Purpose of the COI Pilot: One sentence that describes the net-centric capabilities the COI pilot will demonstrate that begin to solve the information sharing problem, and designates the lead component for the pilot.

- Registered Community-based Vocabulary, Schema and Data Services
- Repeatable Process – Risk Reduction Pilots for Programs of Record
- Adoption/Enforcement Memo to Requirements, Acquisition, and Budgeting Process Owners for Programs of Record

draft

Sample COI Governance Chart



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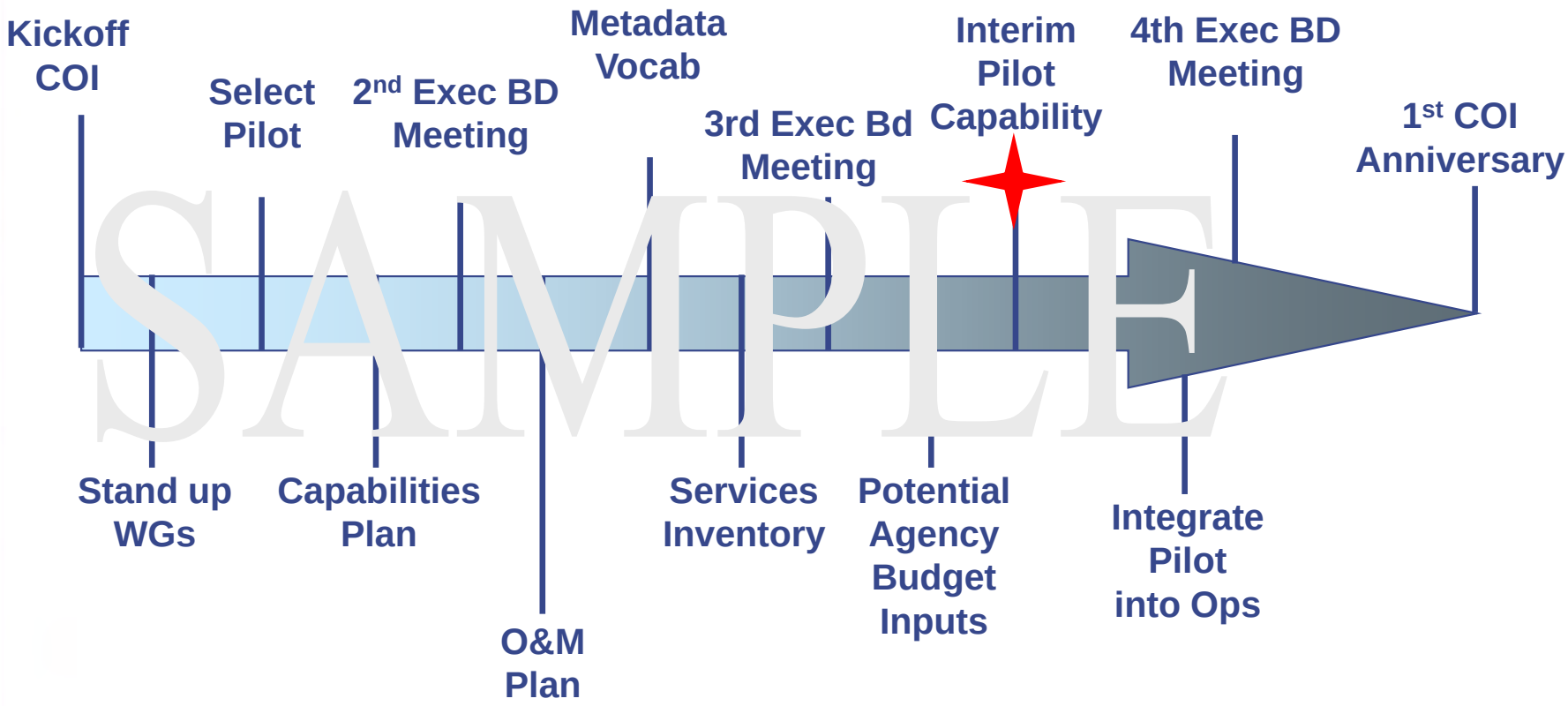
COI Pilot Plan of Action & Milestones

High-level Graphic with dependencies, decision points, and final demonstrated illustrated.

Scope - Metrics - Resources



SAMPLE

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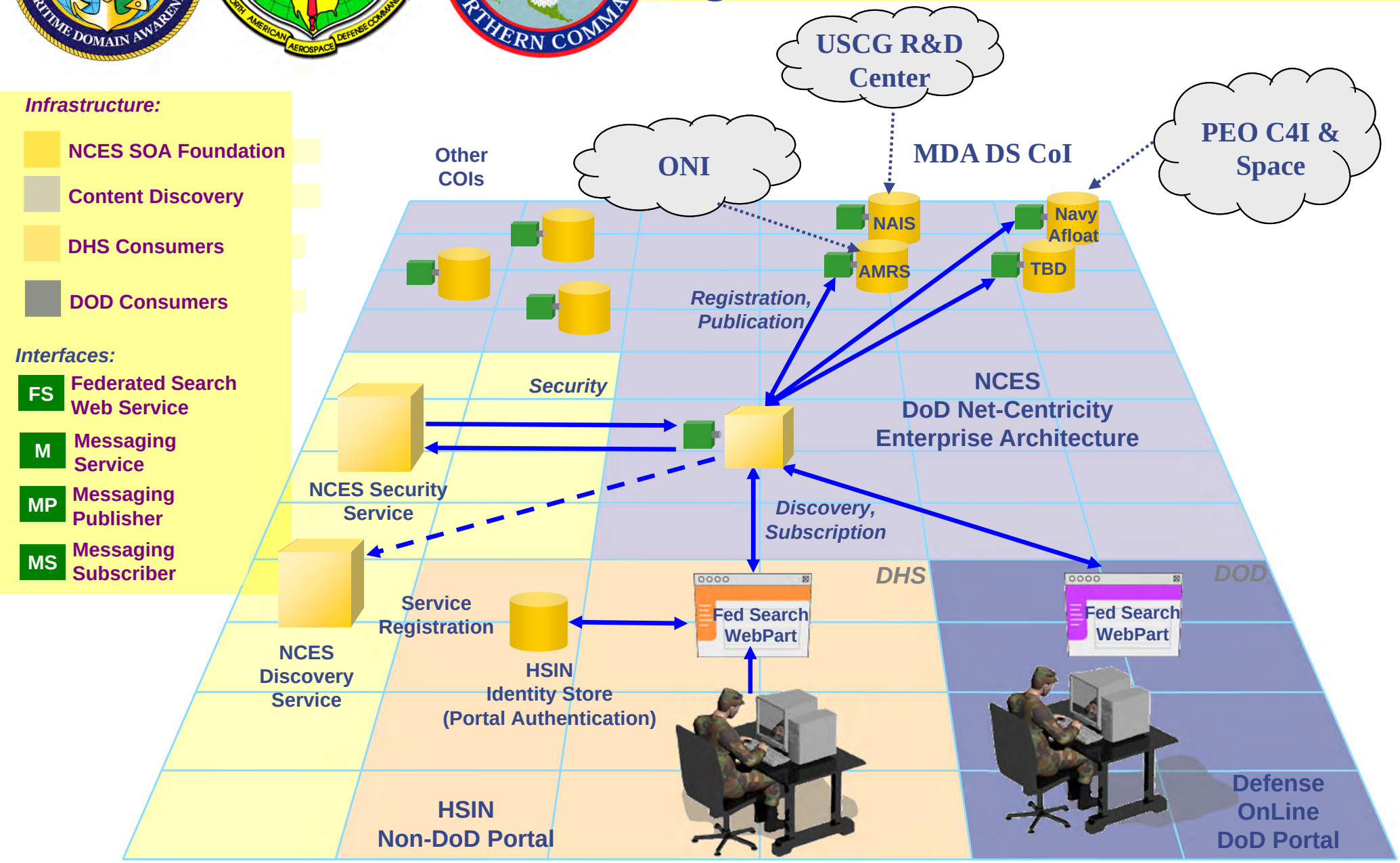
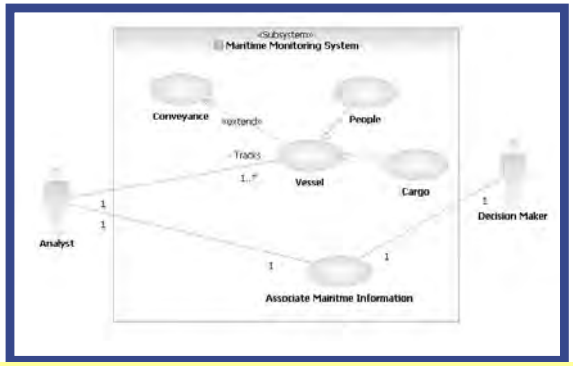
UNCLASSIFIED

Maritime Domain Awareness COI High-Level Pilot Architecture

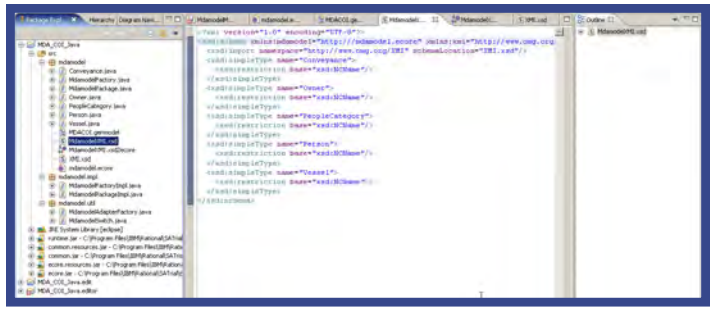


DoD/DHS Partnership ! – Unclassified AIS Information

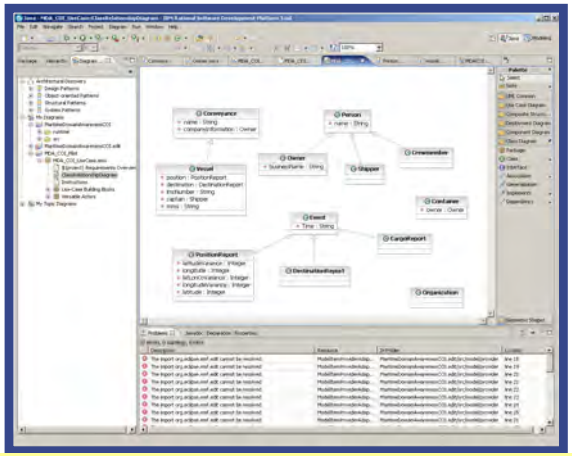
Sample Data Management WG Process



Develop UML Use-Case



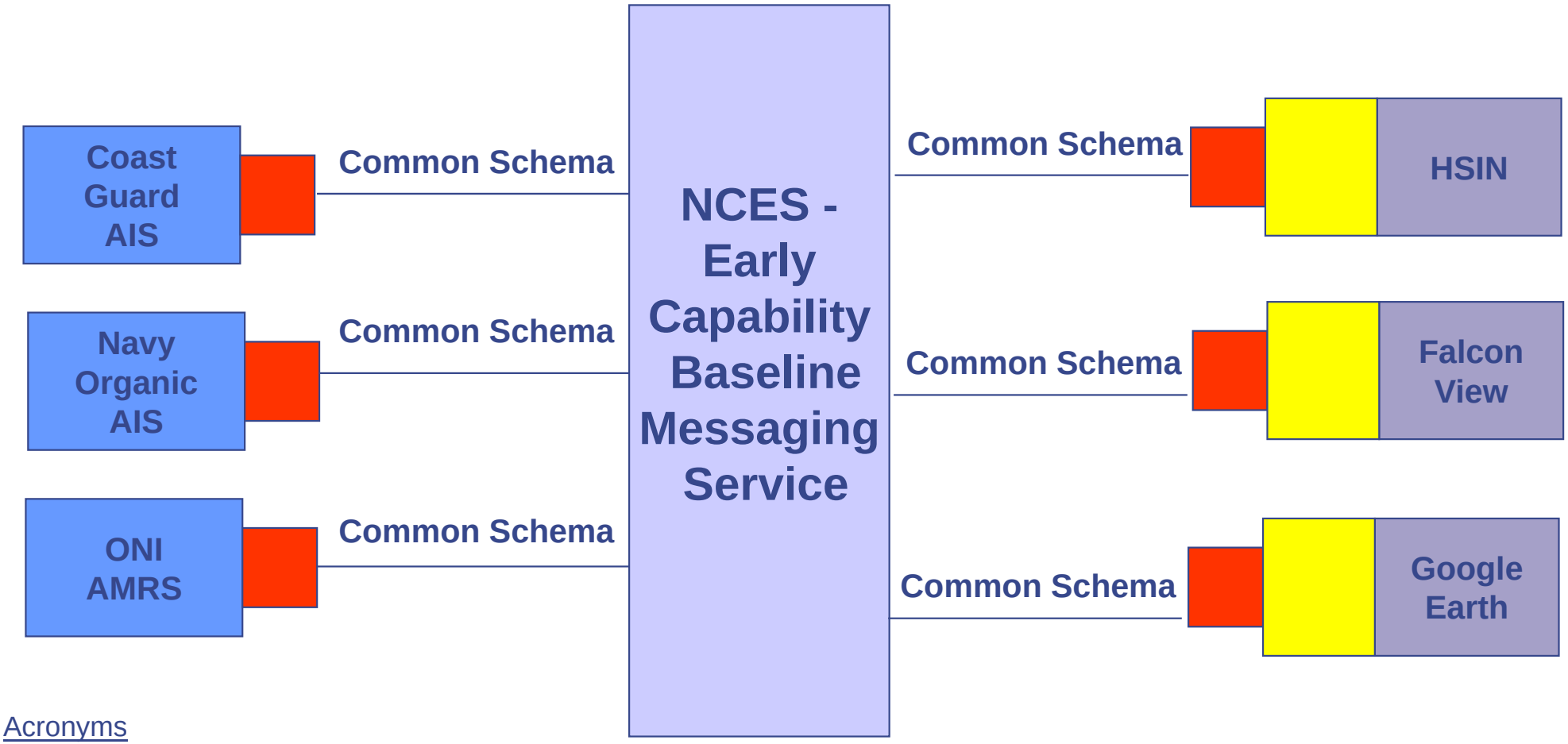
Generate XSD - XML



Class-Relationship Diagram

Data Vocabulary and Schema

Maritime Domain Awareness COI Pilot Pub-Sub Architecture



Acronyms
AIS := Automated Identification System
AMRS := Automated Maritime Reporting System
NCES := Net-Centric Enterprise Services
HSIN := Homeland Security Information Network

= Wrapper

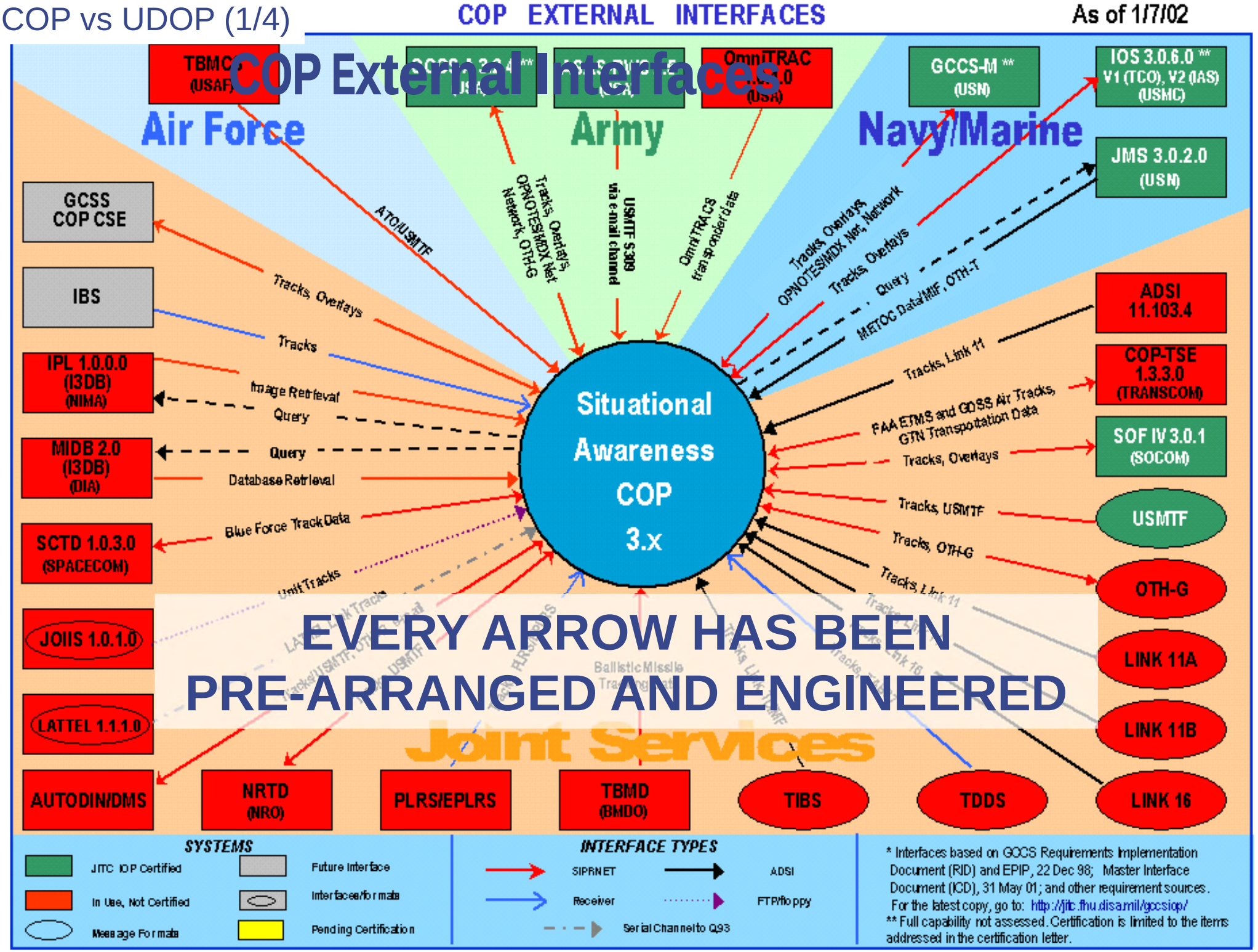
COP vs UDOP

- COP = Common Operational Picture
- UDOP = User-Defined Operational Picture

- A COP is a visual representation of a common database shared by some community
  - The information available is limited to pre-arranged data sources

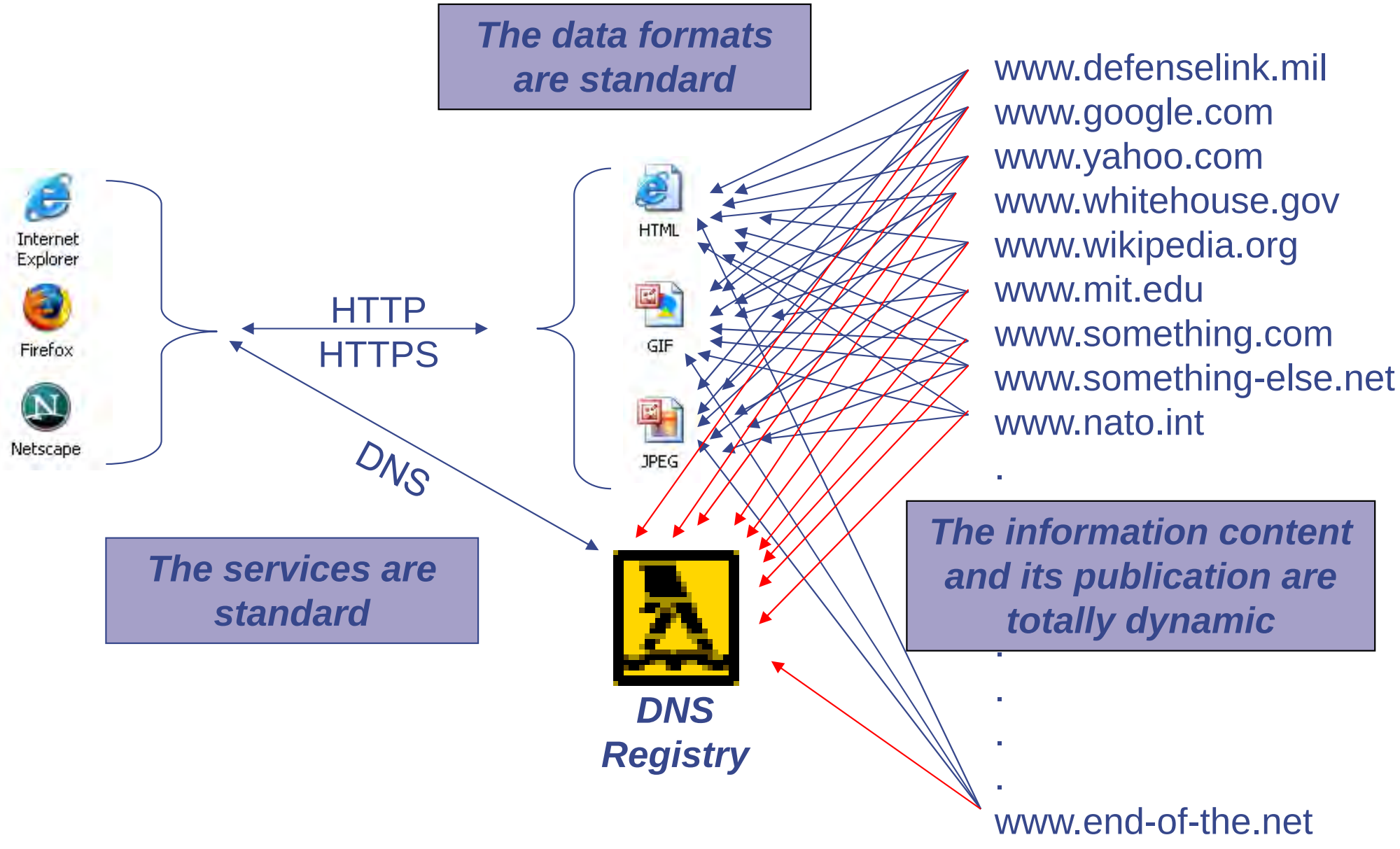
- A UDOP is a visual representation of data sources *which are available in common to the community*
  - The information available is not pre-determined

CIO/NII Enabling Net-Centric Operations


COP EXTERNAL INTERFACES
As of 1/7/02
COP External Interfaces
Air Force
Army
Navy/Marine
TBMCS (USAF)
OmniTRAC (USA)
GCCS-M ** (USN)
IOS 3.0.6.0 ** V1 (TCO), V2 (IAS) (USMC)
JMS 3.0.2.0 (USN)
GCSS COP CSE
IBS
IPL 1.0.0.0 (I3DB) (NIMA)
MIDB 2.0 (I3DB) (DIA)
SCTD 1.0.3.0 (SPACECOM)
JOIIS 1.0.1.0
LATTEL 1.1.1.0
ADSI 11.103.4
COP-TSE 1.3.3.0 (TRANSCOM)
SOF IV 3.0.1 (SOCOM)
USMTF
OTH-G
LINK 11A
LINK 11B
LINK 16
Situational Awareness COP 3.x
ATO/USMTF
Tracks, Overlays
Tracks
Image Retrieval
Query
Database Retrieval
Blue Force Track Data
Unit Tracks
Tracks, OPNOTES/MDX Net, Network, OTH-G
USMTF S309 via e-mail channel
OmniTRACS transponder data
Tracks, Overlays, OPNOTES/MDX Net, Network
Tracks, Overlays
Query
METOC Data/MIF, OTH-T
Tracks, Link 11
FAA ETMS and GDSS Air Tracks, GTN Transportation Data
Tracks, Overlays
Tracks, USMTF
Tracks, OTH-G
Tracks, Link 11
Joint Services
AUTODIN/DMS
NRTD (NRO)
PLRS/EPLRS
TBMD (BMDO)
TIBS
TDDS
EVERY ARROW HAS BEEN PRE-ARRANGED AND ENGINEERED
SYSTEMS
JITC IOP Certified
In Use, Not Certified
Message Formats
Future Interface
Interface/formats
Pending Certification
INTERFACE TYPES
SIPRNET
Receiver
Serial Channel to Q93
ADSI
FTP/floppy
* Interfaces based on GCCS Requirements Implementation Document (RID) and EPIP, 22 Dec 98; Master Interface Document (ICD), 31 May 01; and other requirement sources. For the latest copy, go to: http://jitc.fhu.disa.mil/gccsiop/
** Full capability not assessed. Certification is limited to the items addressed in the certification letter.

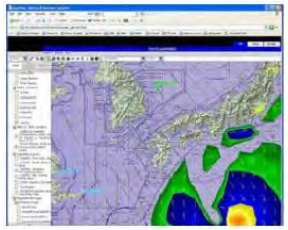
Web Browser Interfaces

a counter-example

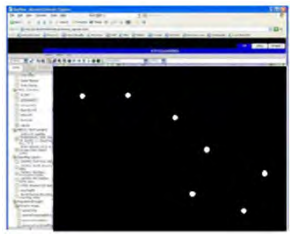


UDOP Interfaces

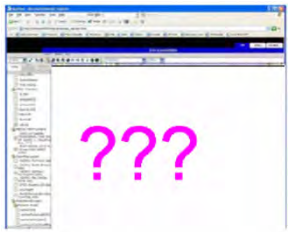
The services and data formats need to be defined and agreed upon



WebCOP-NG



SISP



Other UDOP App

SOAP

UDDI

Service Registry

Army Data Provider
Navy Data Provider
USAF Data Provider
USMC Data Provider
NRO Data Provider
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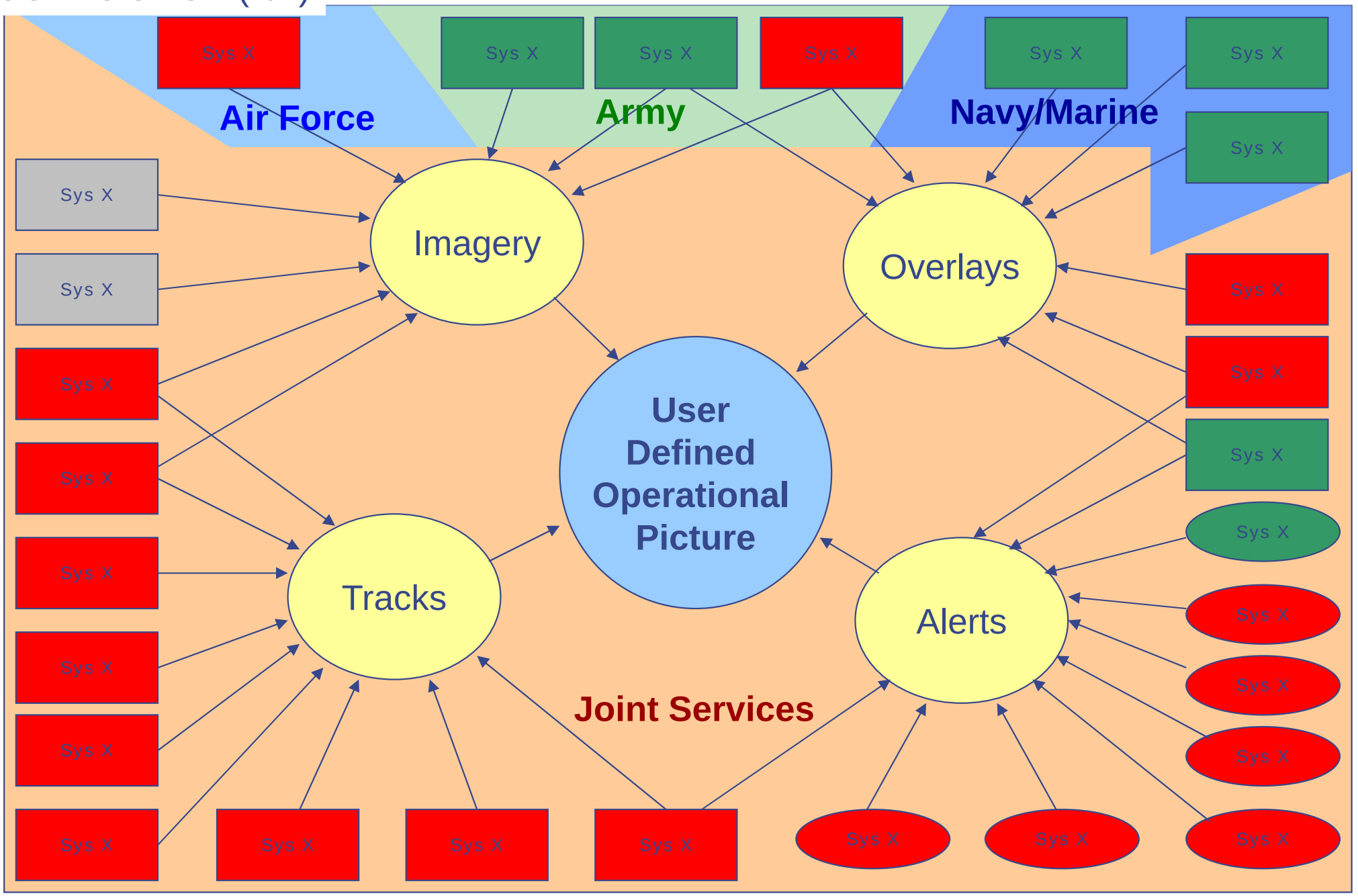
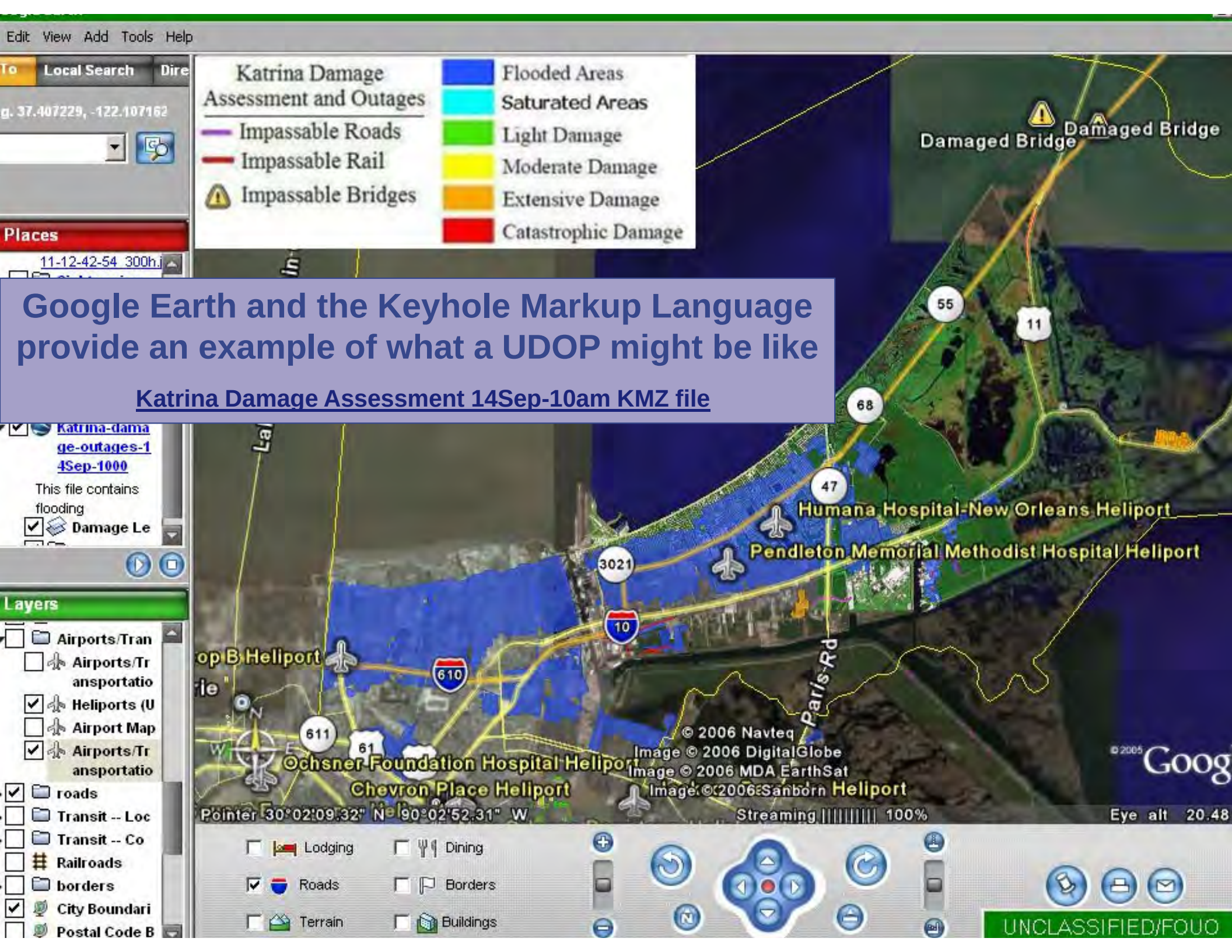
Data You Needed Last Week

COP vs UDOP (4/4)

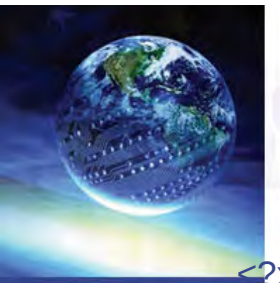


Data providers publish to the GIG in standard formats
Users select what they want on their UDOP



Google Earth and the Keyhole Markup Language provide an example of what a UDOP might be like

[Katrina Damage Assessment 14Sep-10am KMZ file]

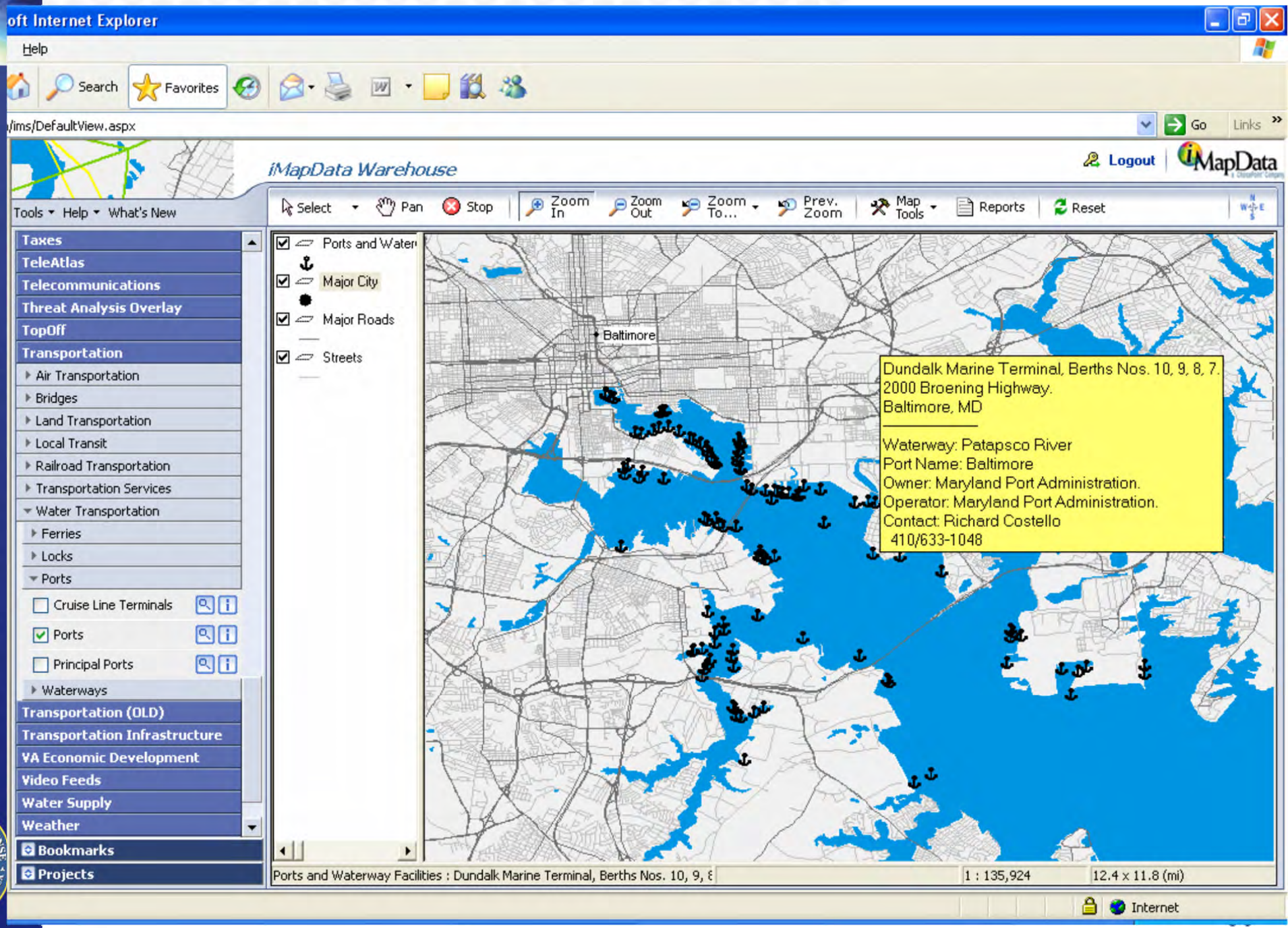


Keyhole Markup Language (KML) as an example interchange agreement for a UDOP

```
<?xml version="1.0" encoding="UTF-8"?>
<kml xmlns="http://earth.google.com/kml/2.0">
<Document id="khDocument137739">
<name>Katrina-damage-outages-14Sep-1000</name>
<open>1</open>
<description>This file contains flooding assessments provided by NGA as of September 14th (Wednesday) at
    1000, damage assessments as of September 9th (Friday) at 1000, and road/rail/bridge outages as of
    September 8th (Thursday) at 1800.</description>
    ...
<ScreenOverlay id="khScreenOverlay137741">
 <name>Damage Legend</name>
 <Icon>
  <href>images/Legend_050909_1000.JPG</href>
 </Icon>
 <overlayXY x="0" y="1" xunits="fraction" yunits="fraction"/>
 <screenXY x="0" y="1" xunits="fraction" yunits="fraction"/>
 <rotationXY x="0.5" y="0.5" xunits="fraction" yunits="fraction"/>
 <size x="0" y="0" xunits="fraction" yunits="fraction"/>
</ScreenOverlay>
    ...
<Folder id="khFolder137743">
 <name>Damage Assessment</name>
 <Folder id="layer 0">
  <name>Flooded - 14Sep - 1000</name>
  <S_katrina_receded_flood_all_14sep05_1000_SSSDDDDDD>
   <name>0</name>
   ...
```

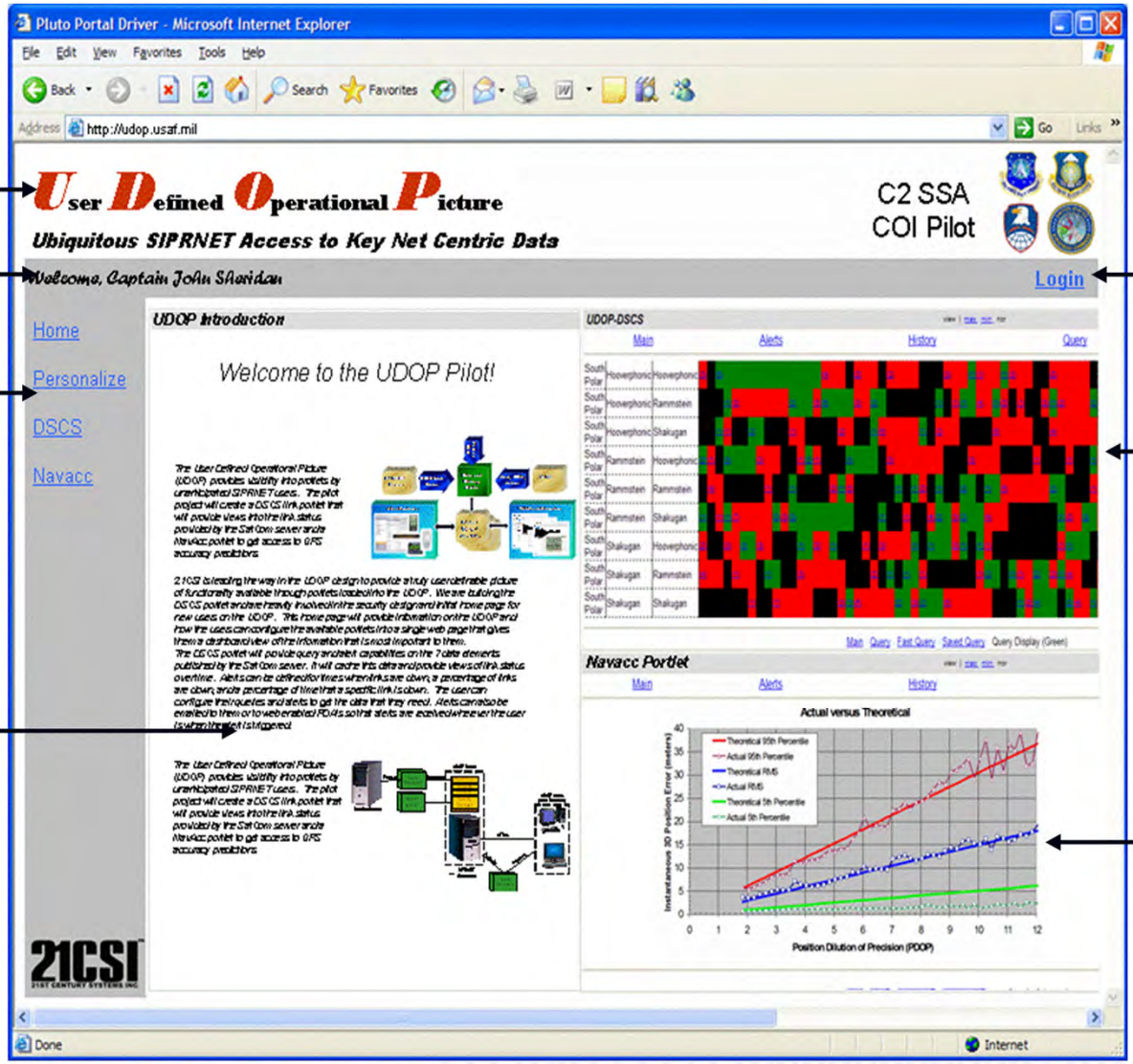
- **KML is a de-facto standard for exchange of geospatial data suited for display**
- **Developed by Keyhole, Inc. (now Google Earth)**
- **Documented at http://www.keyhole.com/kml/kml_doc.html**

HSIN implementation of the MDA UDOP



Only for HSIN Consumers
Enabling Net-Centric Operations

C2 SSA COI Pilot User Defined Operating Picture (UDOP)



Banner

Welcome shows after login

Main Menu. Select portlet and personalization options.

General UDOP Information on Benefits and Features

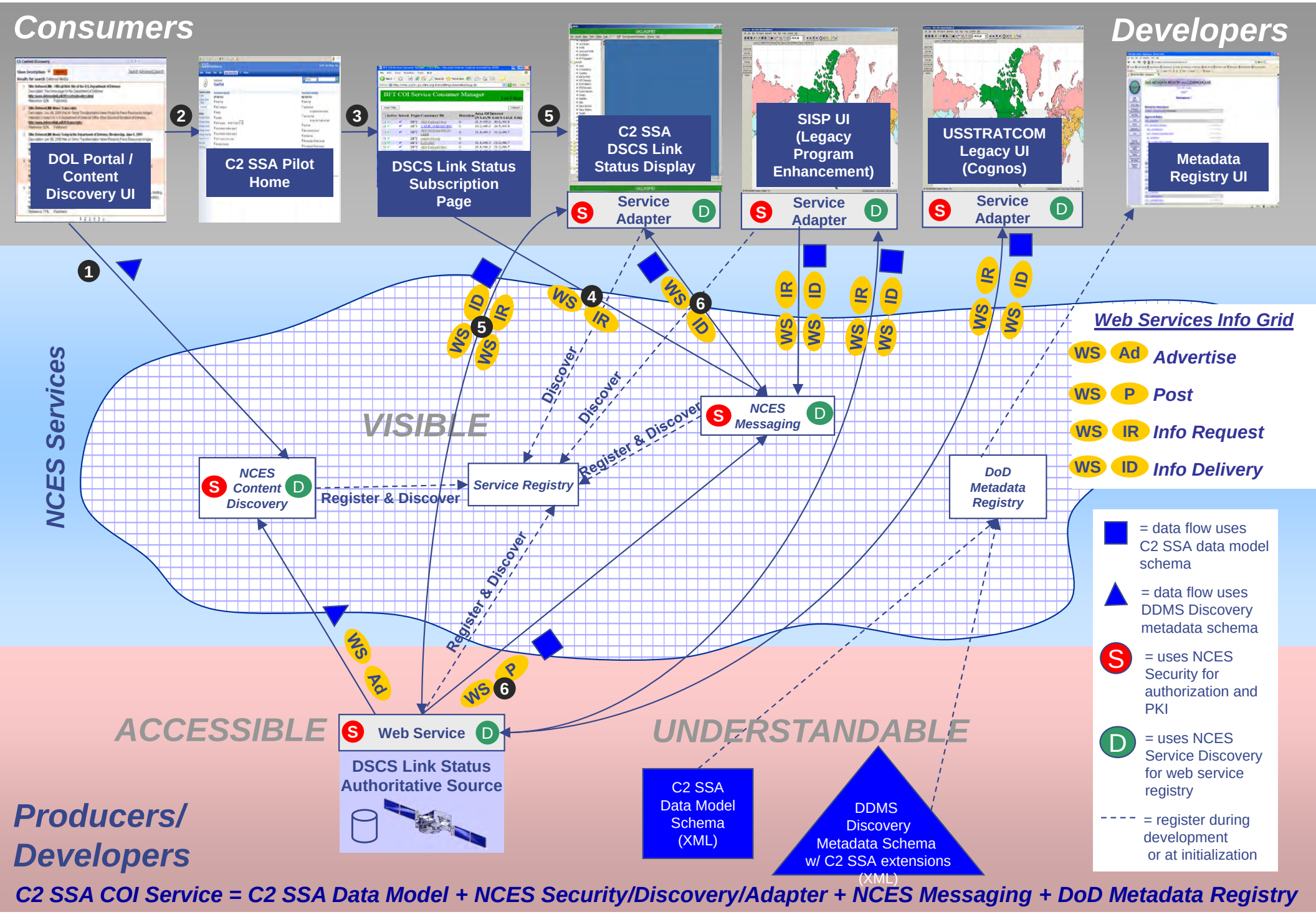
Changes to Logout after login (if needed)

DSCS Portlet (simple chart of IRON summary for new users. Save query and alerts disabled for new users)

NavAcc Portlet (default display for new users)

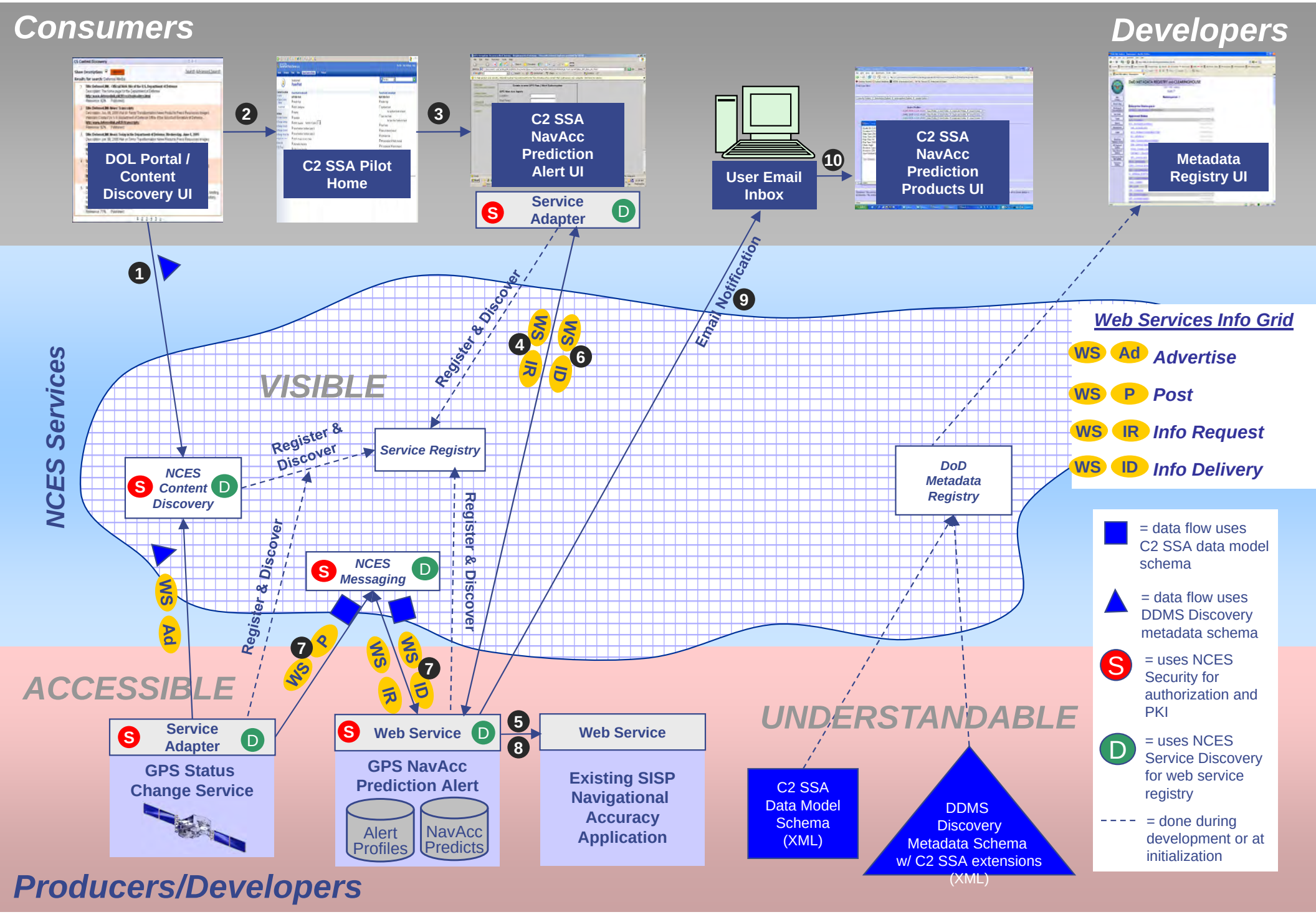
CIO/NII Enabling Net-Centric Operations

C2 SSA COI DSCS Link Status Service UDOP (as of 1 Dec 2005)

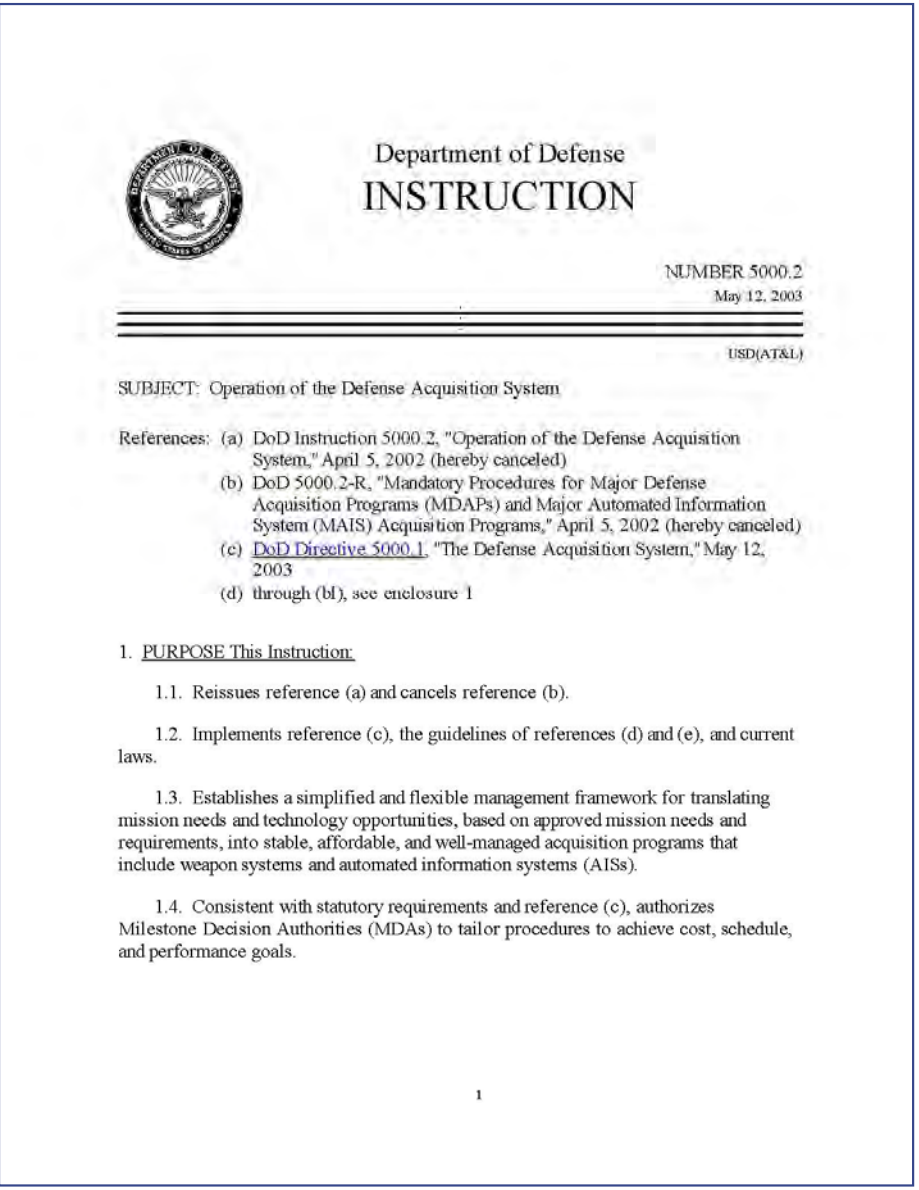


C2 SSA COI Service = C2 SSA Data Model + NCES Security/Discovery/Adapter + NCES Messaging + DoD Metadata Registry

C2 SSA COI NavAcc Prediction Alert Service UDOP (as of 1 Dec 2005)



DoDI 5000.2 *requires* pilots*!*



Department of Defense
INSTRUCTION

NUMBER 5000.2
May 12, 2003

USD(AT&L)

SUBJECT: Operation of the Defense Acquisition System

References: (a) DoD Instruction 5000.2, "Operation of the Defense Acquisition System," April 5, 2002 (hereby canceled)
(b) DoD 5000.2-R, "Mandatory Procedures for Major Defense Acquisition Programs (MDAPs) and Major Automated Information System (MAIS) Acquisition Programs," April 5, 2002 (hereby canceled)
(c) DoD Directive 5000.1, "The Defense Acquisition System," May 12, 2003
(d) through (bl), see enclosure 1

1. PURPOSE This Instruction:

1.1. Reissues reference (a) and cancels reference (b).

1.2. Implements reference (c), the guidelines of references (d) and (e), and current laws.

1.3. Establishes a simplified and flexible management framework for translating mission needs and technology opportunities, based on approved mission needs and requirements, into stable, affordable, and well-managed acquisition programs that include weapon systems and automated information systems (AISs).

1.4. Consistent with statutory requirements and reference (c), authorizes Milestone Decision Authorities (MDAs) to tailor procedures to achieve cost, schedule, and performance goals.

1

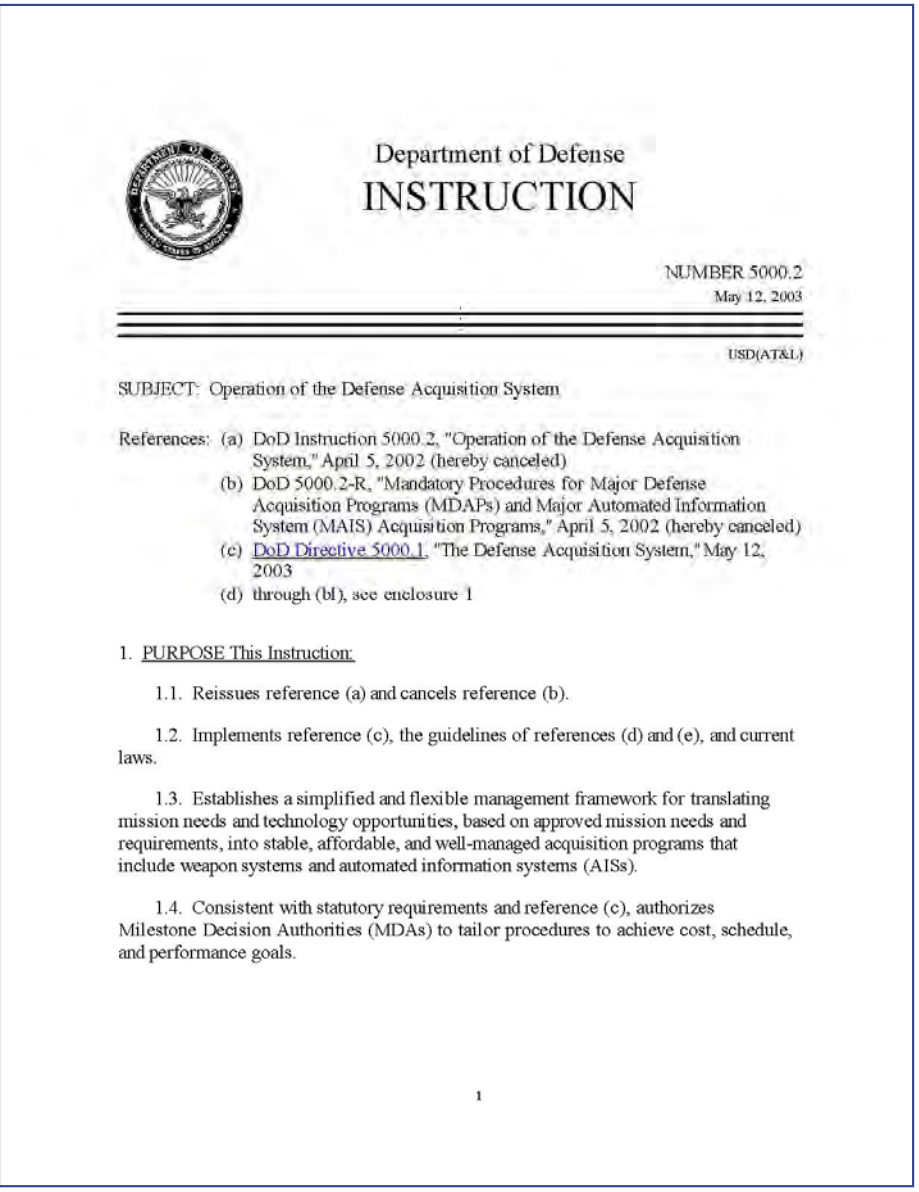
3.3.2.1. … requirements are refined through *demonstration and risk management* …requirements for future increments *depend* on feedback from users …

3.6.5. … *Multiple* technology development demonstrations may be necessary …

3.6.6. … identification and development of the technologies necessary for follow-on increments continues *in parallel with the acquisition of preceding increments*…

Post MS-B programs can (and should) spend current-year funds on pilot demonstrations *to define the next increment!*

Pilots define the CDD, not the reverse



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1

3.3.2.1. … requirements are refined through *demonstration and risk management* …requirements for future increments *depend* on feedback from users …

3.6.7. The project shall exit Technology Development when … the technology for that increment has been demonstrated … During Technology Development, the user shall prepare the Capability Development Document (CDD) …

Tech demos for the next increment happen *before* the CDD is written.
Don't let JCIDS bog you down!

Reference Links

The DoD Net-Centric Data Strategy

http://www.defenselink.mil/nii/org/cio/doc/Net-Centric-Data-Strategy-2003-05-092.pdf

Data Sharing in a Net-Centric DoD, DODD 8320.2

http://www.dtic.mil/whs/directives/corres/html/83202.htm

Guidance for Implementing Net-Centric Data Sharing, DOD 8320.2-G

http://www.dtic.mil/whs/directives/corres/html/832002g.htm

DoD Discovery Metadata Specification (DDMS)

http://metadata.DoD.mil/

DDMS Schema information

http://metadata.dod.mil/mdr/irs/DDMS/

COI Resources

http://www.dod.mil/nii/coi/

CIO/NII Enabling Net-Centric Operations