Enterprise Data Services (EDS)

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Robert M. Cox
PEO STRI
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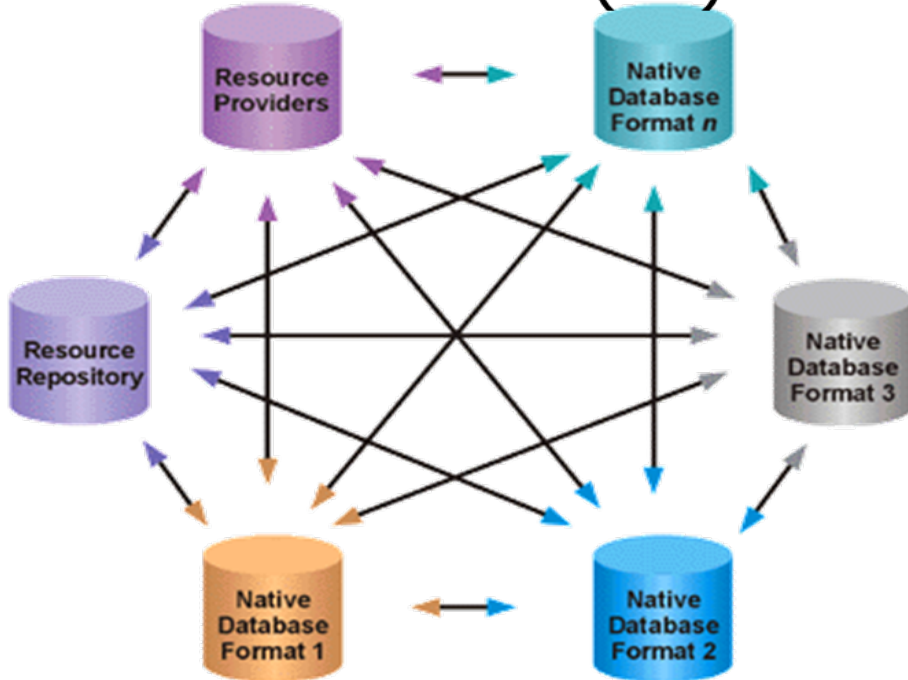407-208-3151

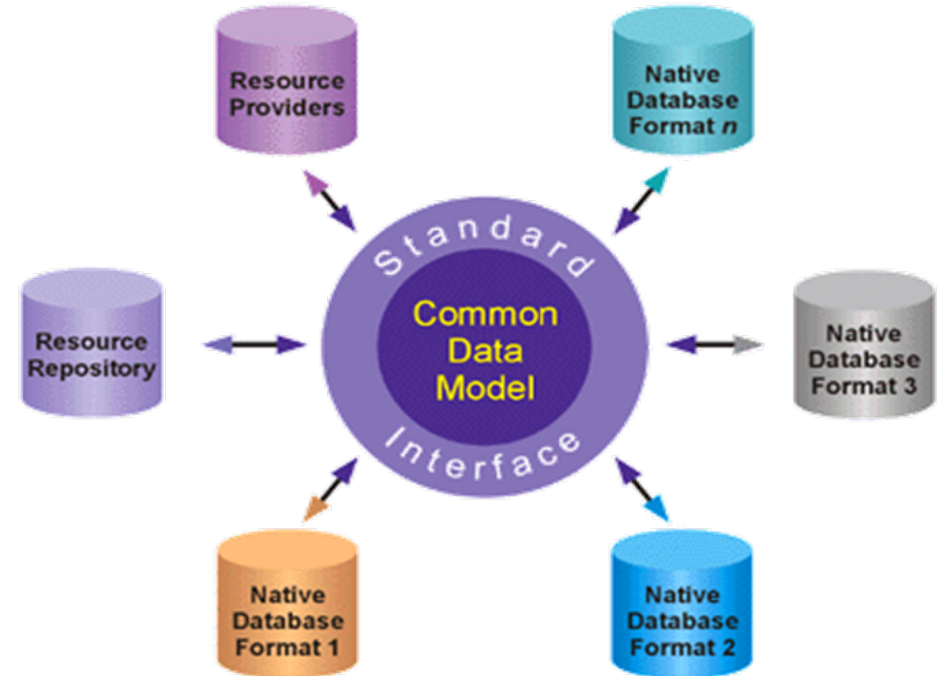# The Problem, The Challenge, The Solution

The Data Problem

Point-to Point (N2)

- **Expensive and time consuming**
- **Often unreliable and non-interoperable**
- **Unique conversion needed for each source**
- **Increase in sources geometrically increases number of conversions**

Common Data Service

- **Significant reduction in conversion cost**
- **Higher reliability, interoperability, integration, and reduction of correlation error**
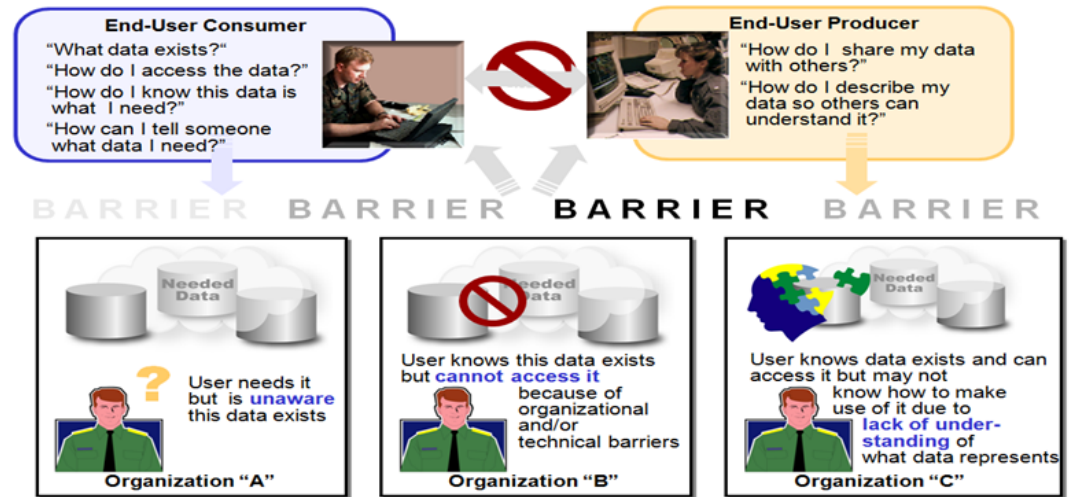- **Common and open standards, tools, and software reuse**

- **The creation and preparation of data for use within applications is a timely and laborious process**

- **DoD has no method to discover and reuse high-value, labor-intensive, and time-consuming data produced across the Enterprise**

- **Representatives from the data production centers are eager and willing to share their data holdings, but lack the technology and infrastructure to do so**

A Net-Centric DoD NII/CIO

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 needs it but is **unaware** this data exists
Organization "A"

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

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: **Discovery Metadata**

Data Strategy Approach: **Web Enabling, Web-service Enabling**

Data Strategy Approach: **COIs, Metadata Registry**

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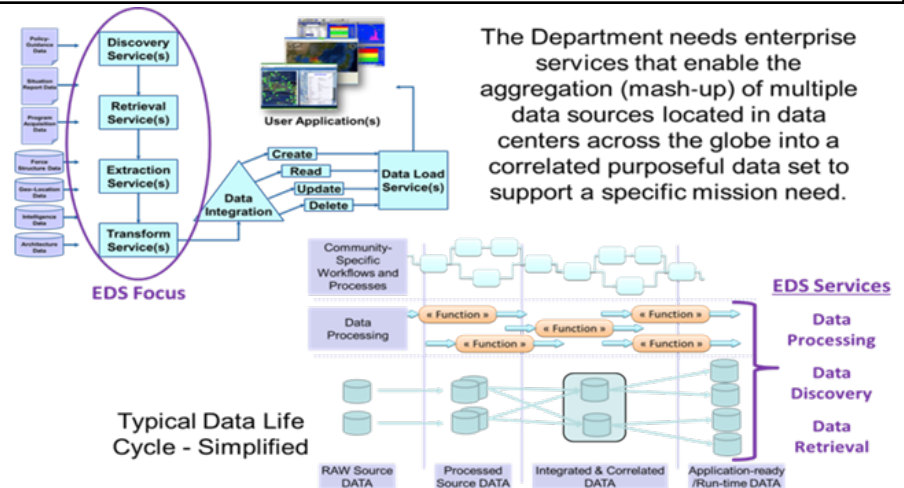**Transforming the Way DoD Shares Information by Establishing Communities of Interest**

An Army Officer recently observed,

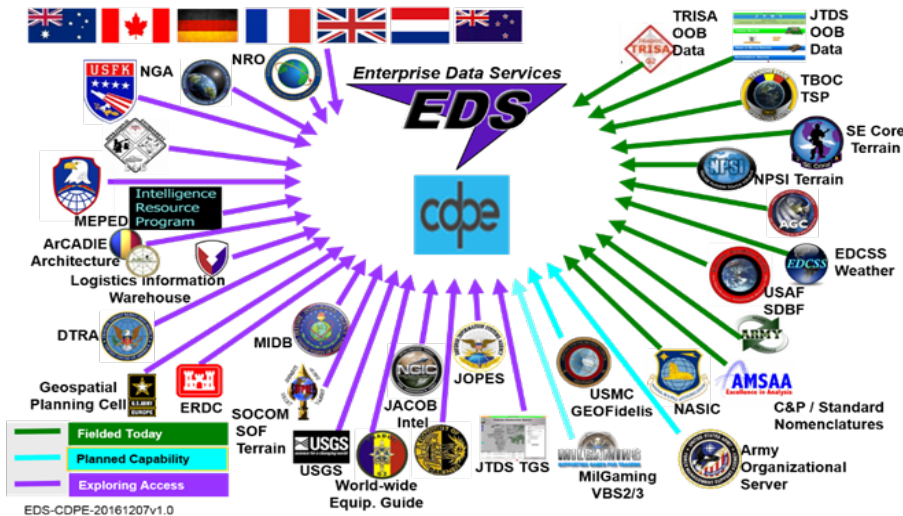*"The Global Information Grid (GIG) exists to connect people with information"*

Mike Krieger
Director, Information Policy
OASD(NII)/DoD CIO
michael.krieger@osd.mil
July 13, 2005

The Department needs enterprise services that enable the aggregation (mash-up) of multiple data sources located in data centers across the globe into a correlated purposeful data set to support a specific mission need.

Typical Data Life Cycle - Simplified

## EDS Data Provider Integration

- CDPE Map Search capabilities allow searching for available terrain databases
- Search may be done by terrain name or by selecting region on map of the world
- Terrain extents are highlighted to the user to convey the scope of the terrain database

- Standard Search hits allow metacard data viewing
- Select Providers support thumbnail representations of data viewable in metacard details
- Thumbnails can be expanded for examination

- About 300 authorized users
- Over 14,000 metacards to search
- Multiple hits per day on web site (https://cdpe.eds.mil)
- Fully cloud enabled
- Built on standards and a "Google-like" interface
- Adding three new data providers this year (Army and USMC force structure data and MilGaming)
- Development of new tools (terrain broker, entity management)

EDS/JLCCTC/Army Org Server Data Integration
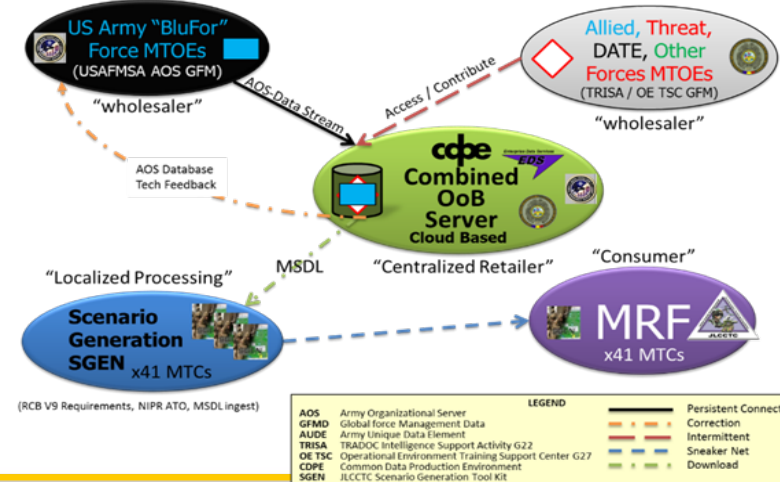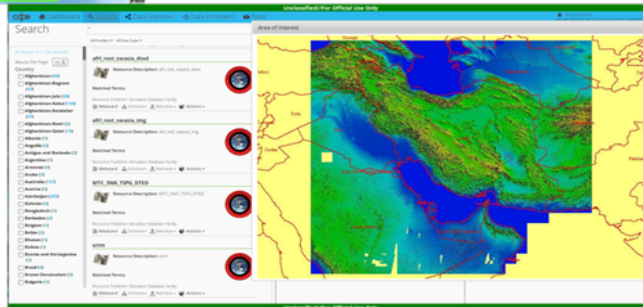
The History

- DoD M&S Steering Committee #1 FY-11/12 Priority
  - Co-Chair Sponsors: Army M&S Office and JS DD J7 JCW
  - Incrementally build a service-oriented DoD enterprise M&S Common Data Production Environment (CDPE)
  - Enable the discovery and reuse of data that has been produced (discovered, retrieved, cleansed, refined, integrated, thickened, and formatted) for M&S applications
  - Automate the discovery and integration of required authoritative source data to improve M&S data production across the DoD enterprise
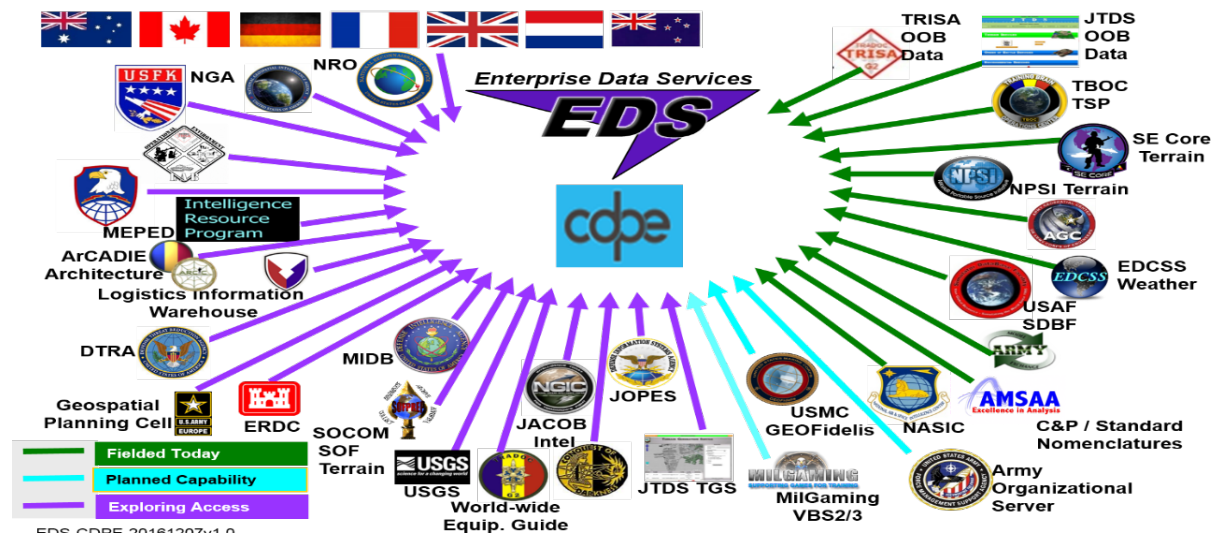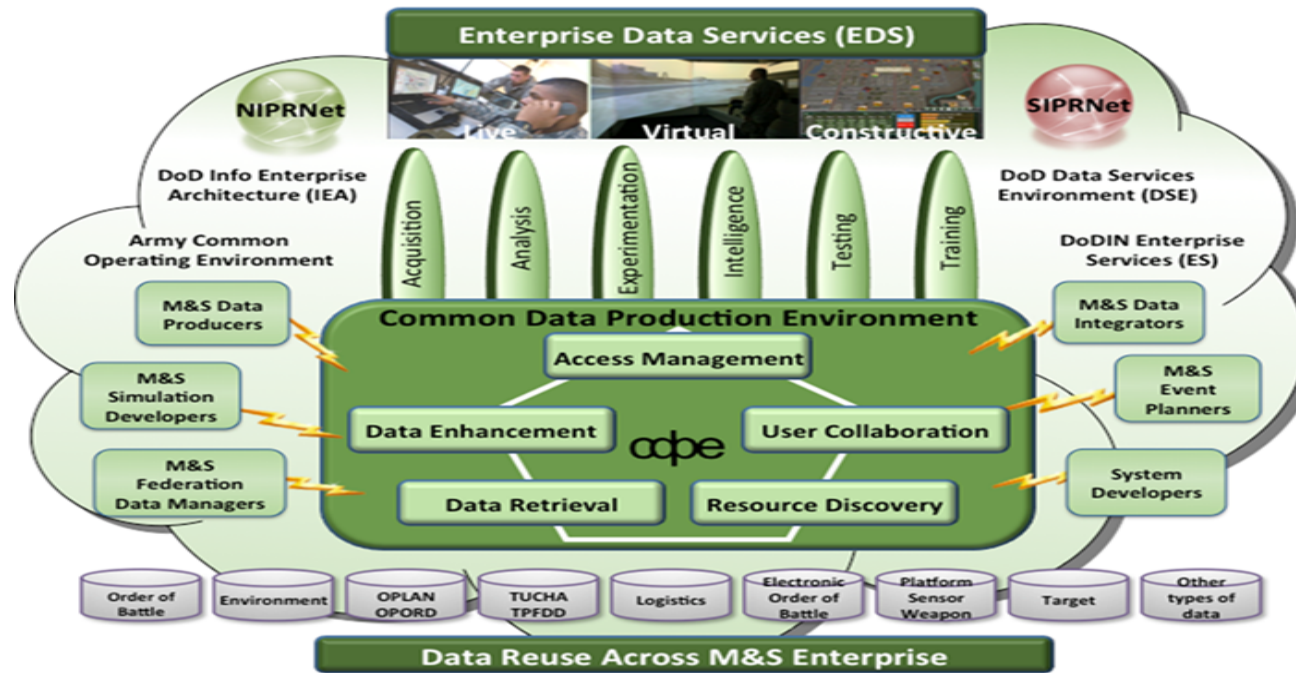 - Automated discovery metadata harvesting promotes accuracy and improved confidence of search results

The Now
The Capabilities
The Data Providers

Enterprise Data Services (EDS)

What it is:

- A "data broker": A standards-based, service-oriented, DoD Enterprise environment that enables the discovery and reuse of Common data and Common data enhancement services for M&S applications.
- Built upon existing DoD/Intelligence Community (IC) discovery, structural, and semantic metadata standards
  - Metadata specifications and data exchange formats (DoD Discovery Metadata Specification (DDMS) v4.1, Universal Core (UCore) and Global Force Management Information Exchange Data Model (GFMIEDM)). Will transition to DDMS 5.0 and NIEM MilOps Domain
  - Services for content discovery and retrieval (Open Archives Initiative Protocol for Metadata Harvesting (OAI-PMH) and IC/DoD Content Discovery and Retrieval (CDR))
  - User authentication and access management (DoD PKI Certificate)
- Provides two ways for users and systems to interface through a Common web service API interface specifications (Machine-to-machine (M2M)) and/or through a Web-based portal
- Provides a way for Communities and Services to meet Net-centric Data and Service Strategy guidance (DoD 8320-series)
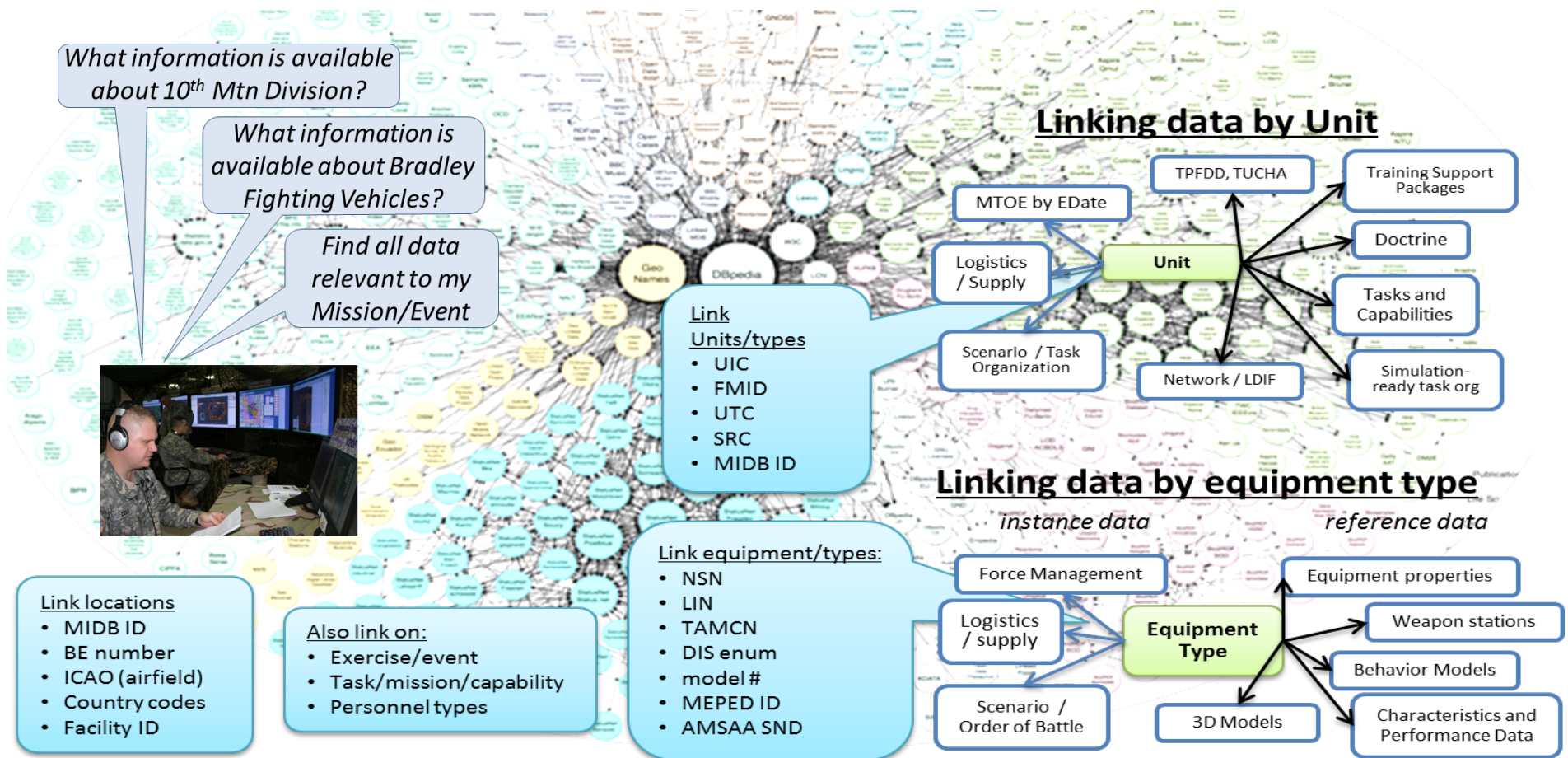
What it is not:

- Does not replace any DoD Community or Service M&S data production system, data management system, scenario generation system, or data repository
- Is not an M&S data warehouse; CDPE doesn't hold a copy of anyone's data
- Is not an M&S data production system; CDPE doesn't create data but will provide data services that data producers can use
- Is not an M&S data management system; but data providers can use CDPE capabilities to automate their workflow
- Is not an M&S event scenario generation system; but CDPE data services may assist someone in generating or reusing scenario data
- Will not meet <u>all</u> data needs for DoD; CDPE focuses on order of battle (OOB) and environmental (ENV) data for M&S, that is common across the Communities and Services
- Is not a "universal translator" of all required M&S data formats; but some translations can be supported as CDPE data services
- Does not provide mandate for any data consumer or data provider beyond current DoD/IC directives, instructions, standards, and guidance

Provide warfighters and decision makers with brokered **access** to all mission relevant **data** and processing **tools** necessary to ensure mission success
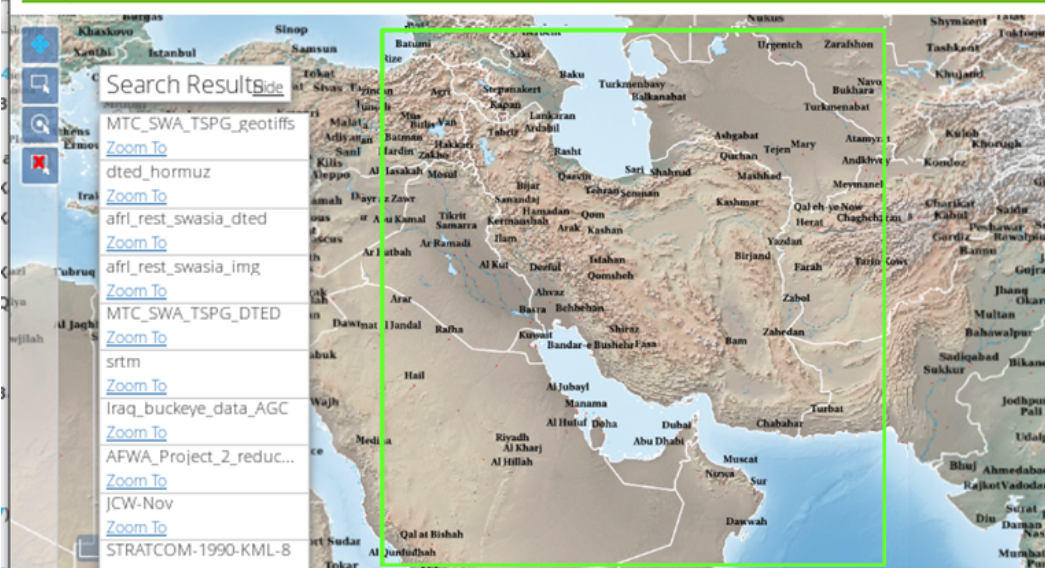
Common Data Production Environment (CDPE) Portal (https://cdpe.eds.mil)

CDPE Map Search Capability

- CDPE Map Search capabilities allow searching for available terrain databases
- Search may be done by terrain name or by selecting region on map of the world
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CDPE Model Search Capability

- **CDPE Model Search capabilities allow searching for model data based on keywords**
- **Search may be global or restricted to a particular provider and/or data type**
- **Result details are shown when user clicks on a search result. For example, this M1A1 3D model result shows details such as model type, model image, resource POC, etc.**

CDPE Class List/Data Explorer Capability

- **CDPE Class List Tool allows searching for data within the class lists provided by several programs: JLCCTC MRF, OneSAF, SE Core, JTDS**

- **CDPE can read each class list "language" and translate within them to return relevant search data to the user**

- **Class list results are tied to other data provided by CDPE, and relevant data resources are presented to the user through the CDPE Search capabilities**

- **CDPE Search results tied to the class list are wide ranging (models, force structures, equipment types, etc.)**

CDPE Terrain Broker

Users:
- Scenario/Exercise Planners
- Terrain Analyst
- M&S Analyst

Simulation (OneSAF)

CDPE Terrain Broker

API

Web Service

1. **Create a new Scenario**

2. **Get all OneSAF Terrain DB**

3. **All Terrain DBs returned**

4. **User Selects terrain DB**

5. **Establish connection to Terrain Server**

6. **Server provides on-demand terrain information.**
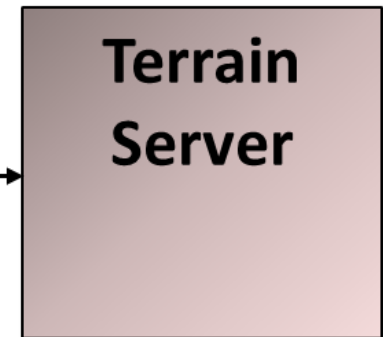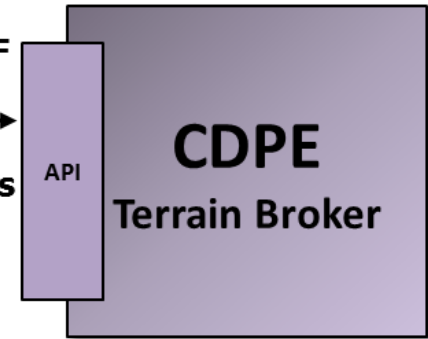
Terrain Server

Simulation Enhancements:
1. Simulation updated to support remotely served paged terrain database information.
2. WebService client capability introduced to allow for machine-machine connectivity to CDPE API
3. World Map interface introduced, containing terrain DB coordinate extents visualized.

CDPE (Terrain Broker) Enhancements:
1. Added Web-Service APIs (http) to support machine-machine search.
2. Added new fields to Terrain Metacard format.
3. Added updates to support coordinate based reasoning.

Data Providers

Environmental (ENV) Representation Data Providers

- Army Geospatial Center (AGC)

- Army Synthetic Environment Core (SE CORE)

- USN NAVAIR Portable Source Initiative (N-PSI)

- USAF Environmental Data Cube Support System (EDCSS)

- Special Operations Force Planning, Rehearsal and Execution Prep (SOFPREP)

- Joint Training Data Services (JTDS)

- USAF Simulator Database Facility (SDBF)

- Army Model Exchange (AME)

- MilGaming

- USMC GeoFidelis

Order of Battle (OOB) Data Providers

- Joint Training Data Services (JTDS)

- ArCADIE – Army Capability-based Architecture Development Integration Environment

- US Army Training and Doctrine Command (TRADOC) Intelligence Support Activity (TRISA)

- Training Brain Operations Center (TBOC)

- Modernized Integrated Database (MIDB)

- US Army Organization Server (AOS)

- National Air and Space Intelligence Center (NASIC)

The Next 12-months

AOS-EDS-JLCCTC Data Connectivity

Top diagram labels:

US Army "BluFor" Force MTOEs (USAFMSA AOS GFM) — "wholesaler"

Allied, Threat, DATE, Other Forces MTOEs (TRISA / OE TSC GFM) — "wholesaler"

AOS-Data Stream

Access / Contribute

AOS Database Tech Feedback

cdpe — Combined OoB Server Cloud Based — Enterprise Data Services EDS — "Centralized Retailer"

"Consumer"

MSDL

"Localized Processing"

Scenario Generation SGEN x41 MTCs

(RCB V9 Requirements, NIPR ATO, MSDL ingest)

MRF x41 MTCs — JLCCTC

LEGEND

AOS	Army Organizational Server
GFMD	Global force Management Data
AUDE	Army Unique Data Element
TRISA	TRADOC Intelligence Support Activity G22
OE TSC	Operational Environment Training Support Center G27
CDPE	Common Data Production Environment
SGEN	JLCCTC Scenario Generation Tool Kit

Persistent Connect
Correction
Intermittent
Sneaker Net
Download

Bottom diagram labels:

USAFMSA Army Org Server

TRISA — DATE / RAFTE Threat / Allied MTOEs

co-hosted by USAFMSA

« OE » G222/G27 — TRISA

JACOB

Modern Integrated DB

How to read:
- Orange - predominantly ITEDS work
- RED — predominantly G222/G27 work
- Green — predominantly M&S work (e.g., JLCCTC, OneSAF, BLCSE, JSJ7)
- Black-Authoritive Service provider
- Sim Terrain

Persistent Connect
Correction
Intermittent
Download

First — thick lines
Next — thin lines

"Common Data Production Environment » ITEDS

USAFMSA AOS mirror

Combined MTOEs

G27 EDT

JLCCTC SGEN

X 41 MTC's

ITEDS CDPE Org Server

G222/G27 OE OoB Data layer — TRISA

SE Core Repository

AGC/NPSI/S OCOM

Army Mapper

installation feature data

Terrain Server

MSDL / GFM DI

WebMSDE

Army Task mirror

BLCSE ForceBuilder

training tasks

ATN CAT/CAR

METL access adaptor

Country code set	Ethnicity code set
Language code set	Religion code set

Based on Aug 16 Army TCM C slide

DTMS

unit / unit type METL

DRRS

source data & reference data, common formats → exercise specification, common format → simulation-specialized database, machine formats

USMC GeoFidelis-UOS-EDS Connectivity
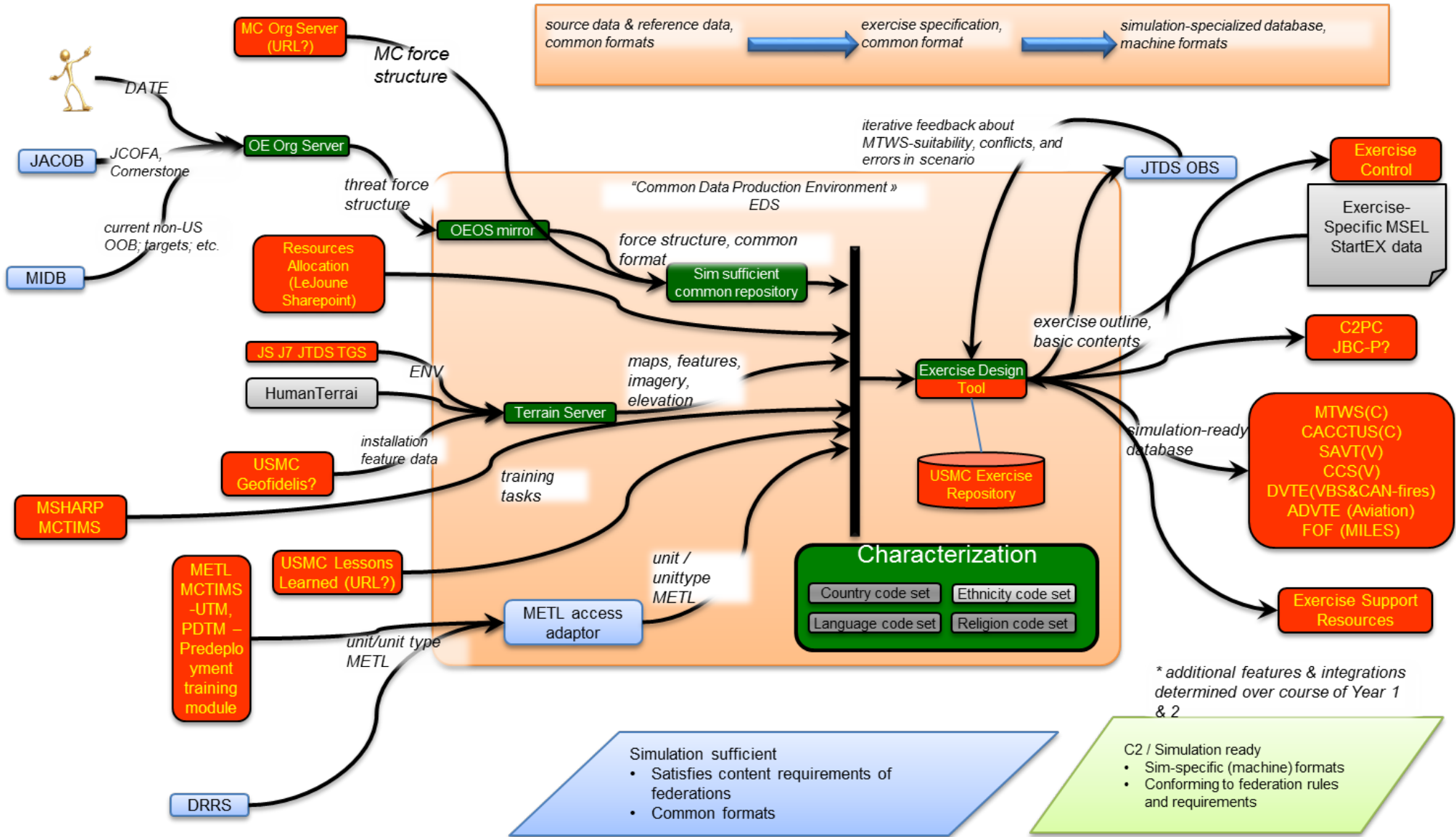
MilGaming-EDS Connectivity

Produces

MilGaming Database Manager

Game Terrain Metacards

Game Model Metacards

Game Scenario Metacards

Game Script Metacards

Game Video Metacards

Automated Weekly Harvest

CDPE

Metacard Ingestion

Metacard information from MilGaming is presented to the user in customizable interfaces, including the use of thumbnail images

Resource Summary	Subject Summary	Component Summary	Metacard Summary
Metadata Standard		CDPE ENV Extension, v 0.3	
Metadata Id Info			
Descriptive Keywords		entity	
Model Info			
Category		Tanks	
Sub-Category		Main Battle Tanks	
Model 2D/3D		3D Model Dataset	
Type		static	
Image			

Semantic Search

EDS CDPE User

- **Advantages:**
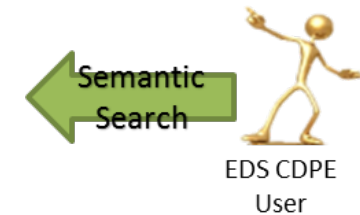 - Metacards are produced / managed by MilGaming
  - Metadata stored "off-line" in CDPE, so available without accessing MilGaming
  - Metacard approach minimizes traffic to MilGaming during search process
- **Disadvantages:**
  - New metacards are not available for search until harvest occurs

Summary

It's really about the Unified Environment

Live, Virtual and Constructive Environmental Representation

SE Core Content (Enterprise content + runtime formats) or could be LVC-IA Order of Battle (OOB) data or models or behaviors

↑

Existing

+

Virtualization of Computing and Storage of data

Enterprise Data Services
EDS

Cloud Enabled

↑

Existing

+

Virtualization of Graphics

Cloud Capabilities merged with GFT

(e.g NVIDIA Kepler Architecture)

↑

Emerging

+

Runtime Publishing for Application of Terrain, OOB, behaviors, or models

↑

Emerging technology with gaming technology

Compiled runtime formats are no longer needed

=

Merged Virtual & Constructive Simulation with visual presentations to produce a single interoperable 3D world representation

↑

IG and Databases are a significant portion of the simulator costs

Reduces cost and hides complexity

Significantly improves correlation

The Data is Critical for a Unified Environment