



Strategy and Roadmap for DoD Business Operations Transformation

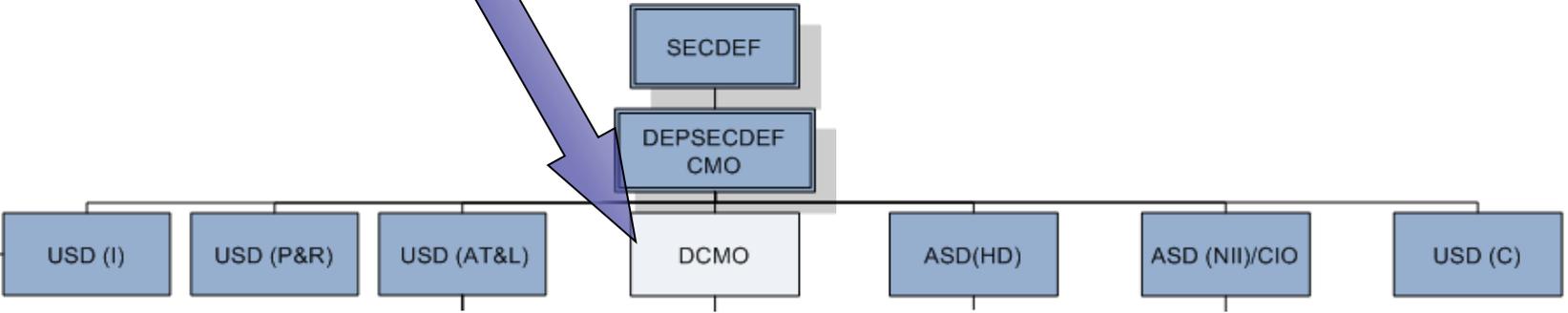
November 30, 2010

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



DCMO CTO/CA

Missions of the DoD

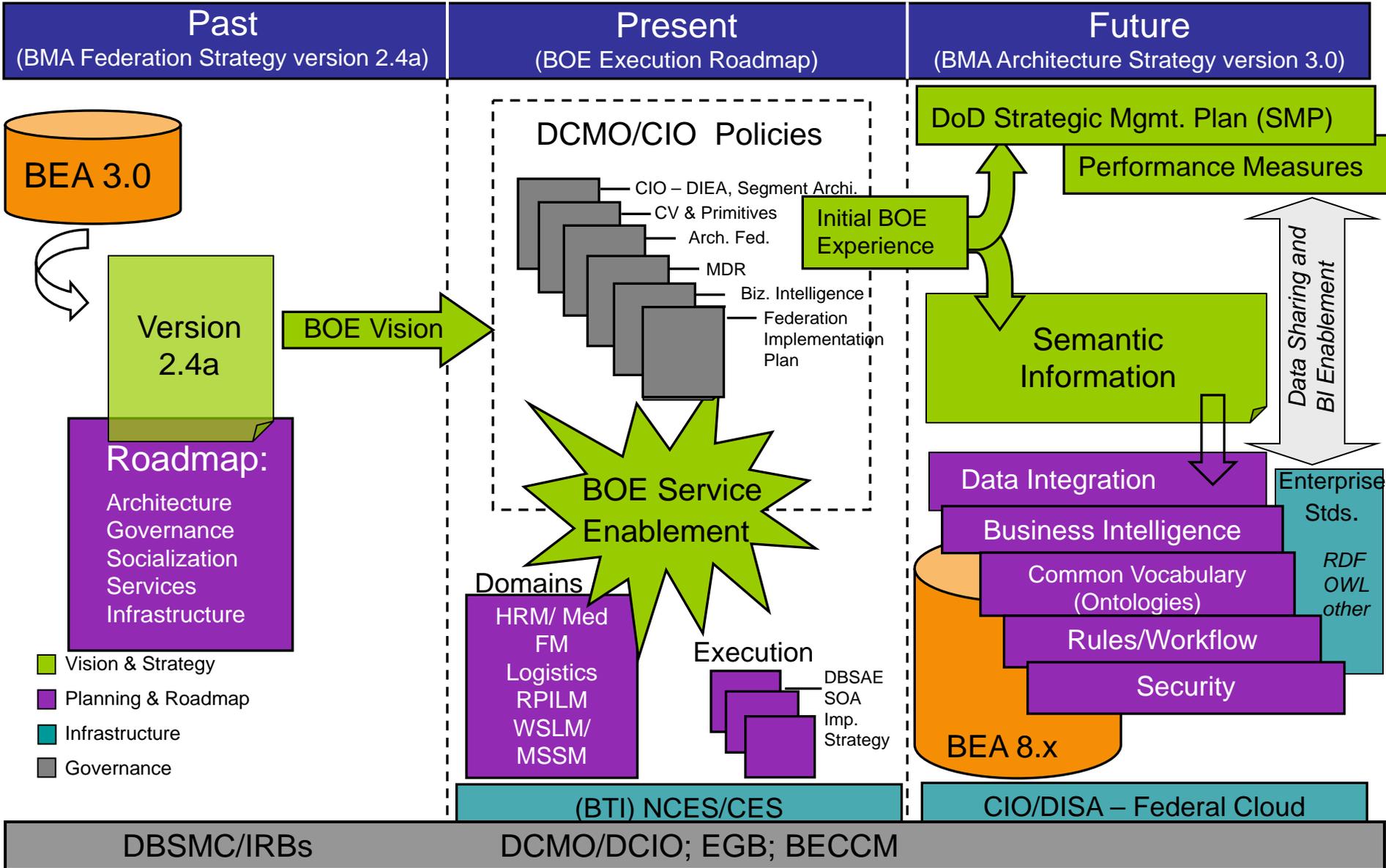


Dennis E. Wisnosky, DoD BMA CTO & Chief Architect in the Office of the Deputy Chief Management Officer (DCMO)





Strategy and Roadmap for DoD Business Operations Transformation





Business Operations thru Semantic web Solutions

- Semantic Web Initiative
 - Business IT development methodology 3-step pattern
 - Modeling the business capability to be deployed
 - Preparing and populating a modern information model and data store
 - Implementing the capability by deploying business services
 - “Model-Data-Implement” semantic web pattern is designed to field capabilities in 60-90 days; this supports the Departments goal to move away from monolithic systems that take years to deploy
 - Current application of this pattern to achieve high performing business operations:
 - Enterprise Information Web (EIW)
 - Performance Data Automation (PDA)
 - DCMO is preparing policy and instructions to fully instantiate the Semantic Web initiative and take advantage of W3C and OMG standards and semantic technologies that the commercial sector is widely deploying



Standards-based Architecture - Primitives

Modeling the business capability to be deployed



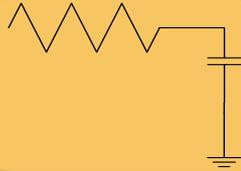
Standard Symbols

Engineering Language and Symbols:

Resistor symbol 

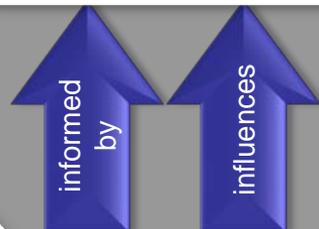
Capacitor symbol 

This agreed upon representation of electrical engineering allows a common understanding...



- DoDAF 2.0 serves as the foundation for architecture primitives
- Use Cases being developed and used to drive pilots

Standards Best Practices



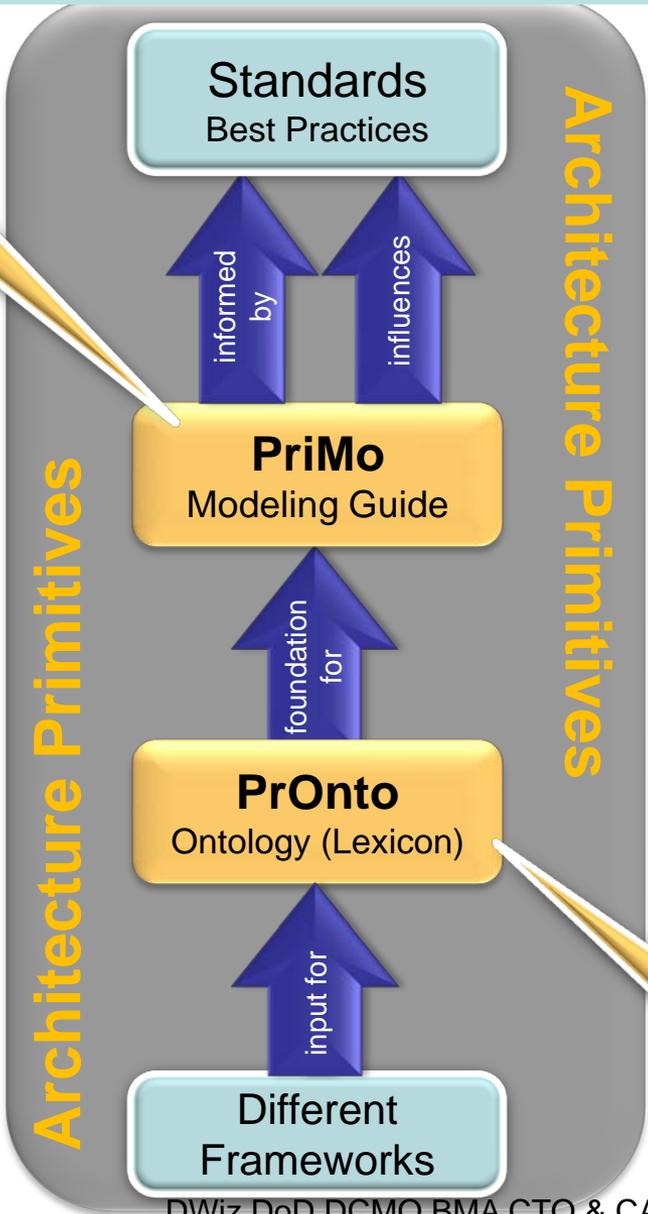
PriMo
Modeling Guide



PrOnto
Ontology (Lexicon)



Different Frameworks



Music Language and Symbols:

Music Scale symbols



Notes symbols



This agreed upon representation of music allows a common understanding...



Standard Language (terms and definitions)





Architecture Primitives Series

Modeling the business capability to be deployed

Vocabulary-Driven Enterprise Architecture Development Guidelines for DoDAF AV-2: Design and Development of the Integrated Dictionary
December 17, 2009

AV-2

Enter New Term
 Joint Case Air Support
 Project: 530
 Version: 42009
 Date: draft

Term	Definition	Acronym	Synonym	Classification	AV-1	AV-2	AV-3	AV-4	AV-5	AV-6	AV-7	AV-8	AV-9	AV-10	AV-11	AV-12	AV-13	AV-14	AV-15	AV-16	AV-17	AV-18	AV-19	AV-20
Terminal Air Controller	Person on the ground guiding the air asset into place during the execution phase of the CAS mission.	TAC		Personnel																				
Target	Designated object of an attack.	TGT		Information																				
Fire Support Control Measure	Ability to control ground troops with an asset.	FSCM		Information																				
Close Air Support	Attack close to CAS mission.	CAS		Information																				
Battle Damage Assessment	Measure of damage to ground CAS mission.	BDA		Information																				
CAS Request	Request for CAS mission.	CASREQ		Information																				
Intermediate Command and Control Point	Officer in the field.	ICCP		Personnel																				

Enterprise Architecture based on Design Primitives and Patterns Guidelines for the Design and Development of Event-Trace Descriptions (DoDAF OV-6c) using BPMN
December 17, 2009

OV-6c

Well Documented Intentions!

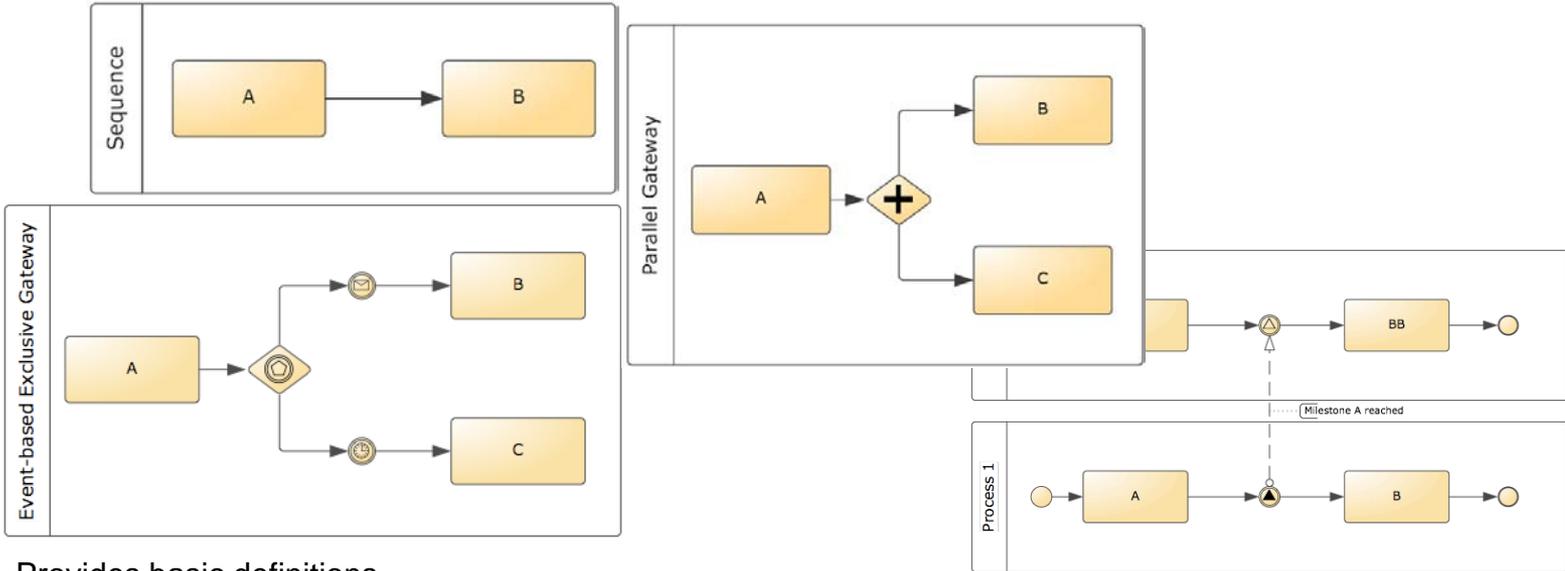
DoD Architecture Framework Processes Best-Practice

http://cio-nii.defense.gov/sites/dodaf20/journal_exp3.html



Primitives Lead to Patterns

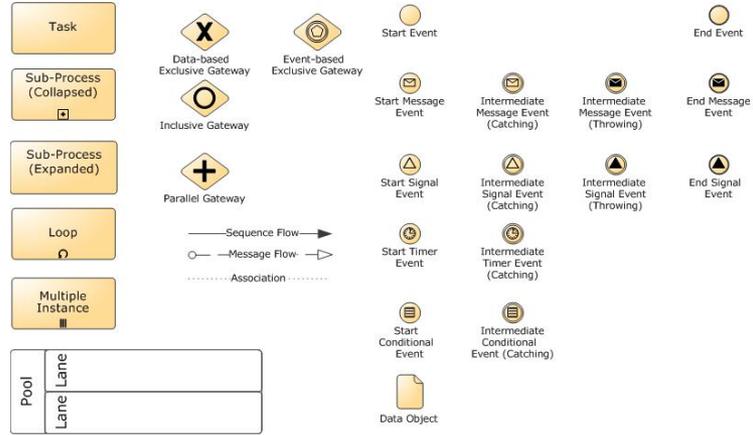
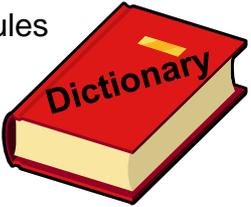
Modeling the business capability to be deployed



PriMo

- Provides basic definitions of the architecture model semantics
- Provides elementary rules for the connectivity of primitive constructs
- Provides foundation building blocks for constructing architecture products
- Caveat: A common vocabulary by itself does not guarantee high quality products

PrOnto



- A style guide provides subjective advice that will ensure the design of high quality products
- A style guide advises on
 - Choice of words
 - Which constructs are appropriate in a given situation
 - Choice of grammar
 - How to combine constructs to maximum effect



Primitives Lead to Patterns

Modeling the business capability to be deployed



NEWS FLASH!
OMG Selects DoD Primitives as a BPMN 2.0 Conformance Class!
Will Industry Care?

- Provides basic definition of the architecture and semantics
- Provides elementary constructs for the connectivity of primitive constructs
- Provides foundation building blocks for constructing architecture products
- Caveat: A common vocabulary by itself does not guarantee high quality products



PriMo

style guide provides objective advice that will ensure the design of high quality products

style guide advises on Choice of words

- Which constructs are appropriate in a given situation

- Choice of grammar
 - How to combine constructs to maximum effect





We Are Underway!

Modeling the business capability to be deployed

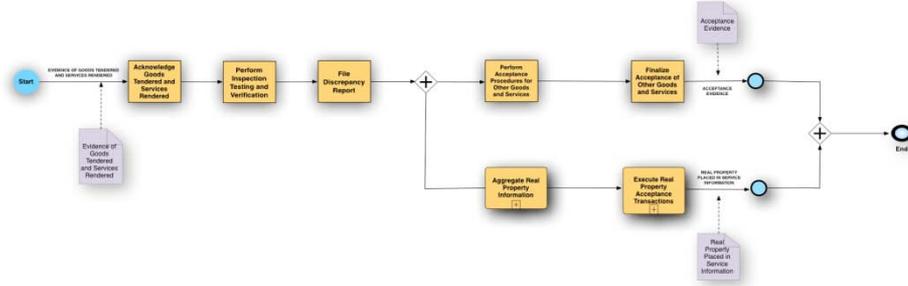
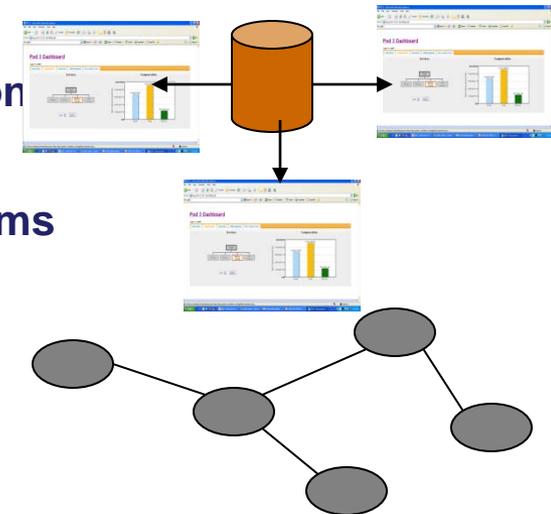




BEA Solution Statement

Modeling the business capability to be deployed

- **Visibility:** pull & display (vice store!) enterprise information directly from the authoritative data sources
- **Agility:** plug-and-play federated environment so new systems or analytical needs can come online and go offline without disrupting the overall environment
- **Access:** build federation into the solution
- **Standards:** leverage BPM and Semantic Web technology standards (RDF/OWL) developed by DARPA and approved by W3C and OMG
- **Savings:** People readable Architecture, Machine readable Architecture, Executable Architecture, Long-term re-use of authoritative data





Interoperability (Federation) in BEA Approach

Modeling the business capability to be deployed

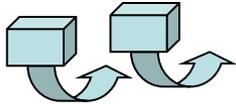
- Federation:
 - ✓ The Interstate highway system
 - ✓ The railroad system
 - ✓ The United States of America
 - ✓ DOD is a federation
- Steps
 1. Build Domain Vocabularies: describe all of the artifacts in each domain using RDF/OWL standards
 - DoD currently does this description work, but without standards – often in Excel, Word, Powerpoint, Visio, etc
 2. Relate Domains: use RDF/OWL based descriptions to say how domains are related
 - This is the big missing piece of the current “standards” approaches
 3. Relate domain data to Domain Vocabulary: Use RDF/OWL to say how all of the data in each domain is related to the Domain vocabulary
 4. Query the Domain Vocabulary for any information
- Result: BEA Enables Enterprise Information Web





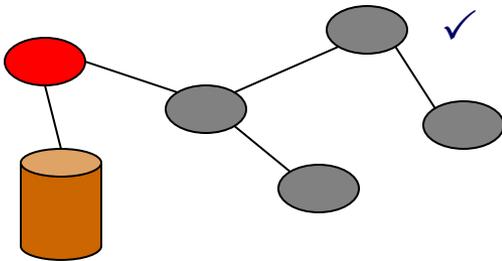
Agility in the BEA Approach

Preparing and populating a modern information model and data store



- Agility in process:
 - ✓ “Agile” development method; quarterly “deliverables”; lessons learned influence next deliverable;

- Agility in product:
 - ✓ Once assets are unambiguously described, whole environment becomes “plug and play”



- ✓ Eg: New DCMO policy issued:
 - Today: additions/changes to relational environment very costly
 - BEA: RDF/OWL graph-based information model is infinitely extensible and inexpensive to change; just add concept to the graph and point to its authoritative data source (ADS)
- Agility in query development
 - ✓ Queries are machine and human readable
 - ✓ Fast to develop across disparate ADSs

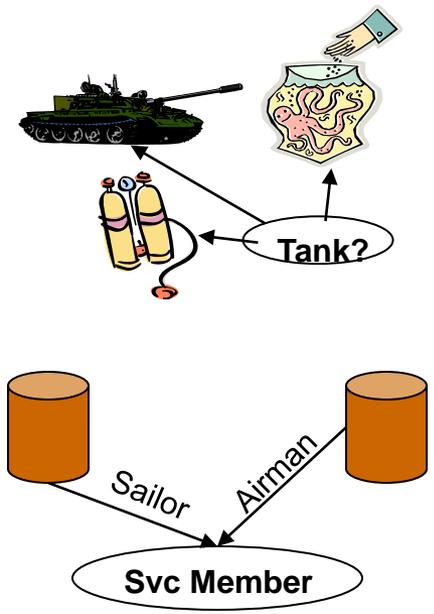
NOTE: up-front time and labor cost of unambiguously describing assets is not trivial



Example Savings in this BEA Approach

Preparing and populating a modern information model and data store

- Flexibility & Data accuracy
 - ✓ Current “standards” approaches force rigid conformity in understanding and representation of data. Result: very painful and expensive retroactive coding.
 - ✓ Semantic approach allows for variation in understanding while prescribing conformity in representation. Result: flexibility at the instance level and accuracy at the enterprise level
- Interface development
 - ✓ E.G.: 5 systems require interfaces to each other (20 interfaces). If each system’s information model is semantically described, only have to describe 5 interfaces
- Portfolio Management
 - ✓ Once information assets are unambiguously described, Domain vocabulary can assess gaps and redundancies in the portfolio and the architecture based on factual assessments



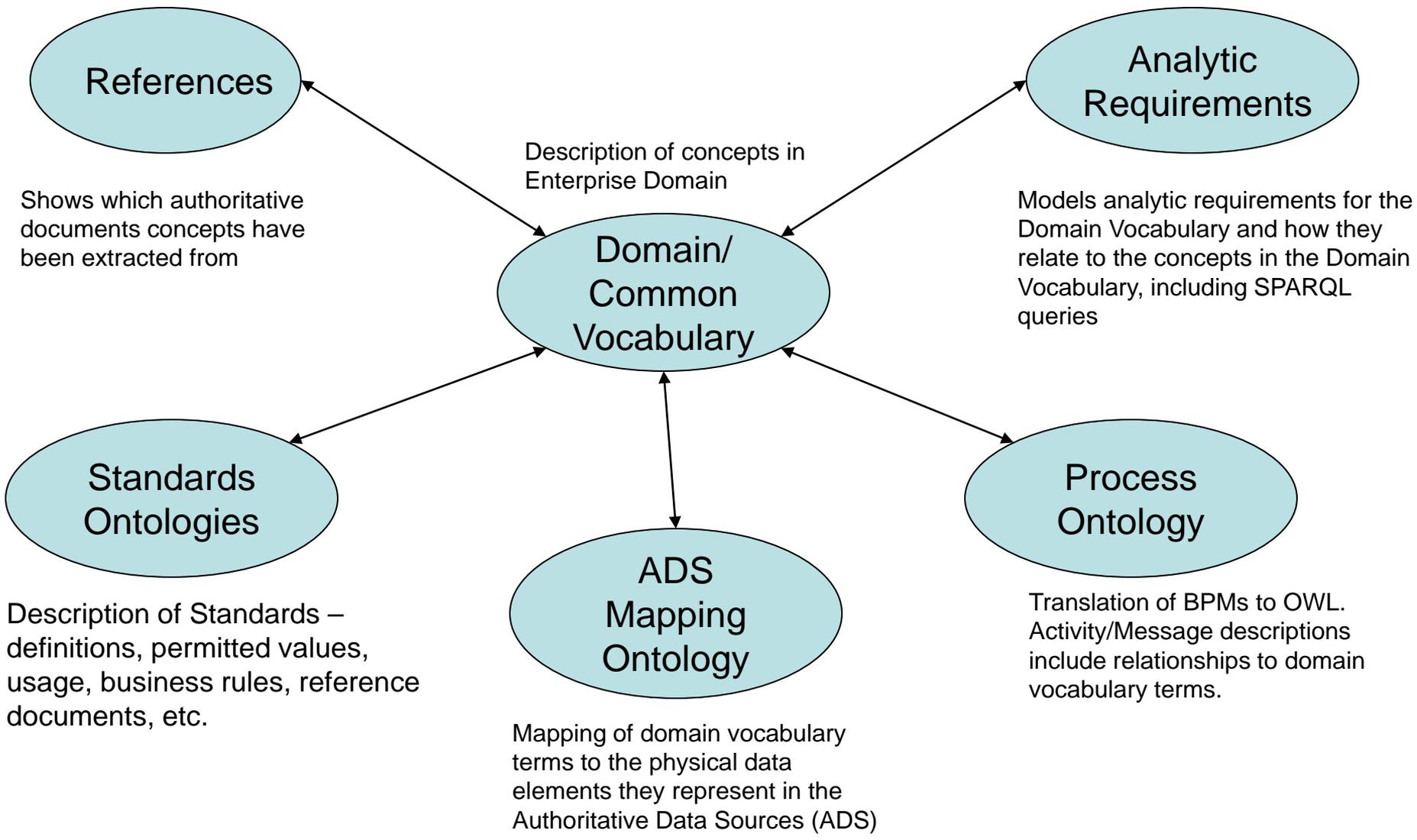
Data	Concept	System	DV to Arch?
Airman	Svc Mem	Pers Sys	
Soldier	Svc Mem	Pers Sys	
Sailor	Svc Mem	Pers Sys	
Lawyer	Svc Mem	Pers Sys	

(notional depiction only)



DoD BEA Ontology

Preparing and populating a modern information model and data store



Example SMP to End to End (E2E) Process

Priority 5 – Strengthen DoD Financial Management

Preparing and populating a modern information model and data store

“Procure to Pay” (P2P)
Level 1 E2E in the BEA

SMP Metrics also to be rolled up to Level 1



Radio_Frequency_Identifier
The Radio Frequency Identifier must be assigned only if referenced by contract in DFAR Clause 252.211-7006

Invoice_Date
The Invoice Date must be assigned for each invoice number

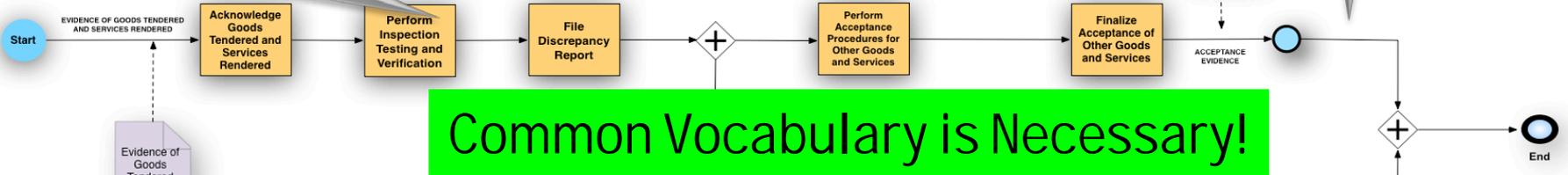
Unit_Price_Amount
The Unit Price Amount must be assigned for each Unique Item Identifier (UII) item

MILSTRIP_Number
The MII STRIP Number must be assigned



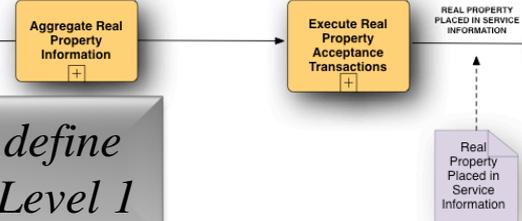
SMP Metrics linked at Leaf Level (e.g., Level 2)

“Perform Receipt Acceptance & Return” P2P Level 2 E2E in the BEA



Common Vocabulary is Necessary!

Leaf Level decomposition used to identify and define requirements “rolled up” to and visualized at Level 1





Common Vocabulary Development

Preparing and populating a modern information model and data store

- Identify information to communicate
- Agree on terms and contextual use
- Communicate

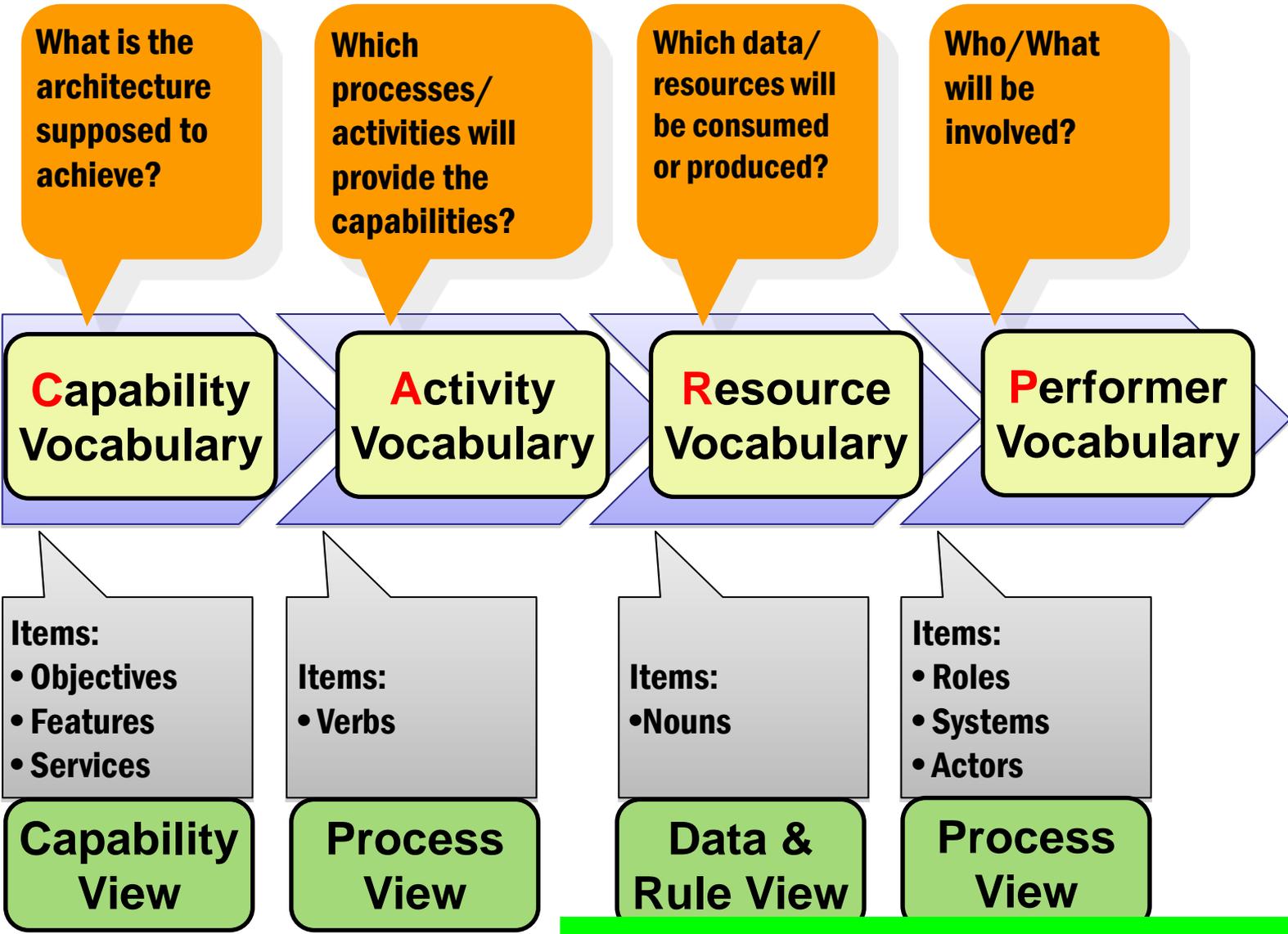


“Now! *That* should clear up a few things around here!”



Building Common Vocabularies

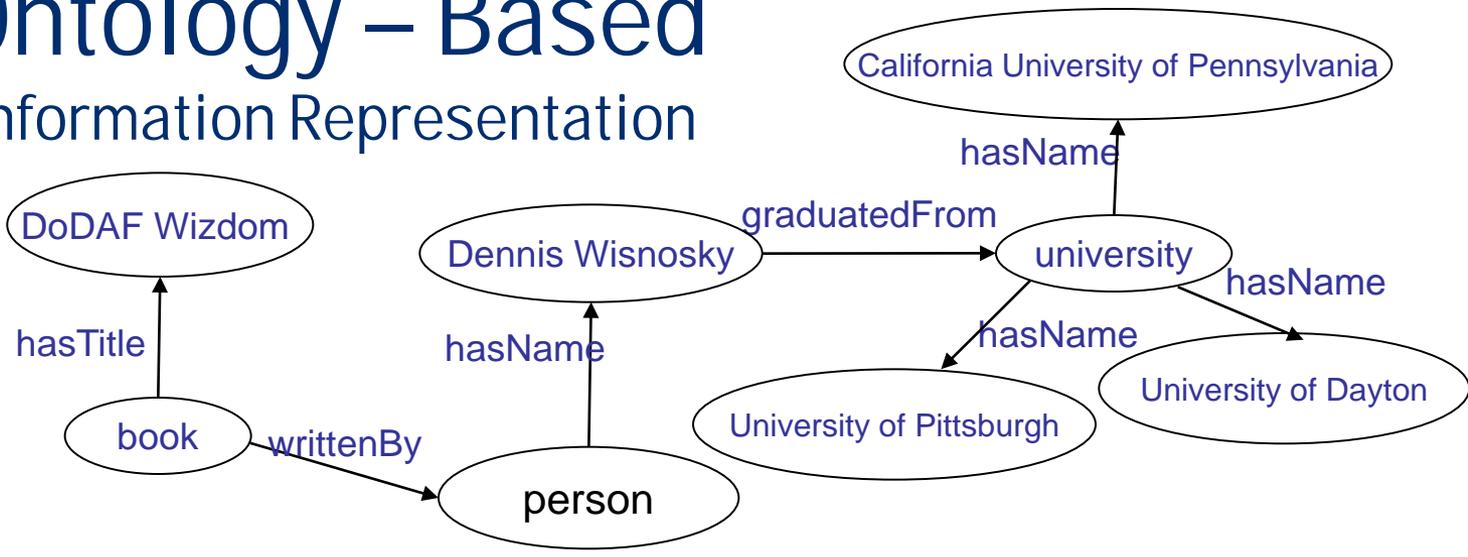
Preparing and populating a modern information model and data store





Ontology – Based Information Representation

DBpedia (Wikipedia) Dataset



Graph1

Who wrote “DoDAF Wizdom”?

Common Vocabulary in Action!

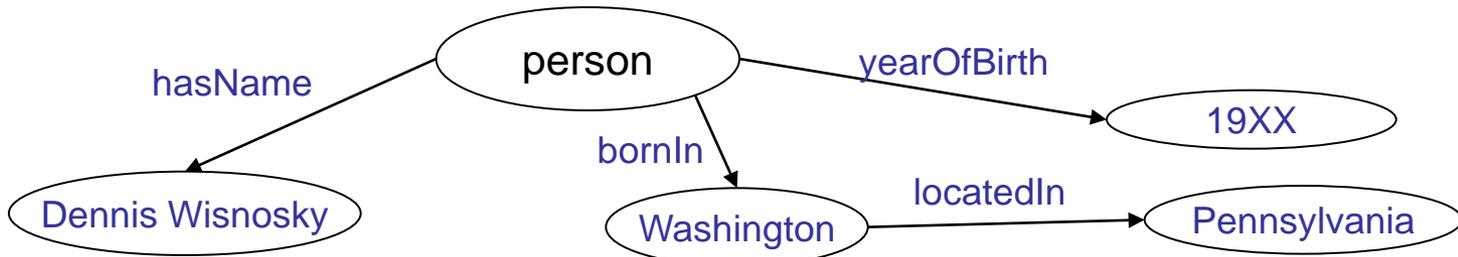


Ontology – Based Information Representation

Where was Dennis Wisnosky born?

Graph2

DoD HR Dataset

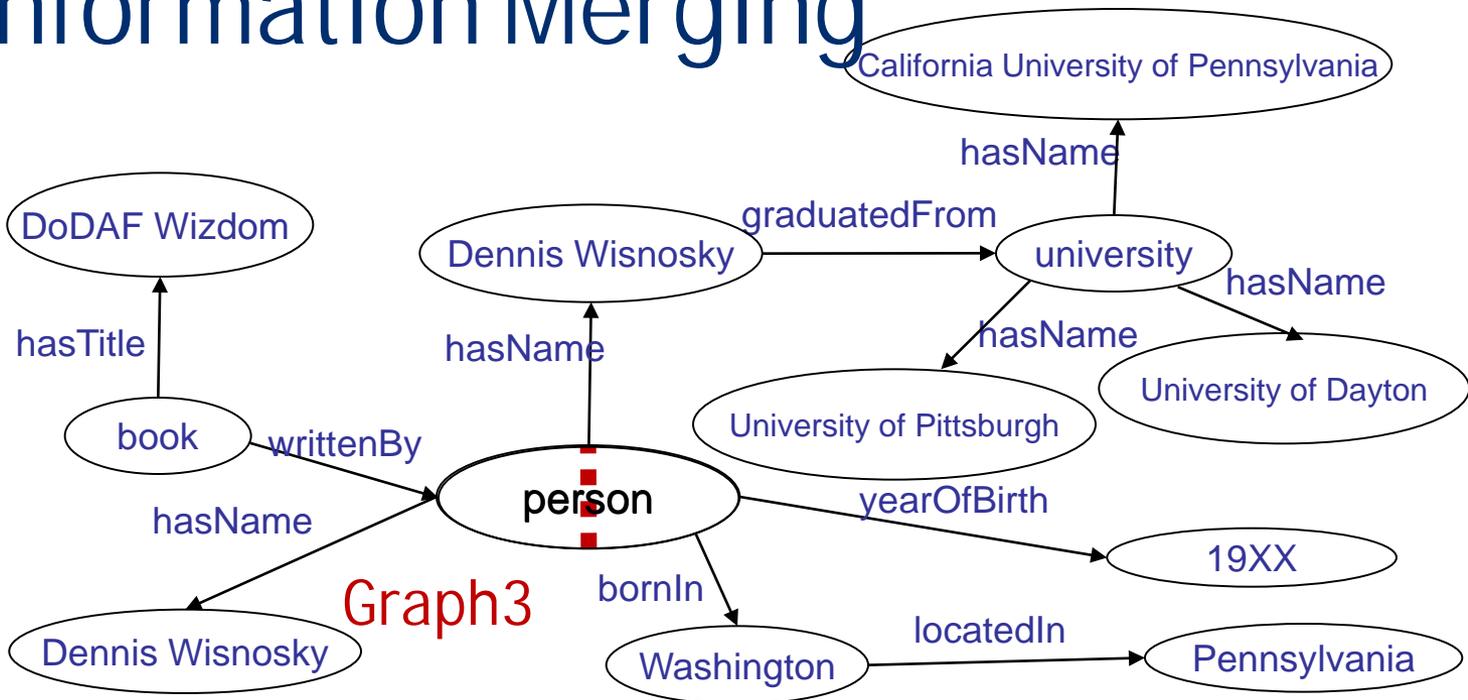




Information Merging

DBpedia
(Wikipedia)
Dataset

DoD HR
Dataset



Graph3

- Wikipedia Dataset: Who wrote “DoDAF Wizdom”?
- DoD HR Dataset: Where was Dennis Wisnosky born?
- Combined Dataset: Where was the person who wrote DoDAF Wisdom born?



HR Enterprise Information Web (EIW)

Implementing the capability by deploying business services

- Building an HR Common Vocabulary that will make future integration and development simpler
- Building an executable information model to provide accurate and timely enterprise Personnel Visibility for the first time
- Making “compliance” (eg: SFIS, IRB, BEA) exercises simpler, faster, meaningful, easier to maintain

Crawl, Walk, Run - EIW



HR Domain Ontology

Implementing the capability by deploying business services

- Information discovery, interoperation, and integration all depend on description
 - If we do not *know* what something is we cannot possibly know how to integrate it with other things or even how it should be used
- If we describe everything, we are in a position to have a knowledge-based web
 - Rich analytics
 - Requirements gap analysis
 - Authoritative Data Source discovery
 - Answer any Personnel & Pay question
 - Integrate and interoperate
- RDF & OWL are the technology used to describe “things”
 - both machines and people can understand the descriptions

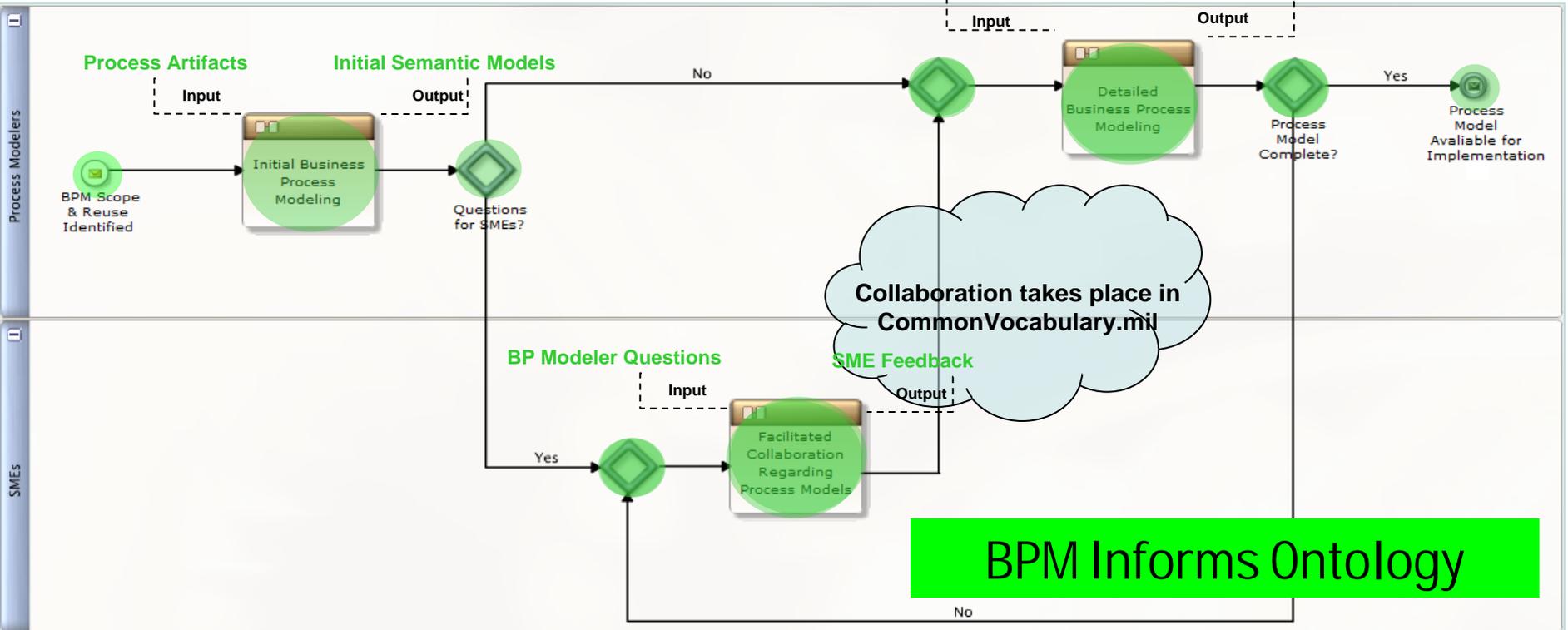


Implementing the capability by deploying business services

BPM Methodology

Goal: Develop correct, consistent, human and machine readable, high quality business process models

Approach:



Benefits:

- Consistent, semantically aligned (end-to-end HR) business processes
 - Communicate effectively with the Services

- Machine readable (queryable) business processes
 - Perform gap analysis
- Standards based models result in fewer errors during implementation



Implementing the capability by
deploying business services

CommonVocabulary - Human Resources - Microsoft Internet Explorer

File Edit View Favorites Tools Help



Address https://www.commonvocabulary.army.mil/ui/groups/HR_EIW/vocab/Human_Resources

Google Search Sidewiki Check Translate AutoFill Sign In



Find: search this vocabulary Search ehtambo6 Log out

CommonVocabulary My account Community File Edit RSS Feeds

Human Resources

Community HR_EIW vocabulary Human_Resources

Classes Properties

- (Acc... Cas)
 - Accumulator
 - AdditionalProperty [d2rq:]
 - Address
 - AgreementType
 - Allotment
 - AllotmentDesignee
 - AllowedValuesClasses
 - Application
 - Application_Status
 - Application_Type
 - Attachment
 - BankAccount
 - CasualtyAssistancePackage
 - CasualtyIncidentHostilityType
 - CasualtyInvestigationRequirement
 - CasualtyReport
 - CasualtySituationNotificationType

View Graph RDF Discussion History

Contents

- 1 Technical Specifications
- 1.2 Overview

Collaboration Is Key!

Technical Specifications

Overview

Ontology Name
http://www.knoodl.com/ui/groups/DIMHRS/vocab/Human_Resources/

Dependencies
 Namespaces

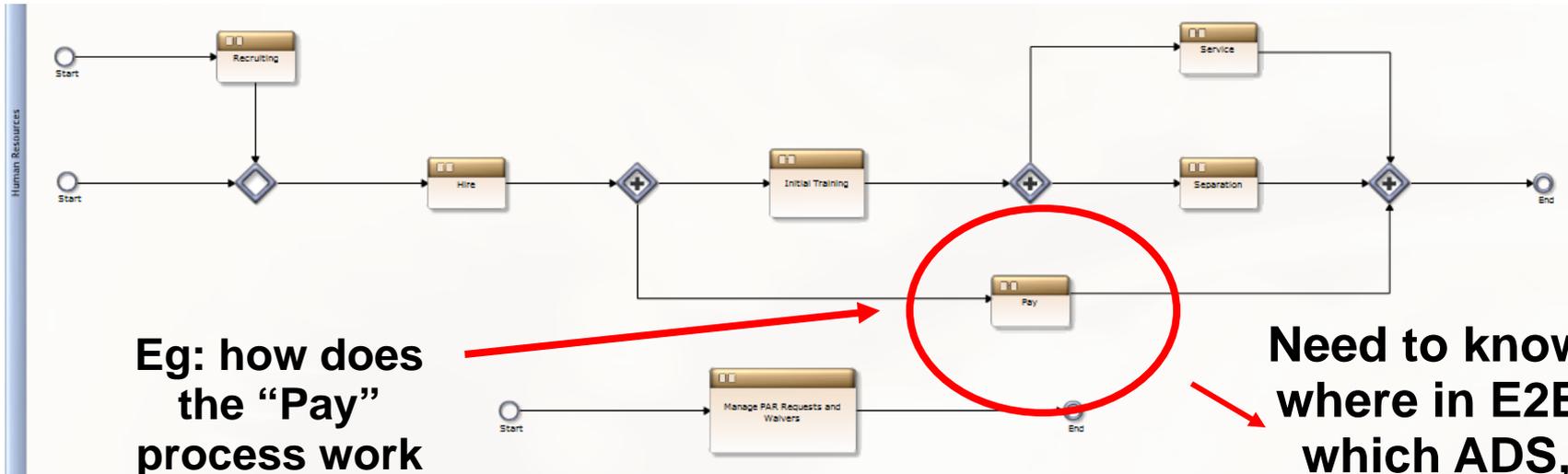
- d2rq: <http://www.wiwiss.fu-berlin.de/suhl/bizer/D2RQ/0.1#>
- d2rq-ext: http://www.knoodl.com/group/DIMHRS/vocab/D2RQ_Vocabulary#
- dc: <http://purl.org/dc/elements/1.1/>
- ja: <http://jena.hpl.hp.com/2005/11/Assembler#>
- ns4: <http://www.knoodl.com/ui/groups/DIMHRS/vocab/Depts/>



HR EIW and H2R E2E

Implementing the capability by deploying business services

Personnel Visibility not possible if DoD doesn't understand the Enterprise H2R E2E processes, information flows, data sources, integration points, standards and exceptions



Eg: how does the "Pay" process work across DoD in the E2E?

Need to know: where in E2E, which ADS, semantics (meaning) of data, and access



Operations – Country View: User Defined Query

Google Maps Demo
 http://184.72.247.236:8080/pod3/

Pod 3 Dashboard

Tabs
 Map Compensation Separation **UCC Country View**

Language Other Other

Select Desired Language:
 FRENCH
 HAITIAN CREOLE

Select months since members last deployment:

Select months until member is eligible to retire:

Submit

Members

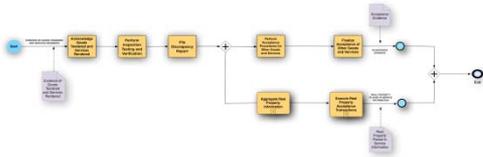
SSN	First Name	Last Name	Loc.	Rank	Primary MOS	uuc
664887701	CukymGrHzY	PAqimqJmX	51	MAJ	MOS180	NORTHCOM
1040784003	dqKfjpcLeZ	ciXksH0Ts	06	1STSGT	MOS8999	NORTHCOM
2060149898	TJzzRuUcrrw	FaWZn5xZOo	06	SGT	MOS321	NORTHCOM
2886040741	XnazuYKSEg	cFAWmVTUlm	08	LTCOL	MOS202	NORTHCOM
240226098	KcVVSFohqY	kBkWiCmTal	51	SGT	MOS3531	NORTHCOM
2768415363	VfYbafiiyC	RrmreZLQgb	BG	SSGT	MOS2671	PACOM
3395337019	qVehcxJKOp	IPGibVqOr	51	CPL	MOS4641	NORTHCOM
2313602753	SIUhsCyABW	sOionznFxr	BG	SGT	MOS341	PACOM
350157891	TibKjntNAK	VXStisZPDM	51	SSGT	MOS431	NORTHCOM
613173606	IDJwluEErp	GpZbpattIWy	I2	LTCOL	MOS302	CENTCOM
2803128426	siaTKGHUlh	SPJGquHvF	51	GYSGT	MOS6276	NORTHCOM

Total Members:20

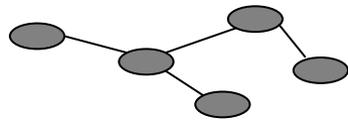
Use Case!

HR EIW Technical Summary!

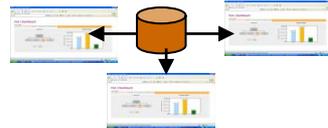
Many DoD and Industry Participants, Learning!



Makes full use of Business Process Models Built on BPMN (OMG) Standard!



Built with Open Source Software and Open Standards (W3C)!



Ad Hoc and Standard Displays use ADS!



Implemented in the 'Cloud'!



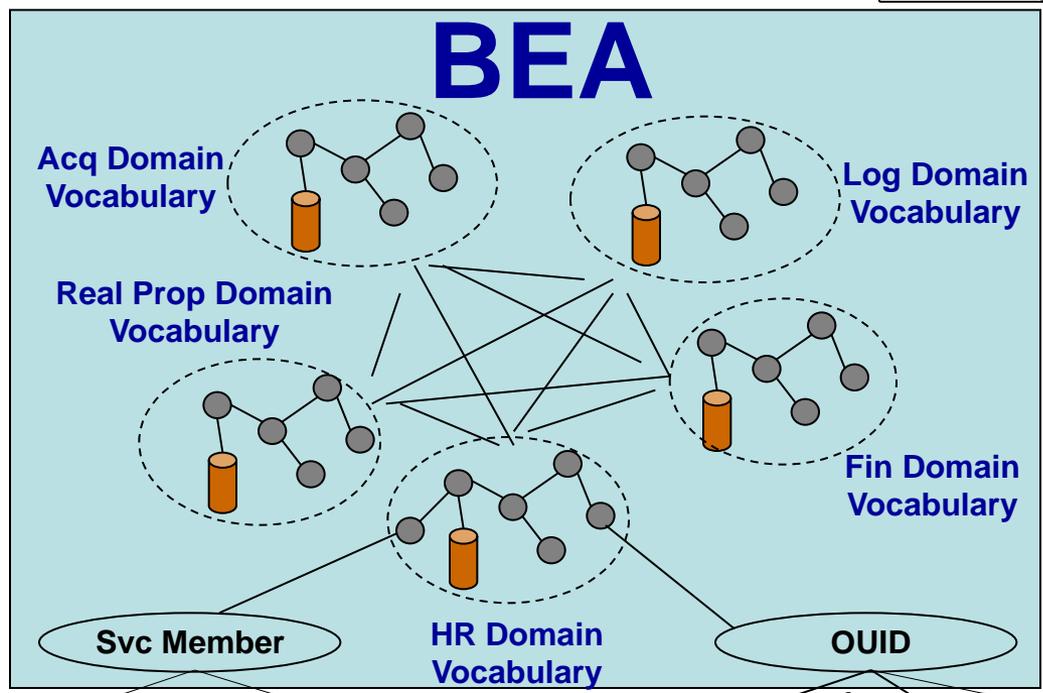
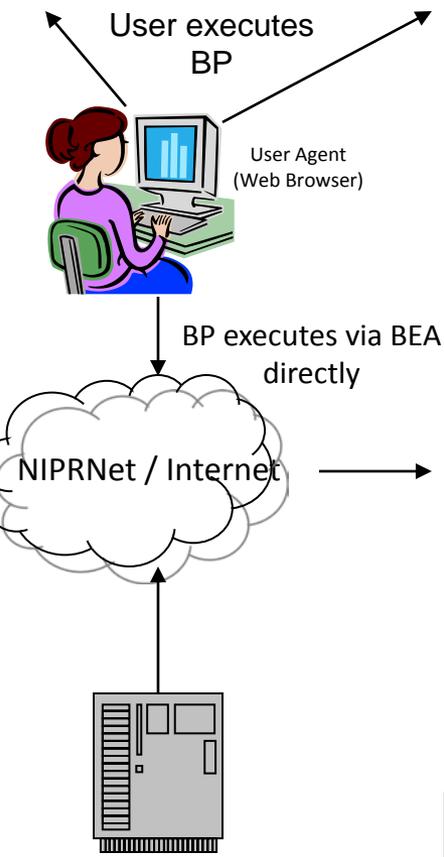
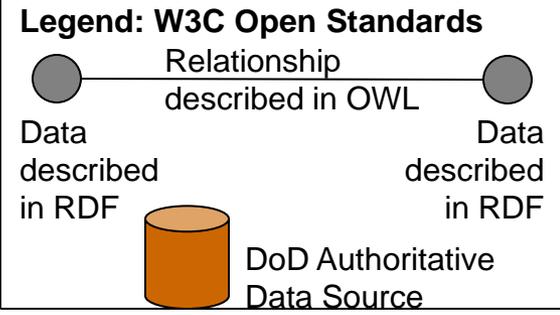
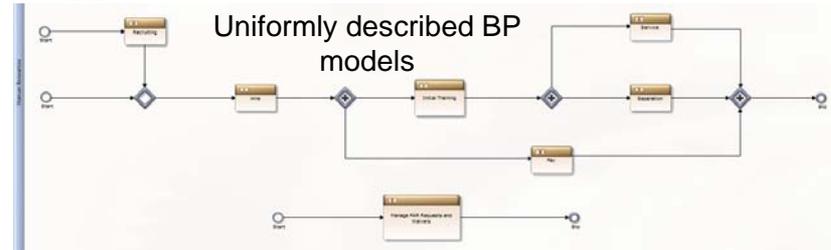
90 Day Deliverables!



Built on a Shoe String!

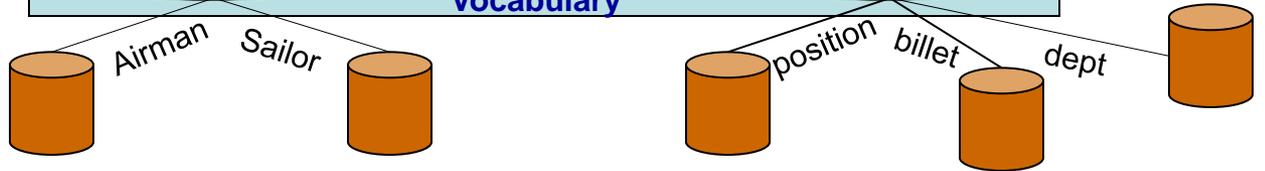


EIW and the Direction of DoD Solution Architectures



Federated Business Enterprise Architecture (BEA) queried directly for:

- Enterprise analytics
- Compliance
- IRB/portfolio management





Agile, Architecture-Driven, DoD Business Capability Delivery

Implementing the capability by deploying business services

Governance
Policy, Processes, Tiered Accountability

This Strategy Applied to Synchronized & Interoperable Supply Chain

Model
Common Architecture Methodology
Common Vocabulary
Standard Representation and Composition
Primitives and Design Patterns

Data
Authoritative Data Sources
Semantic Technologies

Implement
Phased Implementations
Agile Business Services Delivery

Model to Guide Transformation
Data to Improve Performance
Implement to Deliver Capabilities



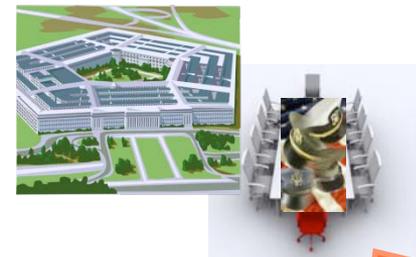
Synchronized & Interoperable Supply Chain

Aligned with
Open Government Initiative

Collaboration



Collaboration Portal –
“Sourcing for Innovative Ideas”



DoD Decision Makers

Transparency

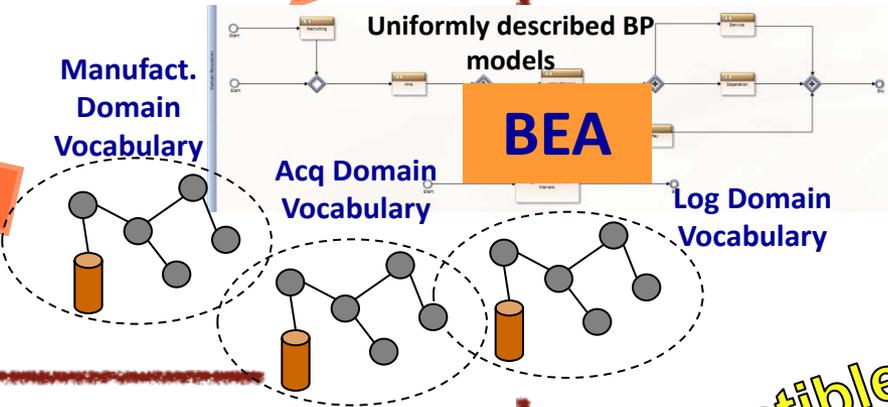


Manupedia –
“Discover and adopt”

Manufact. Domain Vocabulary

Acq Domain Vocabulary

Log Domain Vocabulary



Participation



Economic Growth Thru
Semantic Understanding

Manufacturing eMarket –
“Collaborative Filtering”

Compatible Investment



DoD Weapons Acquisition

National Security Industrial Base





Thank you!

Questions?
Dennis.Wisnosky@osd.mil

