Air Transportation Information Exchange Conference

August 29, 2012

Dennis E. Wisnosky

DoD BMA CTO & Chief Architect (RET)

Video #2

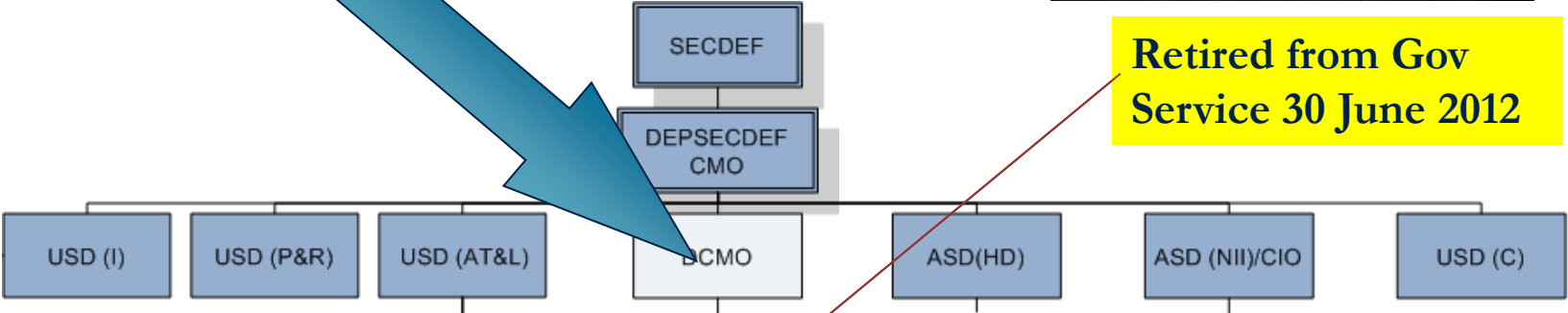DoD Semantic Technology Clip

Missions of the DoD

Warfighter Mission Area	Business Mission Area	Intel Mission Area
Enterprise Information Environment Mission Area		

Retired from Gov Service 30 June 2012

SECDEF

DEPSECDEF CMO

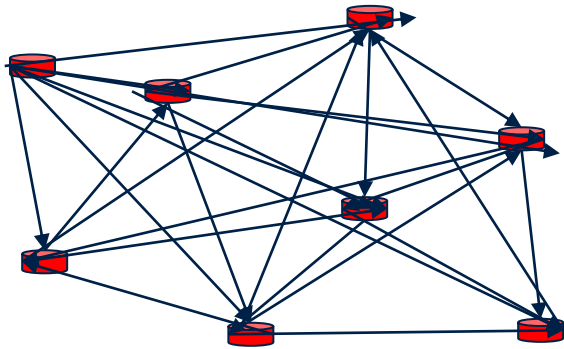USD (I) | USD (P&R) | USD (AT&L) | DCMO | ASD(HD) | ASD (NII)/CIO | USD (C)

Dennis E. Wisnosky, DoD BMA CTO & Chief Architect in the Office of the Deputy Chief Management Officer (DCMO)

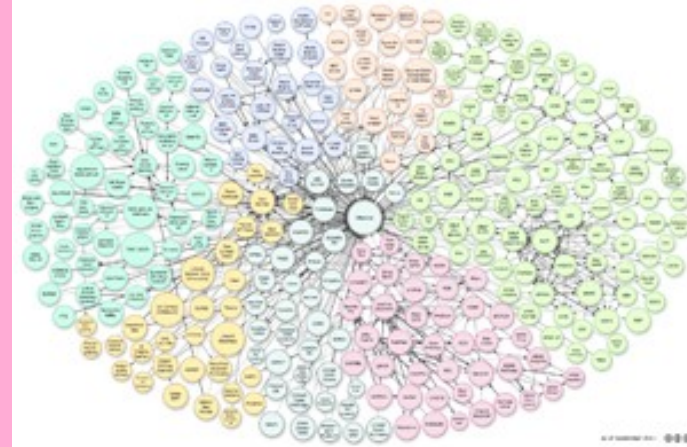**Heading, Altitude, Airspeed!**

August 28, 2012

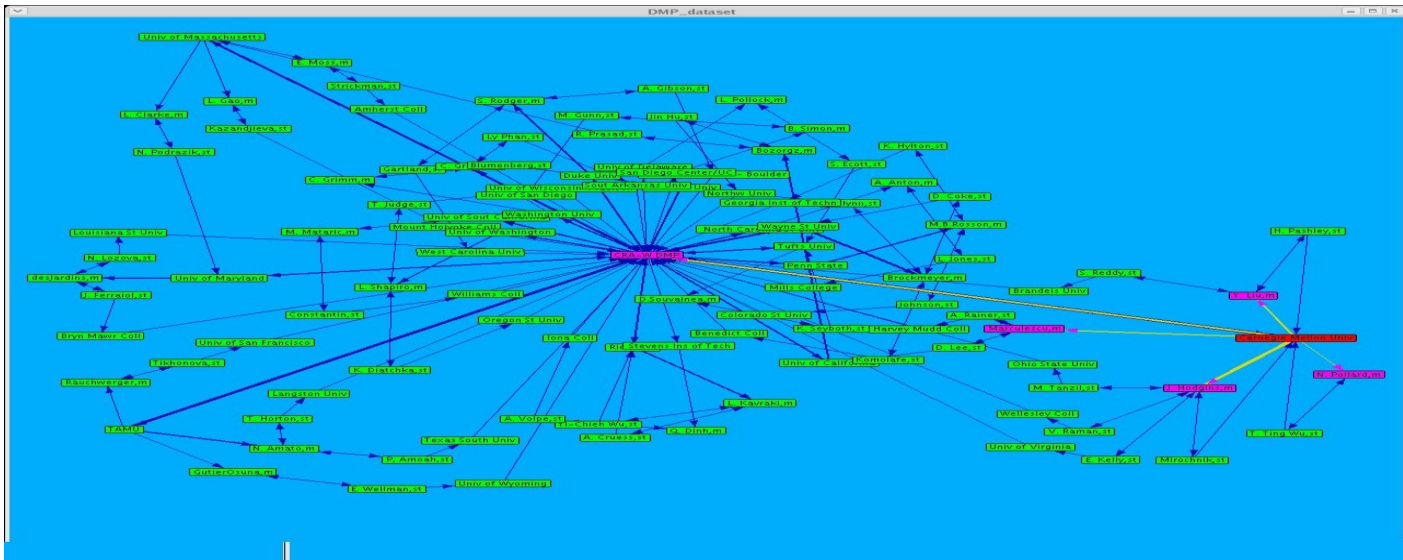# Semantic Web: Heading, Altitude and Airspeed

(near) Exponential connections ($n^2 - n$)

I don't want BIG DATA!
I want little data!

I want what I want,
I want what I need,
I want to know it is right,
I want it when I need it.

(near) Linear connections (2n-1)

Force Directed Graph

August 28, 2012

The Journey!

"Pentagon Bureaucracy - It disrupts the defense of the United States and places the lives of men and women in uniform at risk.

…..the Department of Defense will shift our focus and our resources *from bureaucracy to battlefield, from tail to tooth*." SecDef, 10 Sept. 2001

BMMP

Business Management Modernization Program

2002 - BMMP and the BEA was to drive-in cost accountability and drive-out redundancy.

This called for an Architecture

August 28, 2012

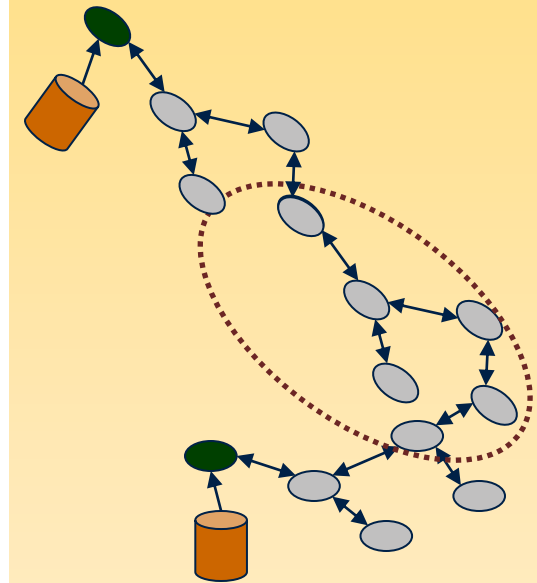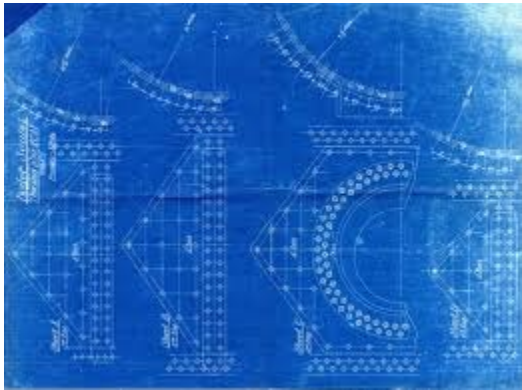# DoD Business Enterprise Architecture (BEA) Progression

Blueprinting ➡ BEA - Stovepiped ➡ BEA - Semantic

Branch office-based; readable but not analyzable; stovepiped

Business Mission-based; readable within a Business Mission;

End-to-End based; analyzable; executable;

BEA 1.0 – 2.4 "Boil the Ocean"

BEA 3.0 - 9.0 "Prioritized"

BEA 10.0 and later "Executable"

dennis@wisnosky.net

Graph1

HR Dataset

O6

Pay Grade

hasTitle

hasGra...e

person

Col. E.J. Blatt

hasName

University Michigan

hasName

graduatedFro...n

Education Institution

Central High School

hasName

hasName

Defense Acquisition U.
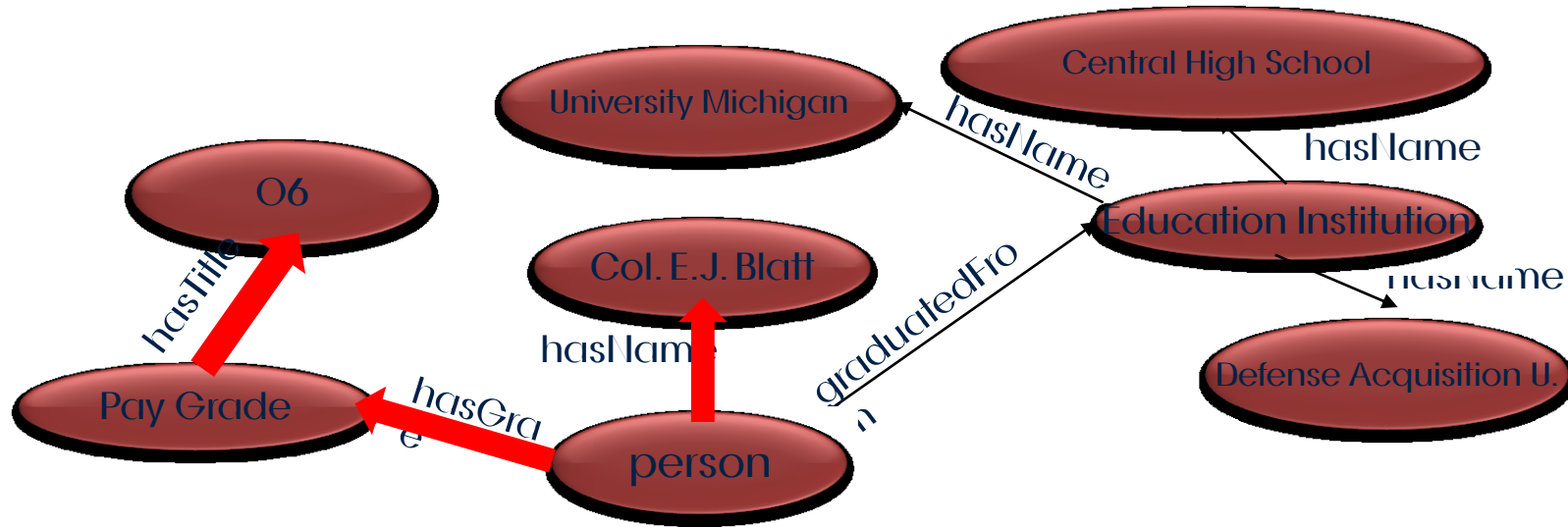
What Pay Grade is Col. Blatt?

How much Dwell Time does Col. Blatt have?

Graph2

HR Dataset

University Michigan

Central High School

hasName

hasName

O6

Education Institution

hasName

Col. E.J. Blatt

hasTitle

hasName

graduatedFro

Defense Acquisition U.

Pay Grade

hasGra

person
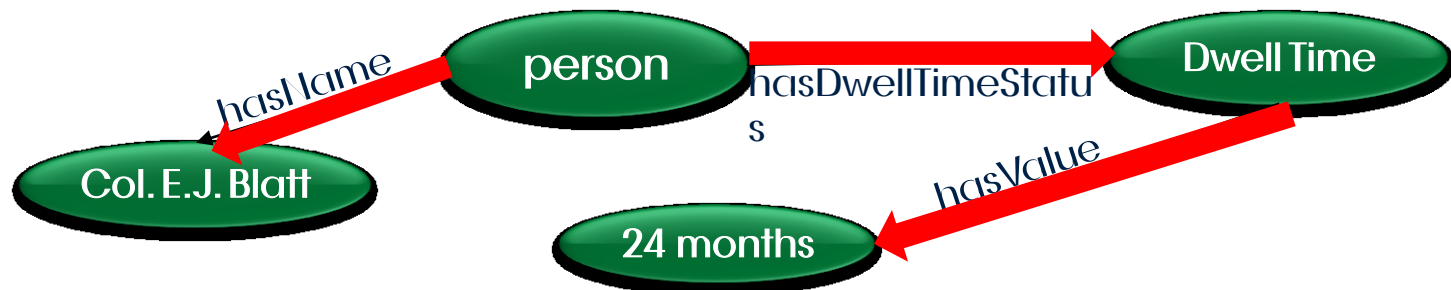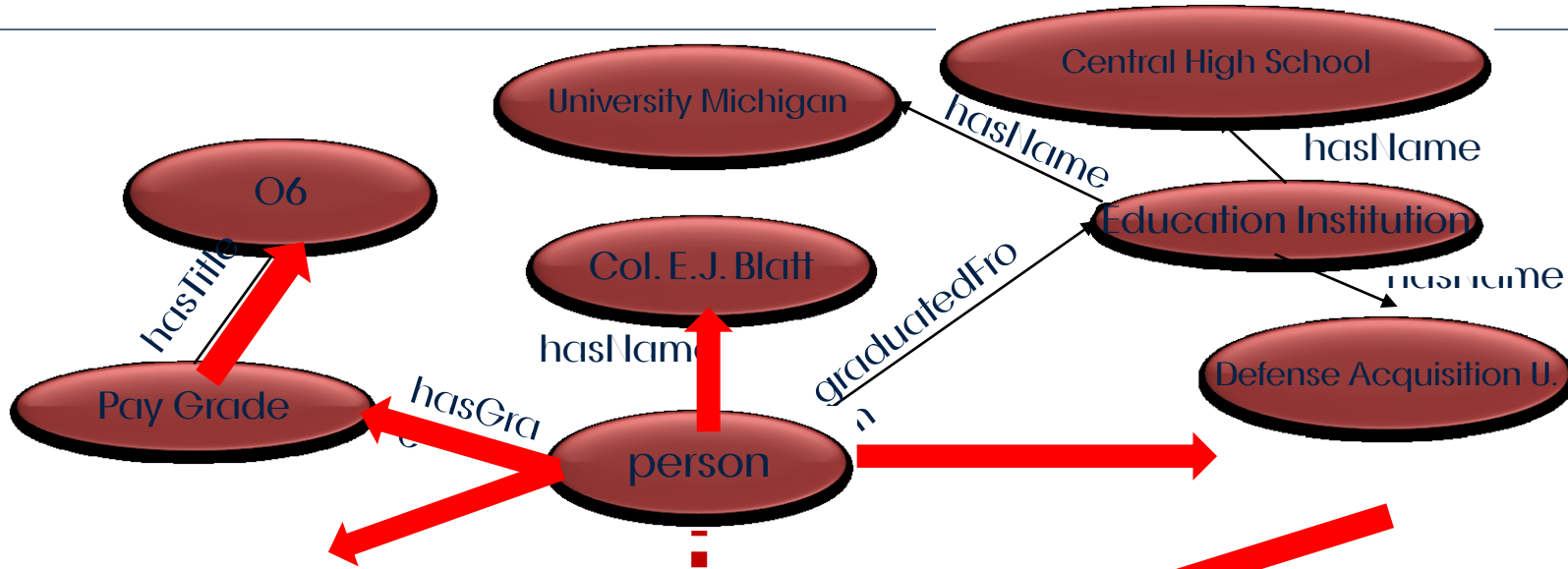
Graph3

Who has a Pay Grade of "O6" and has at least 24 months of Dwell Time?

Deployment History

person

hasName

hasDwellTimeStat us

Dwell Time

Col. E.J. Blatt

hasValue

24 months

DCMO Mandate - Standards Approach

DEPUTY CHIEF MANAGEMENT OFFICER
9010 DEFENSE PENTAGON
WASHINGTON, DC 20301-9010

APR 4 2011

MEMORANDUM FOR SECRETARIES OF THE MILITARY DEPARTMENTS

interoperability. It is also a tool for driving portfolio management and business process reengineering. BEA release 8.0 captured and defined the Department's 15 E2E business lifecycle models at a high level.

The BEA will remain aligned to the DoD Architecture Framework (DoDAF), currently DoDAF v 2.0). In order to facilitate integration of the systems and business architecture within

The BEA will remain aligned to the   currently DoDAF v 2.0). In order to facilitate integration of the systems and business architecture within the   , the BEA will be described in an ontology using a common language {World-Wide Web Consortium (W3C) open standards   and modeling notation (Business Process Modeling   . These open standards shall be applied to all subordinate Enterprise and solution architectures federated or asserting compliance with the BEA.

Enterprise Architecture (BEA) within the context of the DoD Enterprise Architecture. This essential framework will be used by the DBSMC and the supporting Investment Review Board (IRB) process to guide and constrain business system investments and conduct business process reengineering determinations as required by statue.

This memorandum outlines a new approach to leverage the E2Es defined within the BEA and provides the illumination necessary to achieve the management and interoperability required by statute. The Assistant Deputy Chief Management Officer will issue additional guidance to ensure these approaches are clearly applied to these management efforts. Additional guidance will identify future "time boxed" BEA development activities in consultation with the E2E Governance Council.

The BEA is the Enterprise's blueprint for defining the Department's business environment. It captures required Enterprise capabilities; metrics aligned to the Department's Strategic Management Plan; processes, data standards and rules to permit system and Web service

business architectures shall demonstrate compliance with BEA content via participation and conformance with procedures and processes described herein. The DBSMC will receive quarterly BEA updates via the E2E Governance Council.

My point of contact for this matter is Robert Jennings, robert.jennings@osd.mil or 703-614-0214.

Elizabeth A. McGrath

2

"Enterprise Architecture Federation Strategy" on Semantic Alignment, excerpt:
A key goal of net-centricity is to enable semantic understanding of data so that interoperability can be achieved between any applications that have the ability to access and interpret the structural and semantic rules associated with data.

"Net-centric Data Strategy" on Interoperable excerpt:
Data Interoperability - The ability of two or more systems or components to exchange information and to use the information that has been exchanged.

Goal: prioritization and collaboration based on immediate operational needs while providing enterprise infrastructure for self-synchronization on a larger scale

BEA - DoD Federated/Net-centric approach through Standard Semantic Specifications:
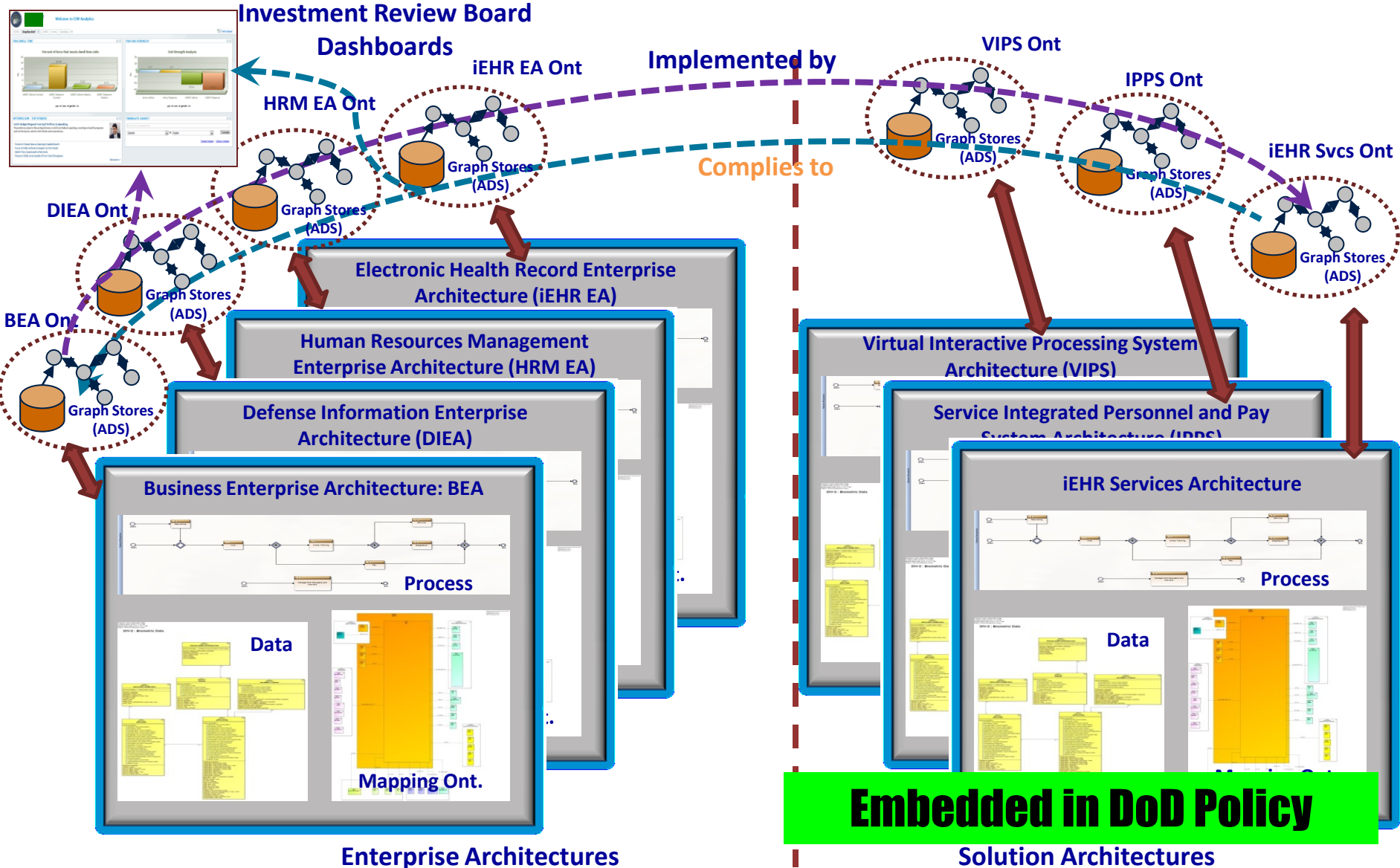Use of semantic standards to realize DoD federated understanding of data
  - OWL (Web Ontology Language)
  - OWL-DL (Descriptive Logic)
  - SPARQL 1.1 (OWL Query Language)
  - BPMN2.0/BPMN 2.0 primitives (Business Process)
  - Standards adopted by DoD in the DISR

A standards based semantic understanding between enterprise applications supports the shift from a stale data warehousing approach to federated dynamic retrieval of authoritative data sources approach

Investment Review Board Dashboards

Implemented by

iEHR EA Ont

VIPS Ont

HRM EA Ont

IPPS Ont

Graph Stores (ADS)

iEHR Svcs Ont

Complies to

DIEA Ont

Graph Stores (ADS)

Graph Stores (ADS)

Graph Stores (ADS)

Graph Stores (ADS)

BEA Ont

Graph Stores (ADS)

Graph Stores (ADS)

Electronic Health Record Enterprise Architecture (iEHR EA)

Human Resources Management Enterprise Architecture (HRM EA)

Virtual Interactive Processing System Architecture (VIPS)

Defense Information Enterprise Architecture (DIEA)

Service Integrated Personnel and Pay System Architecture (IPPS)

iEHR Services Architecture

Business Enterprise Architecture: BEA

Process

Process

Data

Data

Mapping Ont.

Embedded in DoD Policy

Enterprise Architectures

Solution Architectures

Benefits of OWL based Ontologies?

- OWL is an industry standard to express Ontologies:
  - WC3 open specification
  - Support from Open Source and COTS tool vendors
  - Tools exist to create/visualize OWL files, and process OWL rules
  - Active growing community continues to submit new, rich, supporting

http://www.starlab.vub.ac.be/teaching/Ontologies_Intr_Overv.pdf

- C
  -
  - Captures both data, and rules that can be quickly adjusted in a controlled fashion vs. capturing rules in code with a long change/deploy process
  - Formal logic and supports reasoning

- Interoperability:
  - OWL files are easily shared, making structures visible and well understood
  - SPARQL query specifications provide solution to dynamic federated queries
  - Same concepts with different terms across federated ontologies can be resolved via OWL "sameAs" constructs
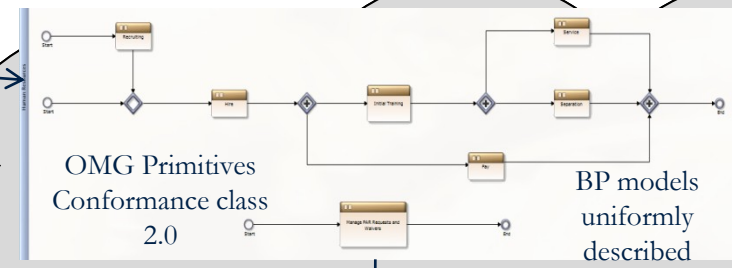
Advances goal of establishing DoD architectures that are people readable, machine readable a **Ontologies DoD needs!**
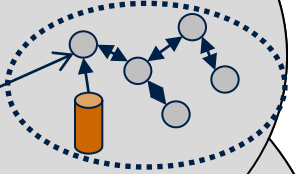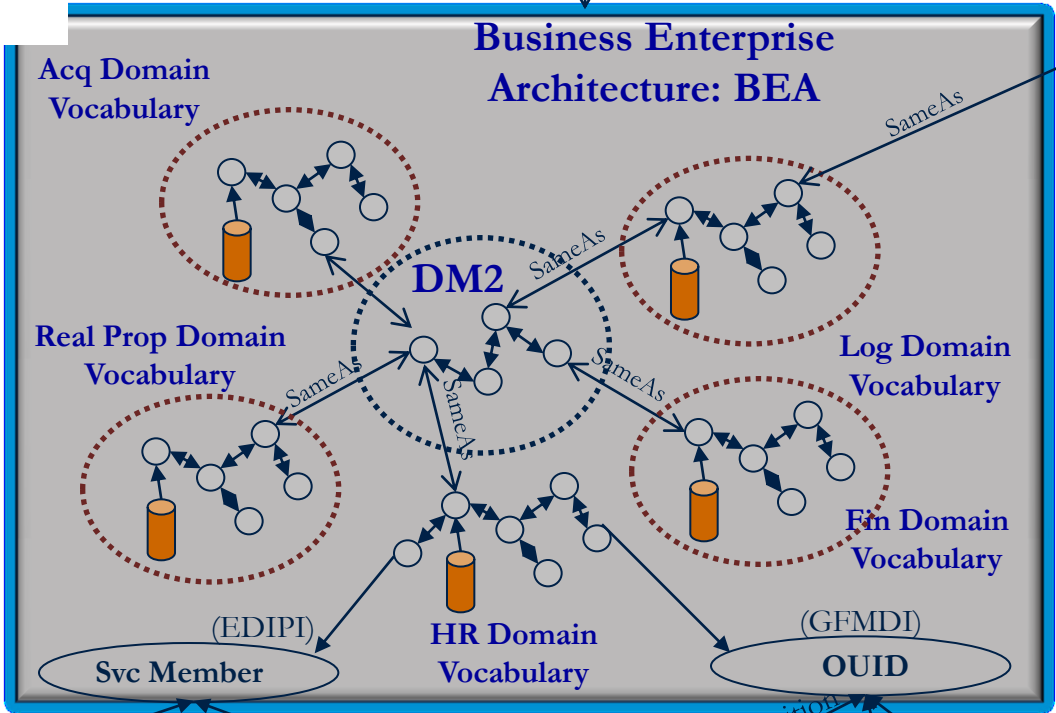
DCMO Federation via Semantic Standards

User

NCES

DoD EA

OMG Primitives Conformance class 2.0

BP models uniformly described

BP executes via BEA directly

Business Enterprise Architecture: BEA

Query BEA *directly*:

- ➢ Enterprise analytics
- ➢ Compliance
- ➢ IRB/portfolio management

Acq Domain Vocabulary

Warfighter Domain Vocabulary

SameAs

DM2

SameAs

Real Prop Domain Vocabulary

SameAs

SameAs

SameAs

Log Domain Vocabulary

Fin Domain Vocabulary

(EDIPI)

Svc Member

HR Domain Vocabulary

(GFMDI)

OUID

position

billet

dept

Airman   Sailor

Watch for DoDAF 2.03!

W3C Open Standards Legend: ◯ Data described in RDF ⟷ Relationship described in OWL ⬮ DoD Authoritative Data Source

https://software.forge.mil/sf/docman/do/listDocuments/projects.bea/docma n.root.bea_ontologies

ß

Deployed Environment

Mission Applications

Data

"Enterprise Information Environment"

Data

"___ation Environment"

Home   Work   Mobile (TDY/Deploy)   Future devices

	WHAT	WHO	HOW
Information Models			Joint Enterprise, Component & Program Architects using OWL/RDF, SPARQL, Primitives
DoD TIER ENTERPRISE	GiG EA and DIEA	DCIO w/Joint Community	
SEGMENT TIER ENTERPRISE	BEA, CBMA & other EAs	Enterprise CIOs (BECCM)	
COMPONENT TIER LEVEL	Component EA	Component CIOs + CMOs	
PROGRAM TIER LEVEL	System Architectures	Programs of Record	

Each tier glues the next
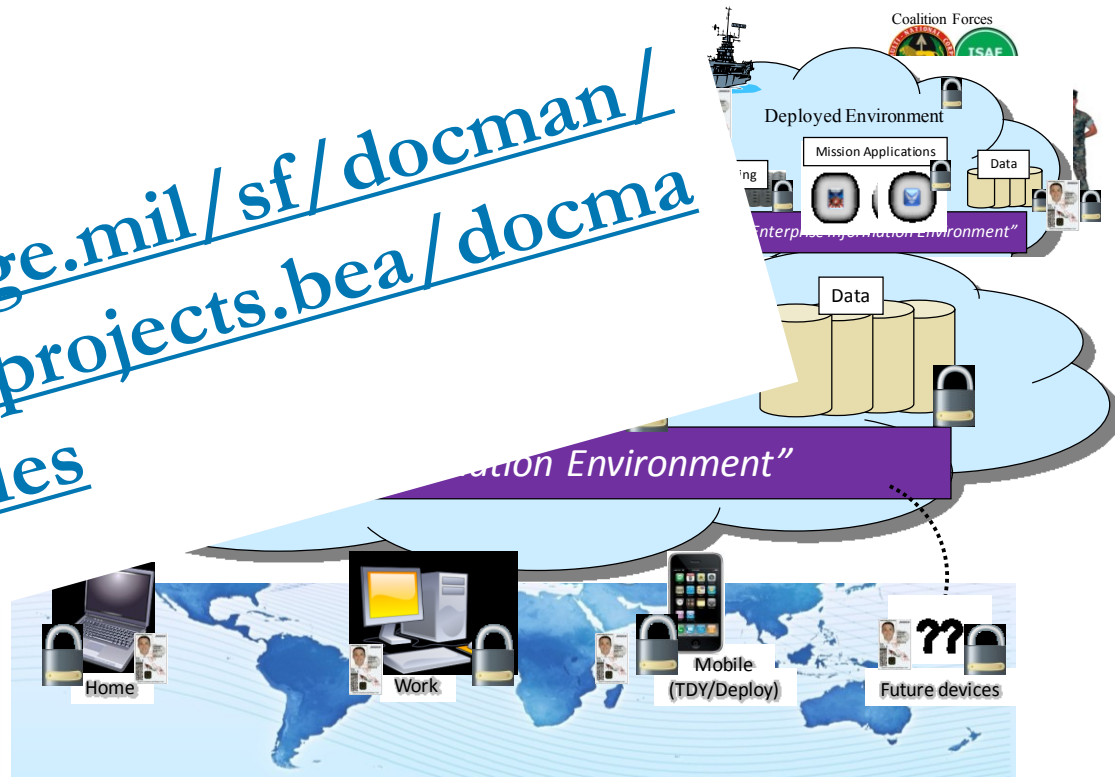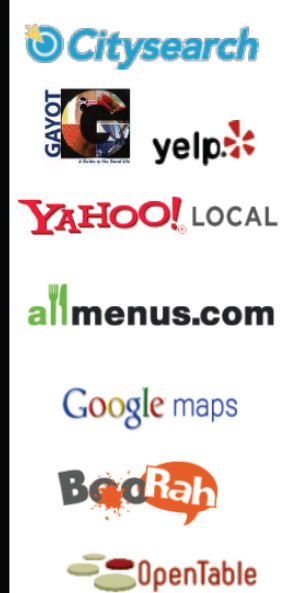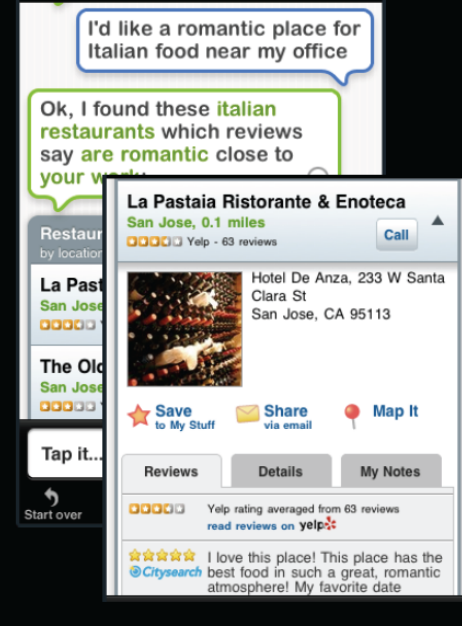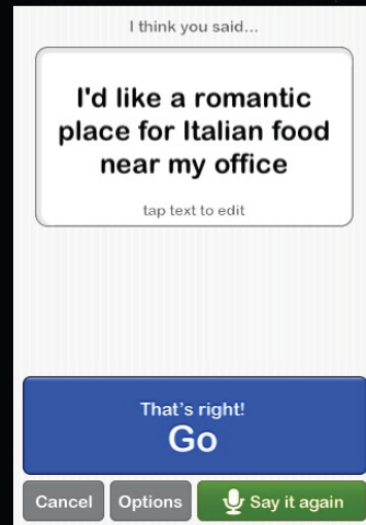
Department (DoD)

JCAs, Mission Areas

Component

Solution

We have the Technology now!

Think *Apple iPhone Siri!!*

Applying multiple sources to solve a problem

Source: Tom Gruber, Inventor of Siri
http://www.tomgruber...

Aroundme
Sky Map
Evi

View Graph Engineering Example!

Tactical - Edge

D
On
(O

Subsystem

CONUS

xml csv

• RSS

I don't want Big Data!

"…..from bureaucracy to battlefield, from tail to tooth"
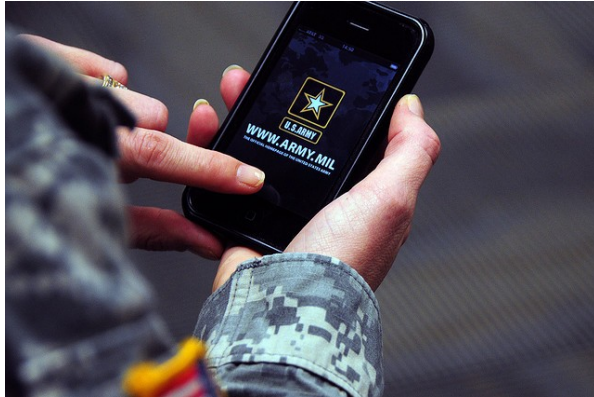
I don't want BIG DATA!
I want my data!

I want what I want,
I want what I need,
I want to know it is right
I want it when I need it.

"Interrogative: Where i

Semantics relates unstructured data to structured,
Semantics delivers the right structure,
Semantics reduces the Warfighter Information Overload.

Thank you!

Questions?

Dennis@wisnosky.net