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# **Service Oriented Architecture (SOA) for DoD**

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**January 9, 2008**

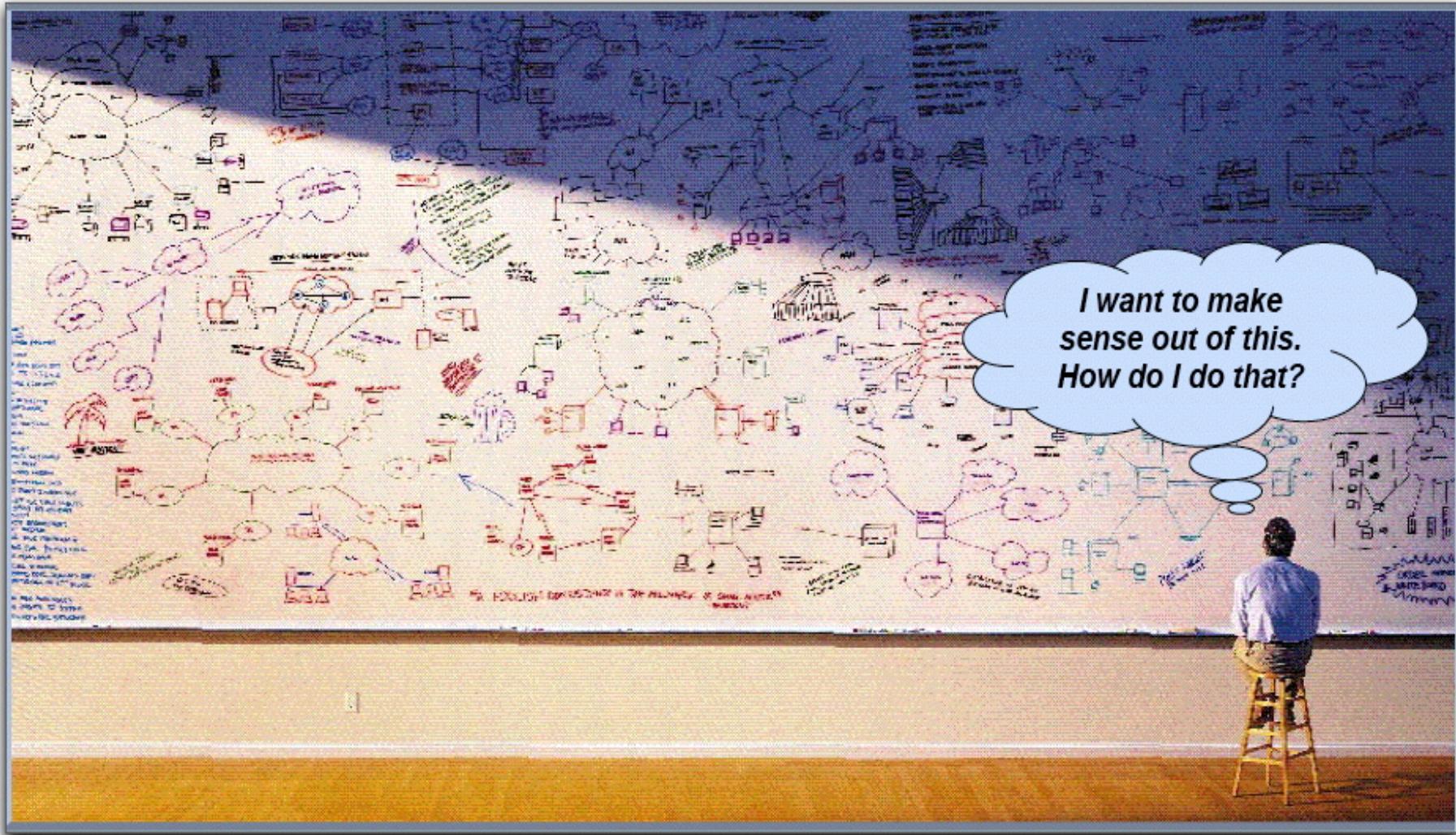


## Part 1

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# SOA Requirements

# The DoD Challenge



# Most DoD Projects Have Own Data

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Projects	07 Budget \$ Millions	Number of Projects	% of Total Budget \$	% of Projects
Project - > \$100 Million	\$10,301	43	33.9%	1.3%
Projects - > \$10 Million	\$15,013	525	49.4%	15.4%
Projects - < \$10 Million	\$5,066	2,832	16.7%	83.3%
Total	\$30,380	3,400	100.0%	100.0%



# What is a Network Centric SOA?

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**The capacity to:**

**Discover Applications Anywhere;**

**Display the Capabilities of All Applications;**

**Discover Network Data from a Data Registry;**

**Mediate the Extraction of Information From Data Bases;**

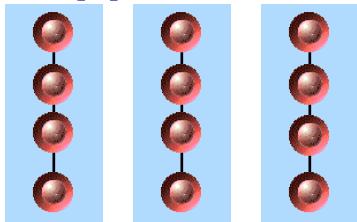
**Execute Unique Requests through Using Multiple Servers;**

**Provide Credentials Validation and Security to Everyone;**

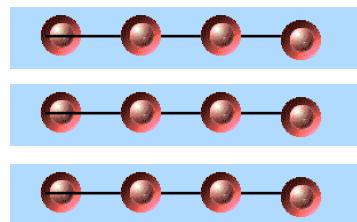
**Generate Responses at “Google Speed” ( <1 second).**

# SOA for Interoperability

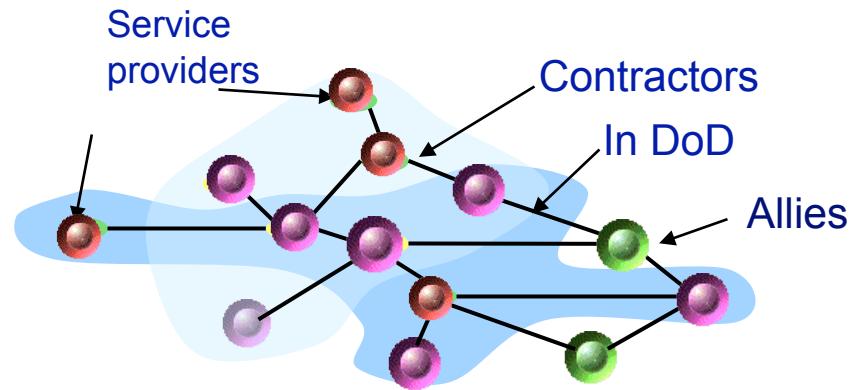
## *Functional Applications*



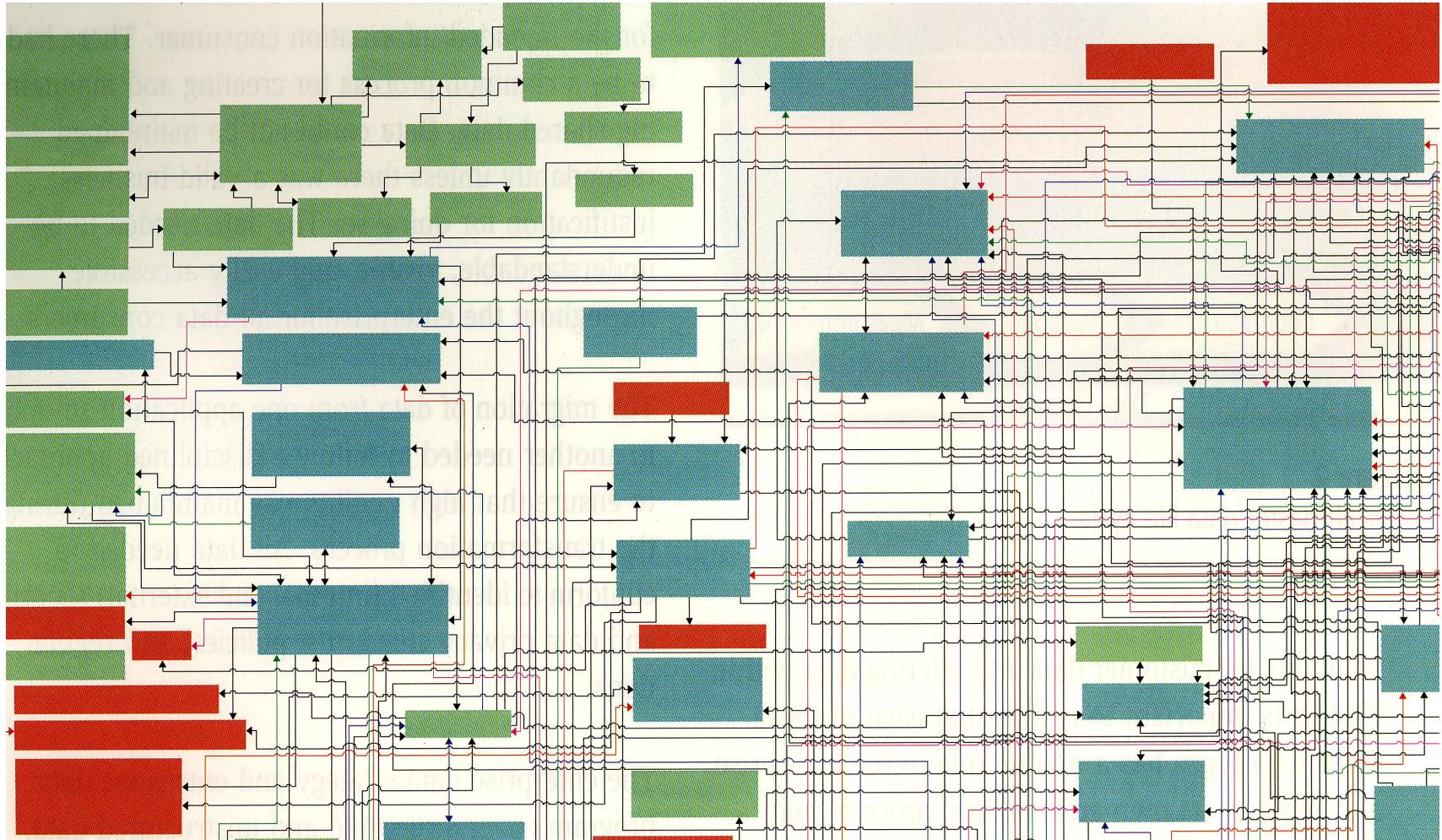
## *Enterprise Applications*



## *SOA Applications*



# Existing Systems Cannot Respond in Google-Time





# Policies For SOA Exist (Partial List)

- DoD Directive 8000.1, "Management of DoD Info Resources", November 21, 2003
- DoD Manual 8020.1-M, "Functional Improvement Process", August 1992
- DoD Directive 8100.1, "GIG Overarching Policy", September 19, 2002
- DoD Directive 8100.2, "Wireless Technologies and the GIG", April 14, 2004
- DoDI 8110.1 "Multinational Information Sharing Networks Implementation".
- DoD Directive 8115.1, "I.T. Portfolio Management", October 10, 2005
- DoD Manual 8320.1-M, "Data Administration Procedures", March 1994.
- DoD Manual 8320.1-M-1, "Standard Data Element Development", May 1992.
- DoD Directive 8320.2, "Data Sharing in DoD", December 2, 2004.
- DoD Directive 8320.03, "Identification Standards", March 23, 2007.
- DoD Directive 8500.1, "Information Assurance", October 24, 2004.
  
- DoD Net-Centric Data Management Strategy: Metadata Registration, April 3, 2003
- DoD Net Centric Strategy, May 9, 2003
- Department of Defense Discovery Metadata Specifications
- DEPSECDEF Memorandum on "Information Technology Portfolio Management", March 22, 2004
- Director of Central Intelligence, "Intelligence Information Sharing", June 9, 2004

# ASD NII / DoD CIO Is in Charge

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**DoD Directive 5144.1, May 2, 2005:**

- Initiates continuation, modification or termination of programs;
- Concurs with budget requests;
- Ensures enforcement of policies and standards;
  
- Assures compliance with standards & policies;
- Dictates data & information management methods;
- Has direct authority over the Director of DISA;
- Issues DoD Instructions.

## DoD Directive 8320.02, Data Sharing

- Data shall be visible, accessible, and understandable to any user.
- Data assets shall be made visible by associating metadata (“tagging”) for each data asset.
- Data assets shall be made understandable by publishing semantic and structural metadata in a DoD metadata registry.

# A Requirement for DoD SOA

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## DoD Directive 8320.03, Unique Identification

- All business, warfighter, intelligence, and enterprise information environment transactions, among the Department of Defense, Federal and State Agencies, non-governmental organizations, and domestic and foreign persons and organizations will use Unique Identification (UID) standards.

# DoD Infrastructure Costs are Excessive (\$ Millions\*, I.T. Costs)

Function	Total 07 Spending	% of Total Spending
Warfighter Missions	\$10,876	36%
IT Infrastructure	\$14,185	47%
Logistics	\$2,377	8%
HR Management	\$1,834	6%
Finance & Administration	\$1,036	3%
Other	\$185	1%
Total DoD FY 07	\$30,492	100%

SOA



# Problem: DoD Contractors Build Separate Infrastructures

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\$ Billions	FY05	FY06	FY07
Total DoD I.T. Spending	\$28.7	\$29.9	\$30.4
DoD Spending on Contractors	\$21.1	\$22.6	\$24.1
% of I.T. Spending Contracted Out	73.5%	75.6%	79.3%



## Part 2

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# SOA Concepts



# DoD Pursues “Federation” or “Tiered Accountability” for SOA

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## POLICY:

- Units in DoD shall operate under a common set of rules.
- SOA is based on trust and security among autonomous units.

## PROBLEMS:

- Where and when do common SOA rules apply?
- How will SOA trust and security be established?



# Problem: Who Oversees SOA?

(Partial List)

- DoD CIO Executive Board (CIO EB)
- Military Communications and Electronics Board (MCEB)
- GIG E2E Systems Engineering Advisory Board (SSEB)
- IT Standards Oversight Panel (ISOP)
- Information Assurance Senior Leadership Group (IASLG)
- Interoperability Senior Review Panel (ISRP)
- GIG Waiver Board and Panel
- DISN Flag Panel
- DISN Designated Approving Authority (DAA)
- DISN Security Accreditation Working Group (DSAWG)
- DIAP (Defense-Wide Information Assurance Program.)
- Joint Battle Management Board (JBMC2 BoD)
- Defense Business Systems Management Committee (DBSMC)
- CCB (Configuration Control Board)

# Who Builds SOA?

- The United States Strategic Command (USSTRATCOM) is responsible for planning, integrating, and coordinating DoD's NetOps.
  - The DoD GIG is executed by Joint Task Force Global Network Operations (JTF/GNO) through DISA.
  - Business Transformation Agency develops systems.
  
  - SOA components to be shared:
    - \* Service Discovery - (*Services Discoverable in Directory*)
    - \* Enterprise Service Management - (*Display of Services Capabilities*)
    - \* Mediation - (*Enables Extraction of Information*)
    - \* MetaData Registry - (*Enables Discovery of Data*)
    - \* Messaging - (*Ability to Different Servers to Execute a Task*)
    - \* People Discovery - (*Single Source for Identification*)
    - \* Service Security - (*Credentials validation, Security processes*)
    - \* Application Hosting
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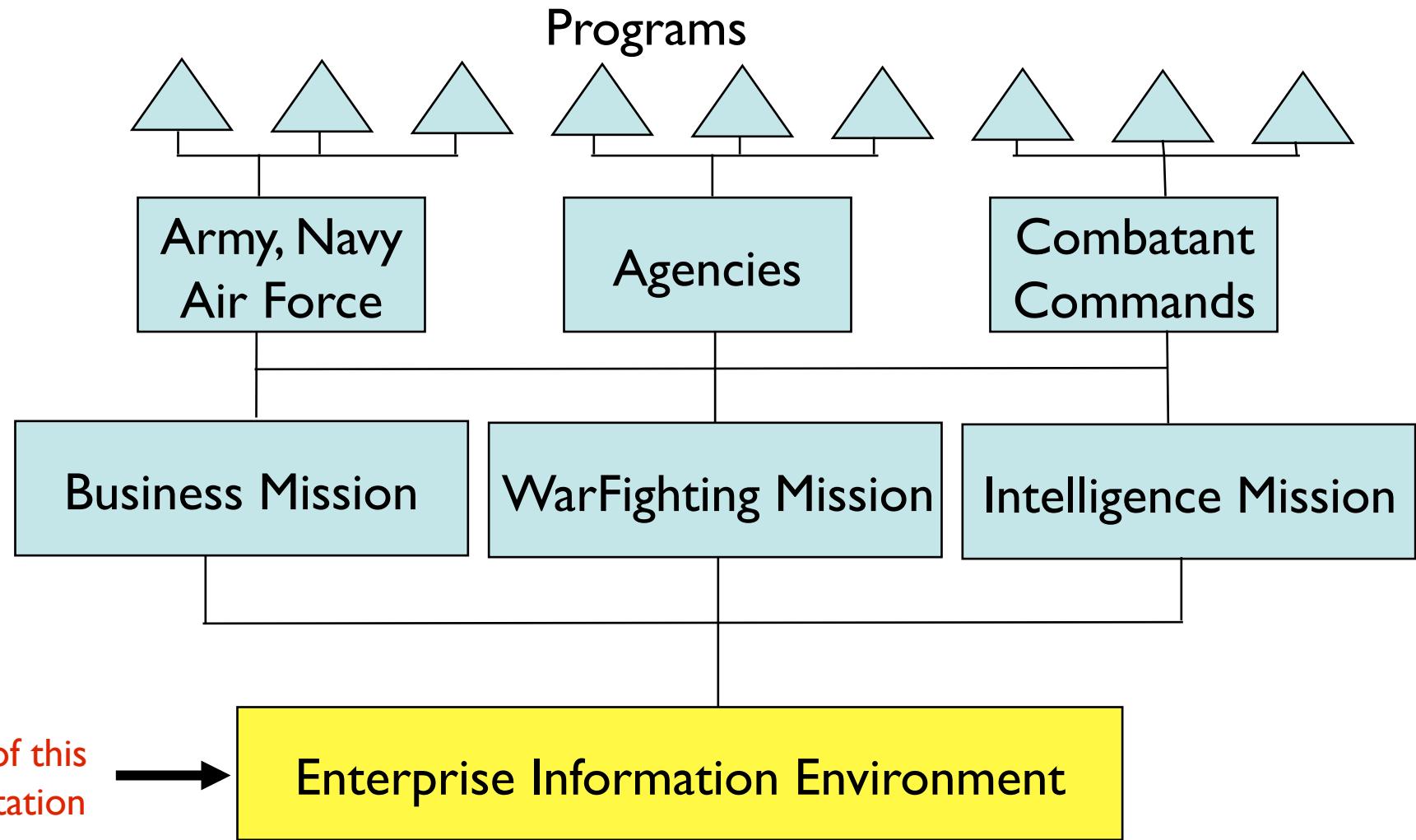
## A New Authority for Business SOA?

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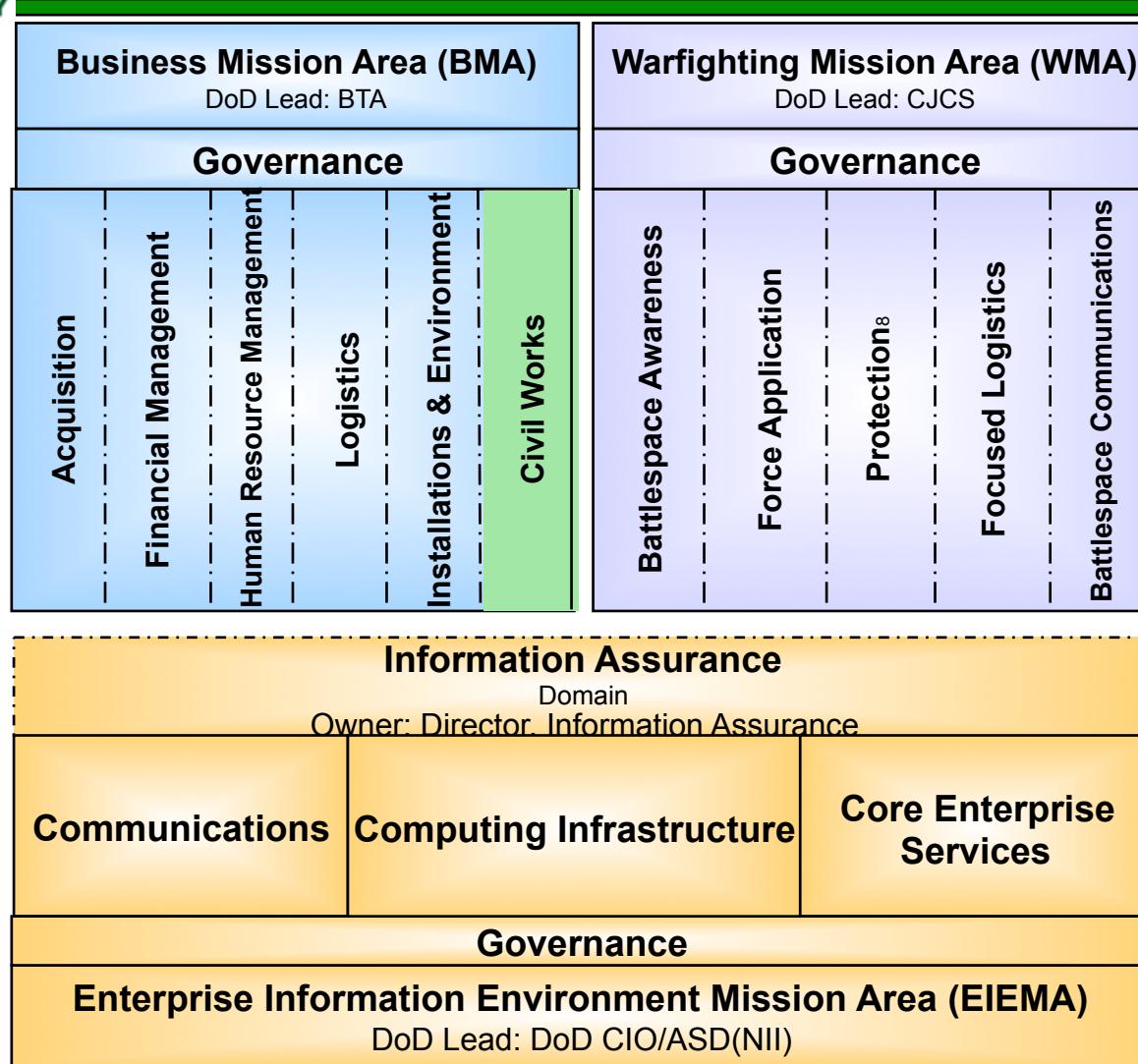
**According to H.R. 1585 the DoD Chief Management Officer, with support from Service Undersecretaries for Management:**

- 1. Will also act as the Management Officers of the Army, Navy and the Air Force.**
- 2. Will approve budgets for changes to policies, procedures, processes, and systems.**
- 3. Will approve budget requests for business systems submitted to Congress.**

# Concept How to Organize SOA

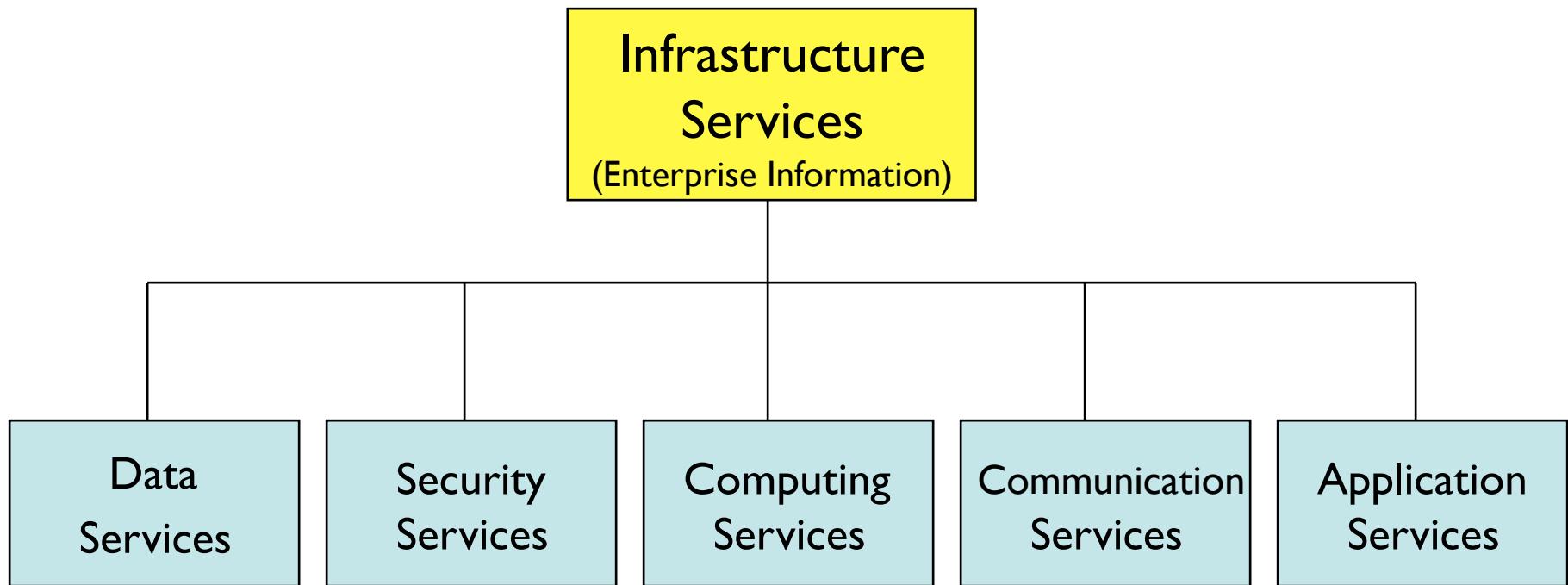


# SOA Concept

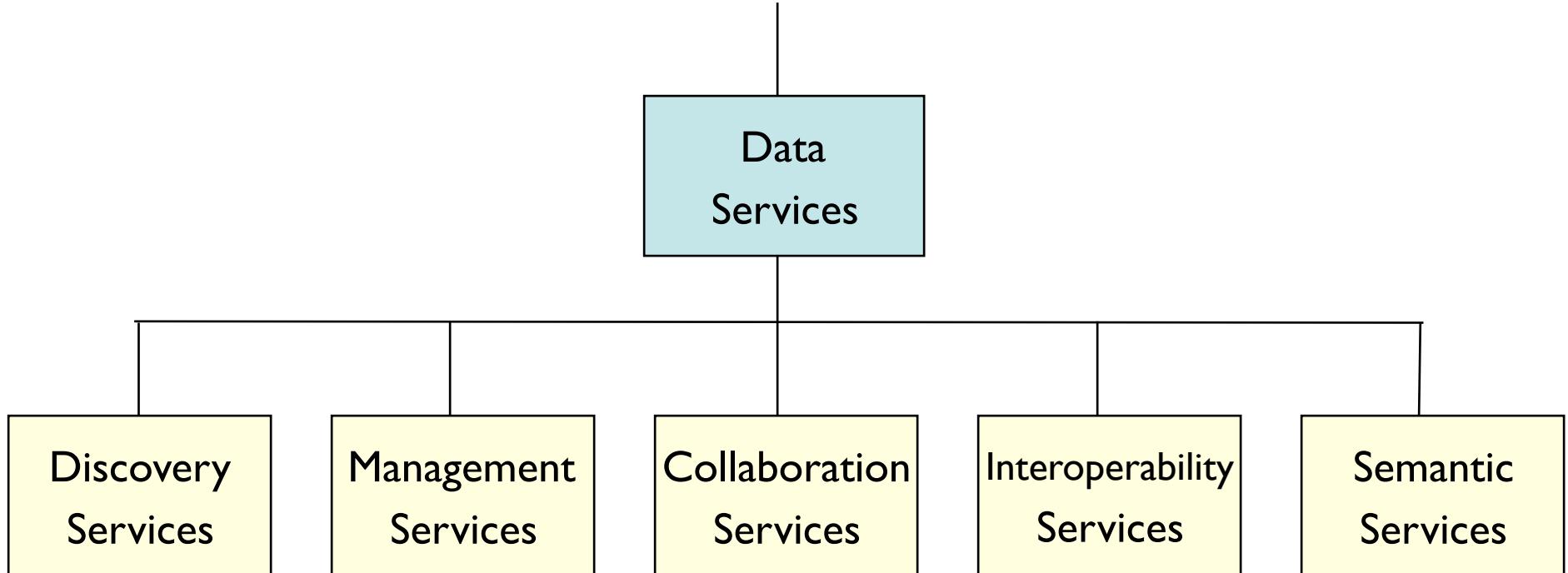


# Organization of Infrastructure Services for SOA

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# Organization of Data Services



# Fundamental Data Principles

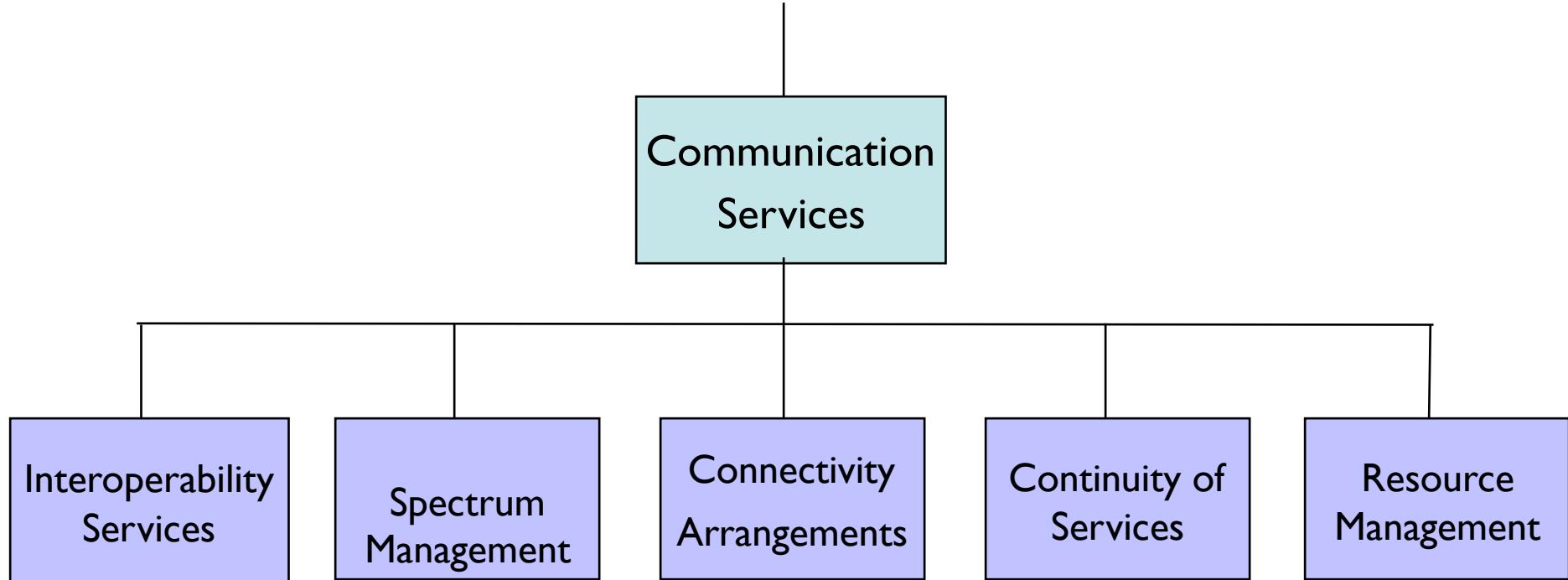
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- Data, services and applications belong to the Enterprise.
- Data are a strategic asset.
- Data and applications cannot be coupled to each other.
- Data must be visible outside of the applications.
- Data should be obtained from dictionary, not summaries.
- Semantics and syntax is defined by a community of interest.
- Data must be trusted by casual user.

## ISSUE

- How will individual projects comply?
- How will data be extracted from legacy databases?

# Organization of Communication Services

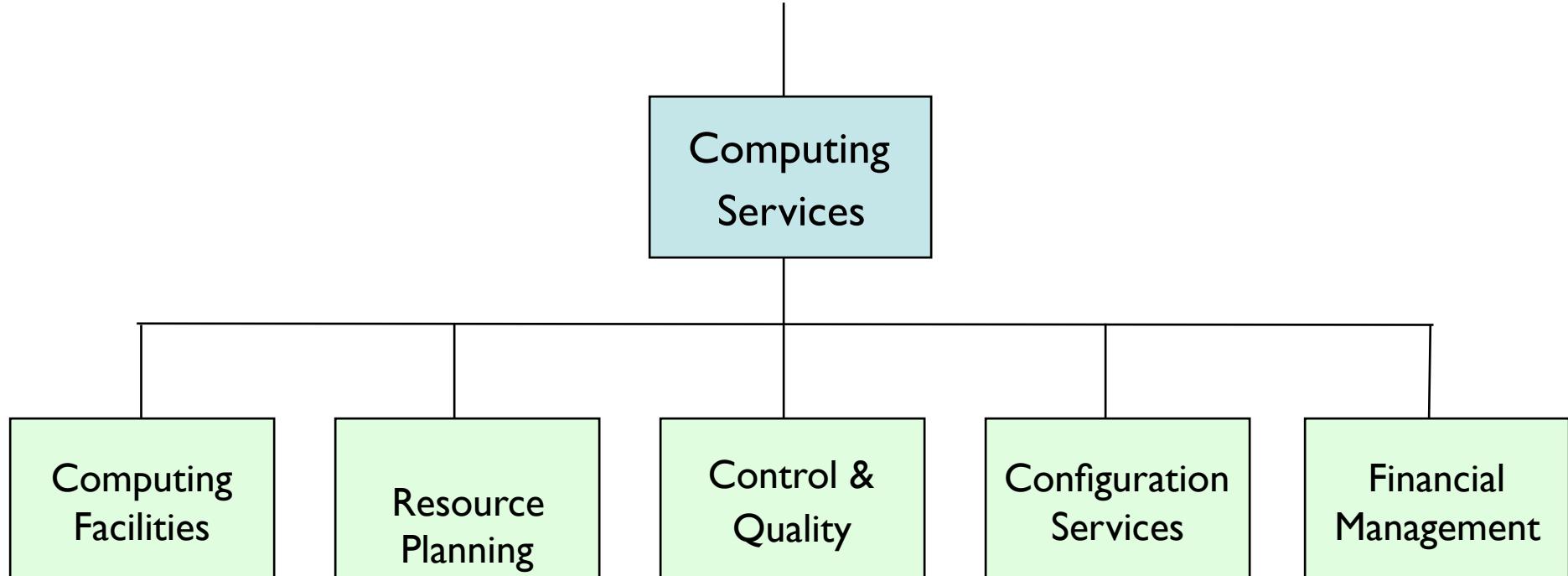


- GIG shall enable users to access and share information from any location, at any time.
- GIG shall be implemented as a unified enterprise under a central authority.

## ISSUE

- How will individual projects integrate?
- How will GIG offer end-to-end connectivity?
- How will low latency be assured throughout?
- How will existing networks become integrated into GIG?

# Organization of Computing Services



- **Provide Adaptable Hosting Environments**
  - Global facilities for virtual hosting to the “edge” for sharing applications, operating systems, and services.
  - Physical and virtual environments for data centers, applications and community-of-interest (COI) services.
- **Distributed Computing Infrastructure**
  - Computing, data storage, and shared spaces for data and information sharing.
- **Shared Computing Infrastructure Resources**
  - Access shared resources regardless of location or access device.

## ISSUE

- **How will data centers deliver high performance, high security, redundant connectivity?**
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## Part 3

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# SOA Implementation: NCES

# Current Scope of DISA/NCES

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Messaging

Collaboration

Mediation

Content  
Discovery

Content  
Delivery

People  
Discovery

Service  
Availability

MetaData  
Registry

- Monitoring of NCES web services on the GIG
- Service Oriented Architecture Foundation
- Content Discovery and Delivery
- Portal and Collaboration - NIPRNet and SIPRNet
- Joint Enterprise Directory Service (JEDS)
- Service security and certificate validation
- Metadata Registry

**ISSUE** – Portal for NCES services launched from any portal

- Concentrates on infrastructure, not applications.
- Almost completely dependent on BEA software.
- Intelligence Mission is just getting organized.

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# NCES Milestones

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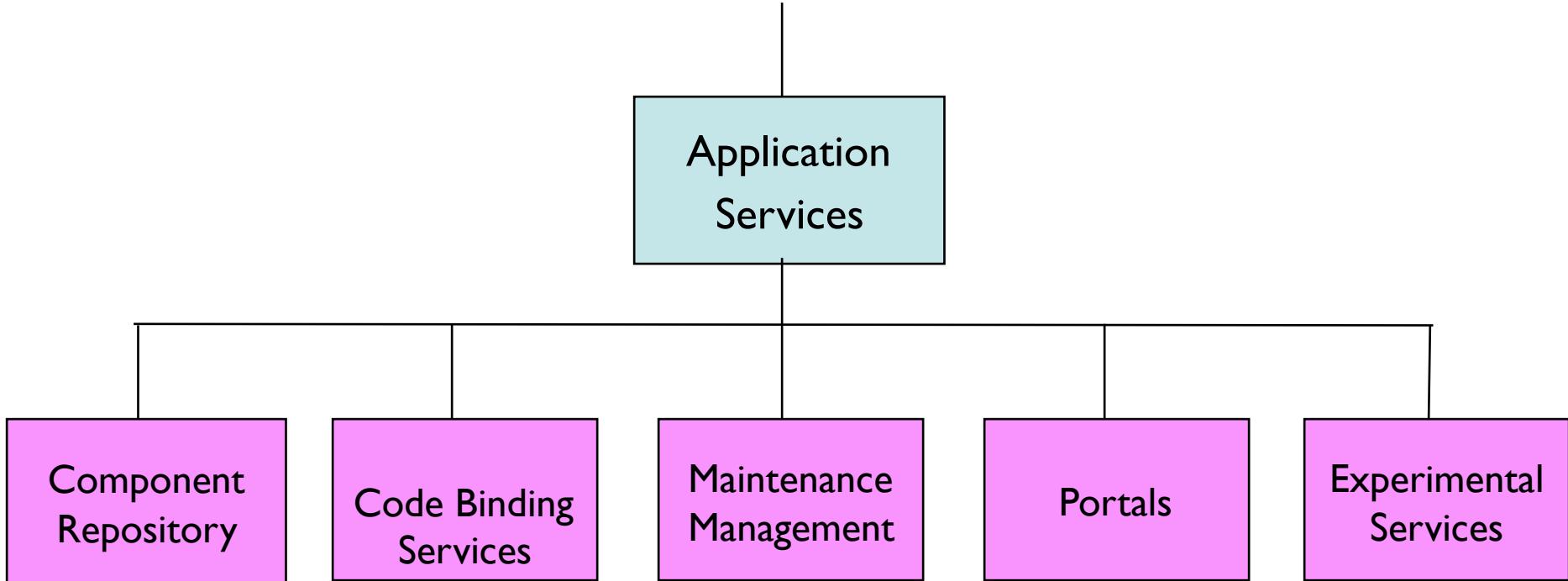
- Milestone C, March 2008
- Limited Operational Availability, April 2008
- Initial Operational Test and Evaluation, July 2008
- Initial Operational Capability, January 2009
- SOA Application Migration, 2010 - ?

## ISSUE

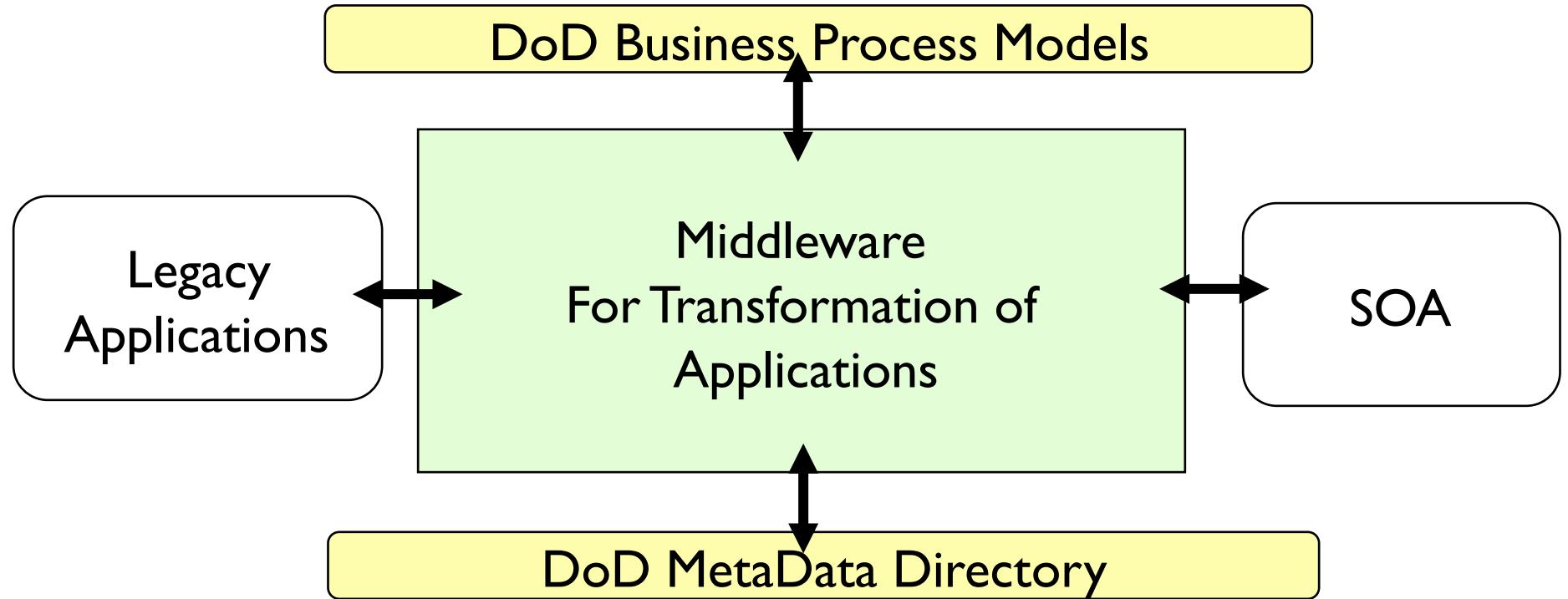
- Is progress fast enough? Is there adequate investment?
- Which Project Plans anticipate NCES availability?
- MetaData Registry Inclusion into Projects is Unknown.

# What is Missing?

# Organization of Application Services



# Transformation for SOA Migration



# SOA Middleware Vendors (Partial)

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- **Ab Initio**
  - **BEA Systems**
  - **IBM**
  - **InterSystems**
  - **Metastorm**
  - **Oracle**
  - **Pegasystems**
  - **SAP**
  - **Software AG**
  - **Tibco**
  - **Sun Microsystems**
  - **Vignette**
  - **VMWare**
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# Requires Compliance with SOA Standards (Partial)

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- Universal Description, Discovery, and Integration, **UDDI**.  
Defines the publication and discovery of web service implementations.
  - The Web Services Description Language, **WSDL**, is an XML-based language that defines Web Services.
  - **SOAP** is the Service Oriented Architecture Protocol. It is a key SOA in which a network node (the client) sends a request to another node (the server).
  - The Lightweight Directory Access Protocol, or **LDAP** is protocol for querying and modifying directory services.
  - The DoD I.T. Standards Registry makes **SOAP**, **WSDL**, **UDDI**, **WSS**, **WSRP**, **JSR168**, **WEBDEV** mandatory.
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# Example of Missing Application Services

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- **Provide Common End User Interface Tools**
  - Application generators, test suites, error identification, application components, standard utilities, quality certification, etc.
- **Common end-user Interface Tools.**
  - E-mail environments, collaboration tools, information dashboards, and intranet portals, etc. These enable users to dynamically use and manipulate data and services on the network.

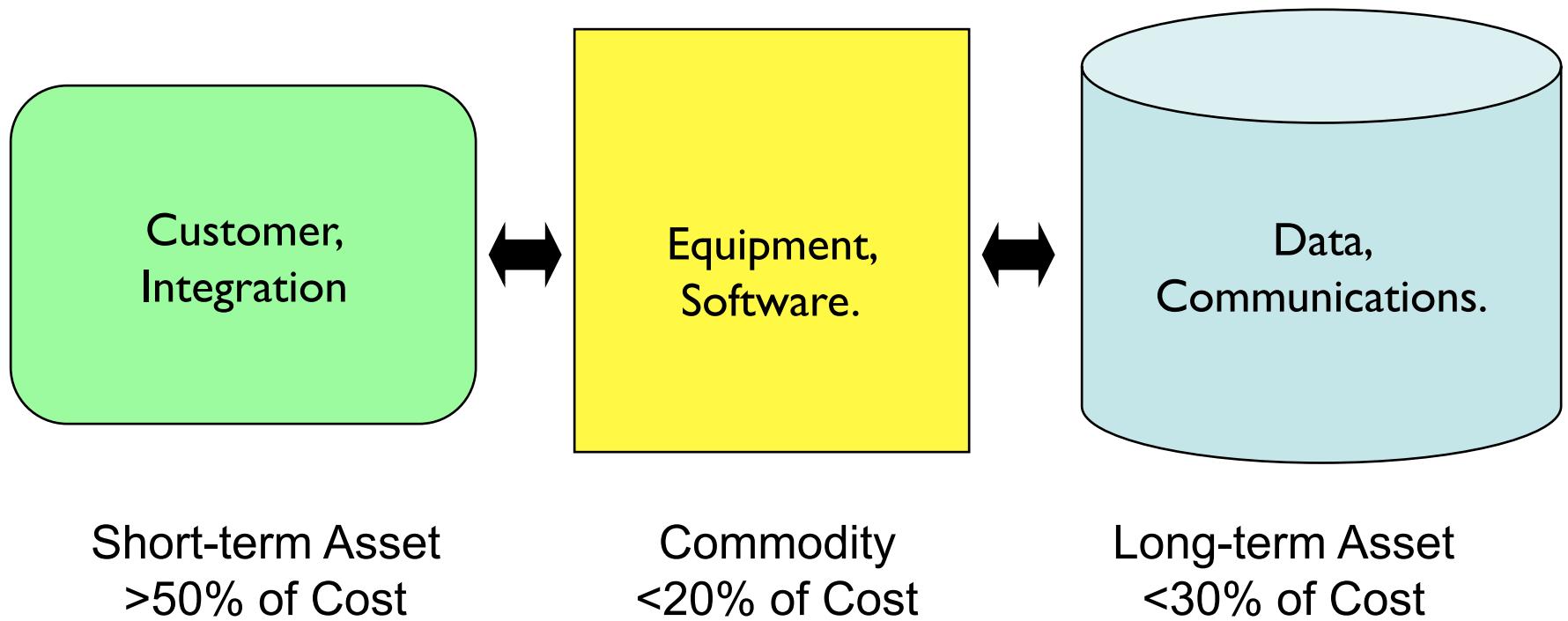


## Part 5

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# Why SOA?

# Transformation Through SOA



## DoD SOA = >1,000 Billion Transactions / Hour

<i>Generation</i>	<i>Period</i>	<i>Missions for National Security Systems</i>	<i>Interoperability: Number of Data Sources</i>
1	1955 - 1975	Automate Separate Applications	100
2	1975 - 1995	Automate Separate Processes	1,000
	1995 - 2005	Integrate Processes within a Function	100,000
	2005 - 2015	Integrate Functions within an Organization	10 Million
	2015 - 2020	Innovate Processes As Needed	1 Billion
	2025 -	Sense and Respond	1,000 Billion

# Summary

- SOA requires standardization.
  - SOA requires discarding of obsolete assets.
  - SOA is a driver in an “arms race”.
  - SOA enables a weapon of Information Warfare.
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- Current pace of SOA implementation is unsatisfactory.
  - WW IV has already started.
  - WW IV requires Information Superiority.
  - SOA is necessary for DoD Information Superiority.



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“What is a Service Oriented Architecture”

Lecture, George Mason University (slides), November 19, 2007,  
(video) <http://video.google.com/videoplay?docid=-2644274303432509757>