

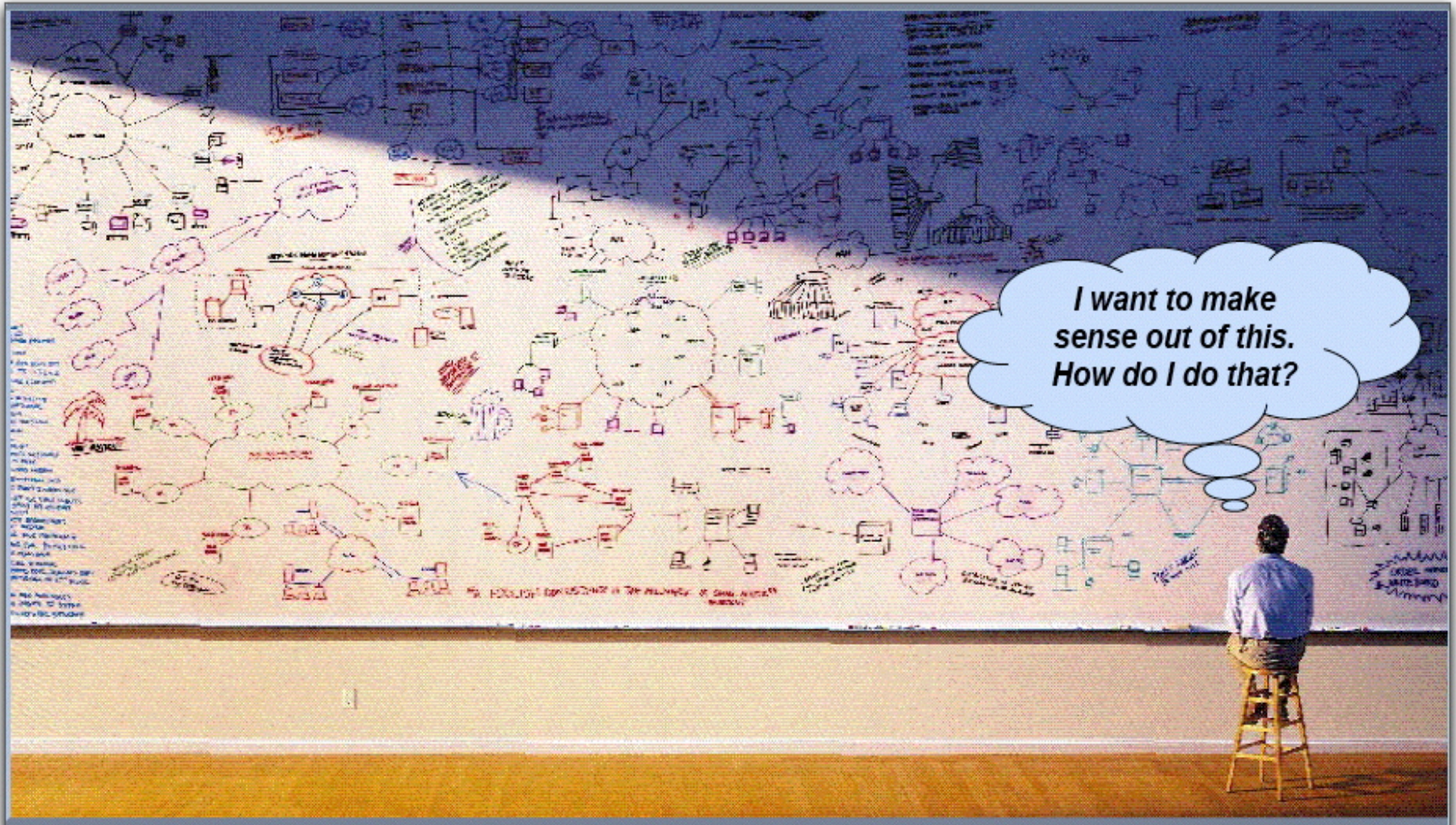
Service Oriented Architecture (SOA) for DoD

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January 9, 2008

SOA Requirements

The DoD Challenge



DoD use of SOA

Most DoD Projects Have Own Data

| 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?

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;

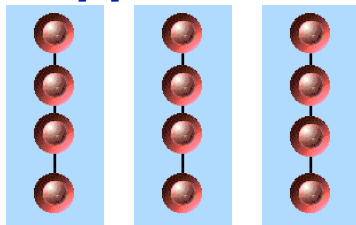
Execute Unique Requests through Using Multiple Servers;

Provide Credentials Validation and Security to Everyone;

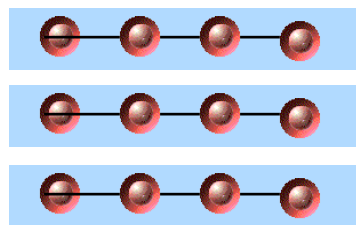
Generate Responses at “Google Speed” (<1 second).

SOA for Interoperability

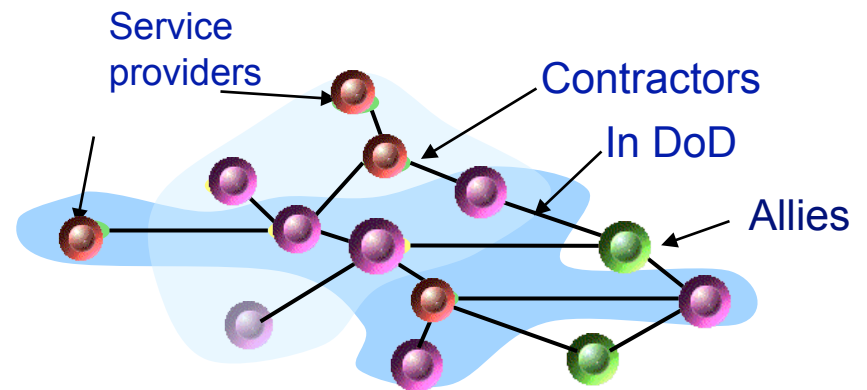
Functional Applications



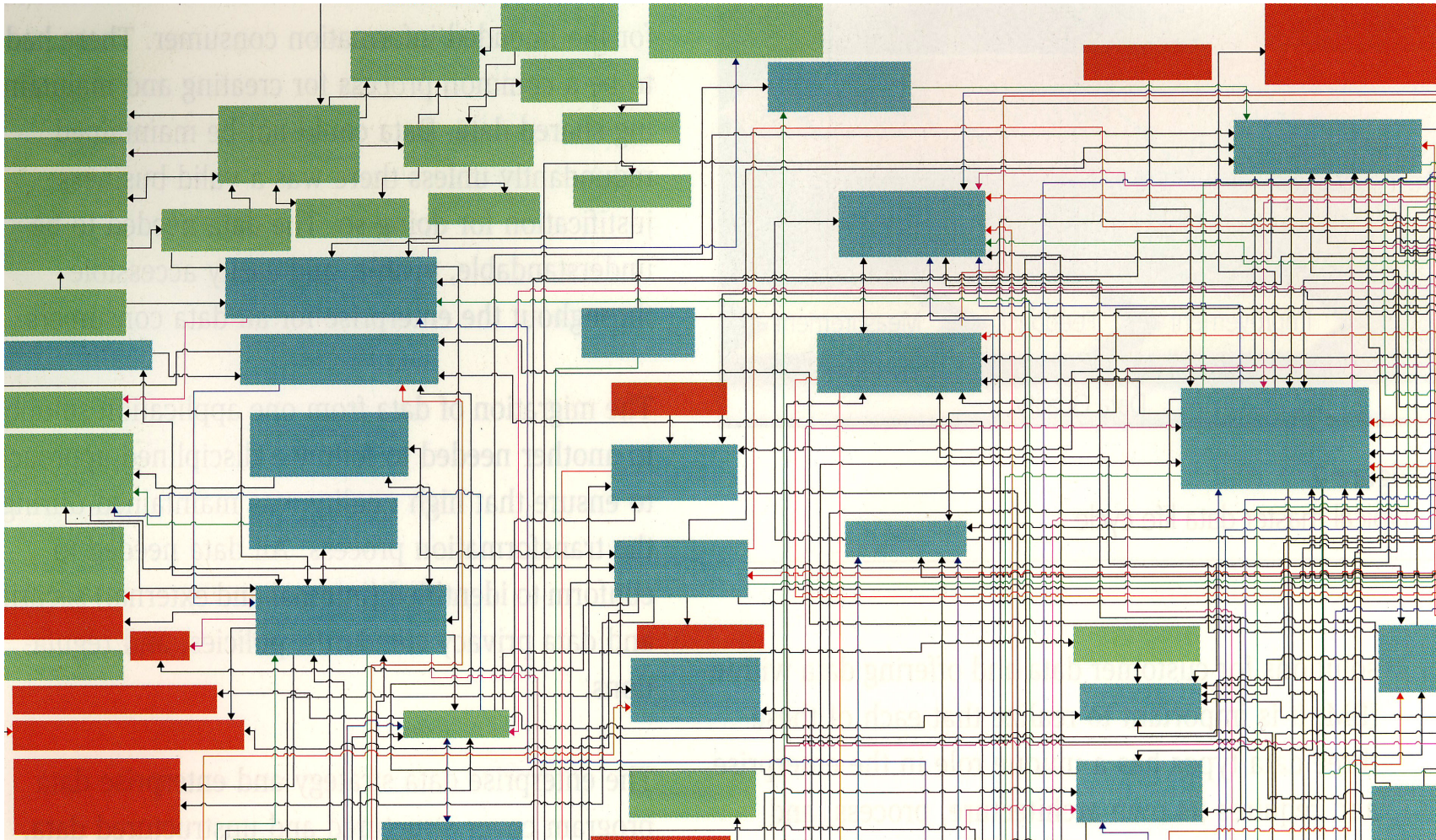
Enterprise Applications



SOA Applications



Existing Systems Cannot Respond in Google-Time



DoD use of SOA

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

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

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% |
| SOA → 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% |

Problem: DoD Contractors Build Separate Infrastructures

| \$ 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% |

SOA Concepts

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

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?

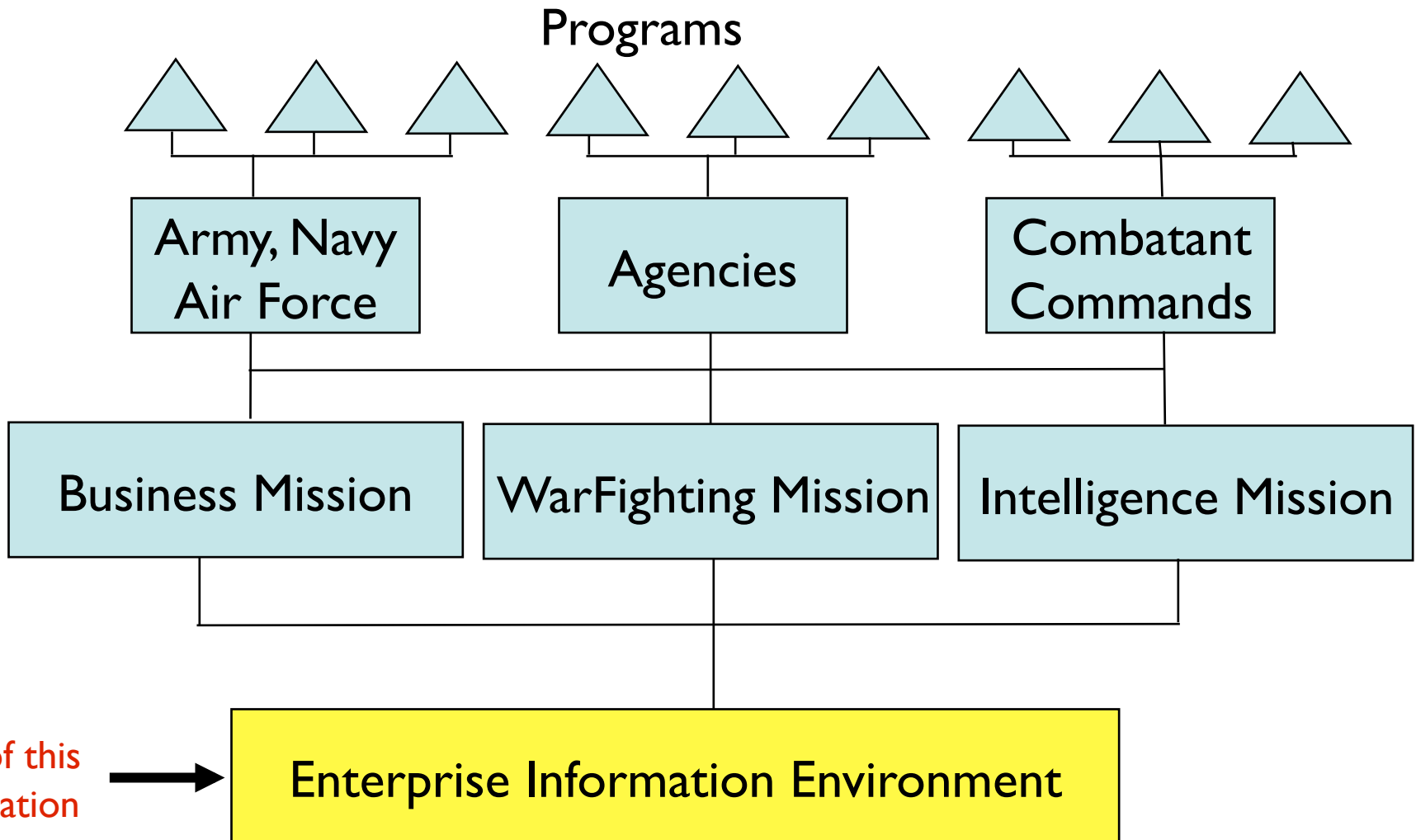
- The United States Strategic Command (USSTRATCOM) is responsible for planning, integrating, and coordinating DoD's NetOps.
 - The DoD GIG is executed by Joint Task Force Global Network Operations (JTF/GNO) through DISA.
 - Business Transformation Agency develops systems.
 - SOA components to be shared:
 - * **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**
-

A New Authority for Business SOA?

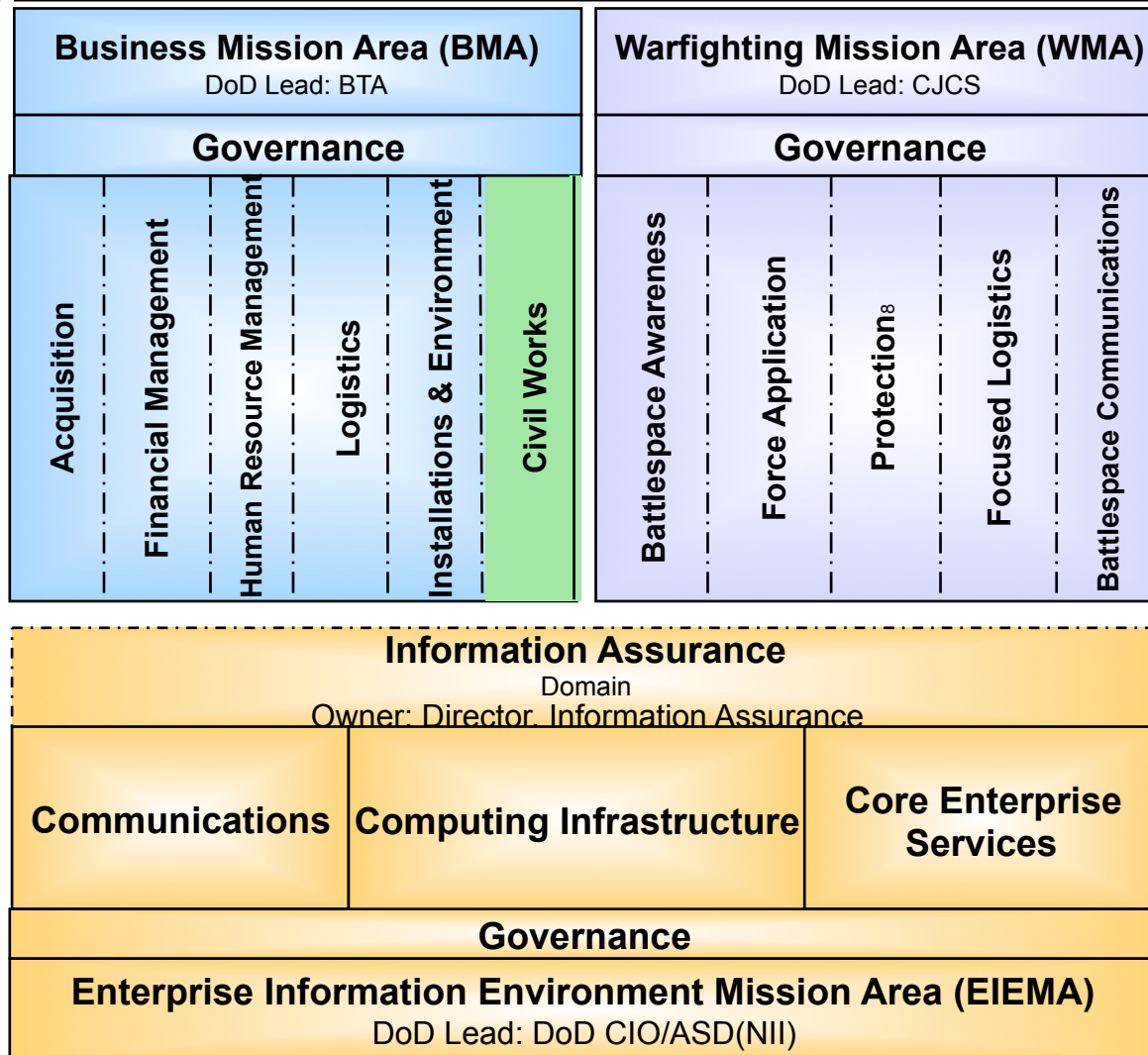
According to H.R. 1585 the DoD Chief Management Officer, with support from Service Undersecretaries for Management:

- 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.**

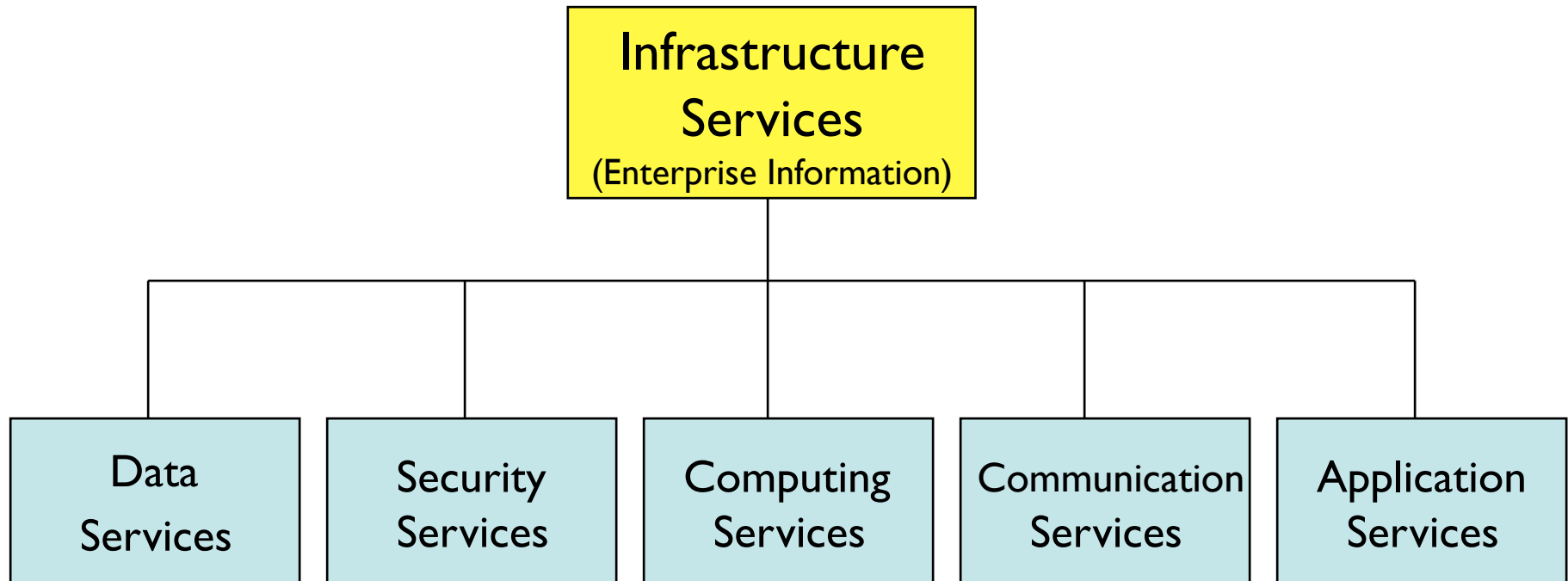
Concept How to Organize SOA



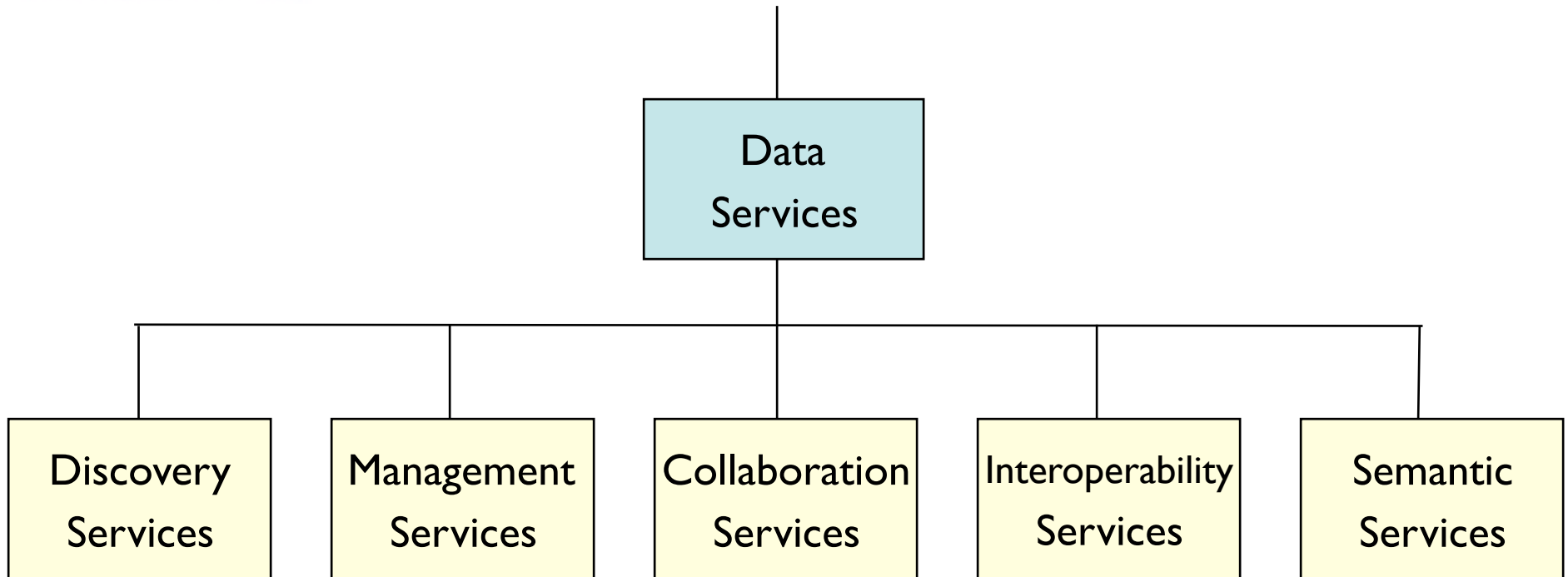
SOA Concept



Organization of Infrastructure Services for SOA



Organization of Data Services



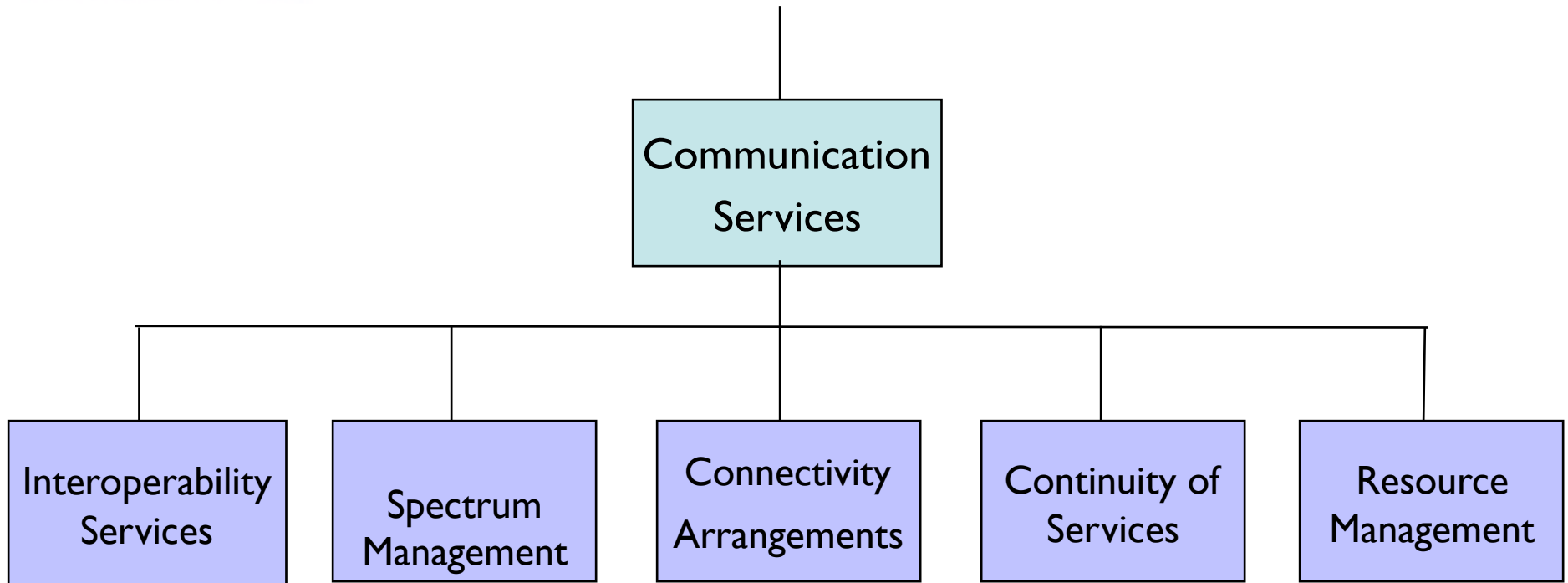
Fundamental Data Principles

- **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



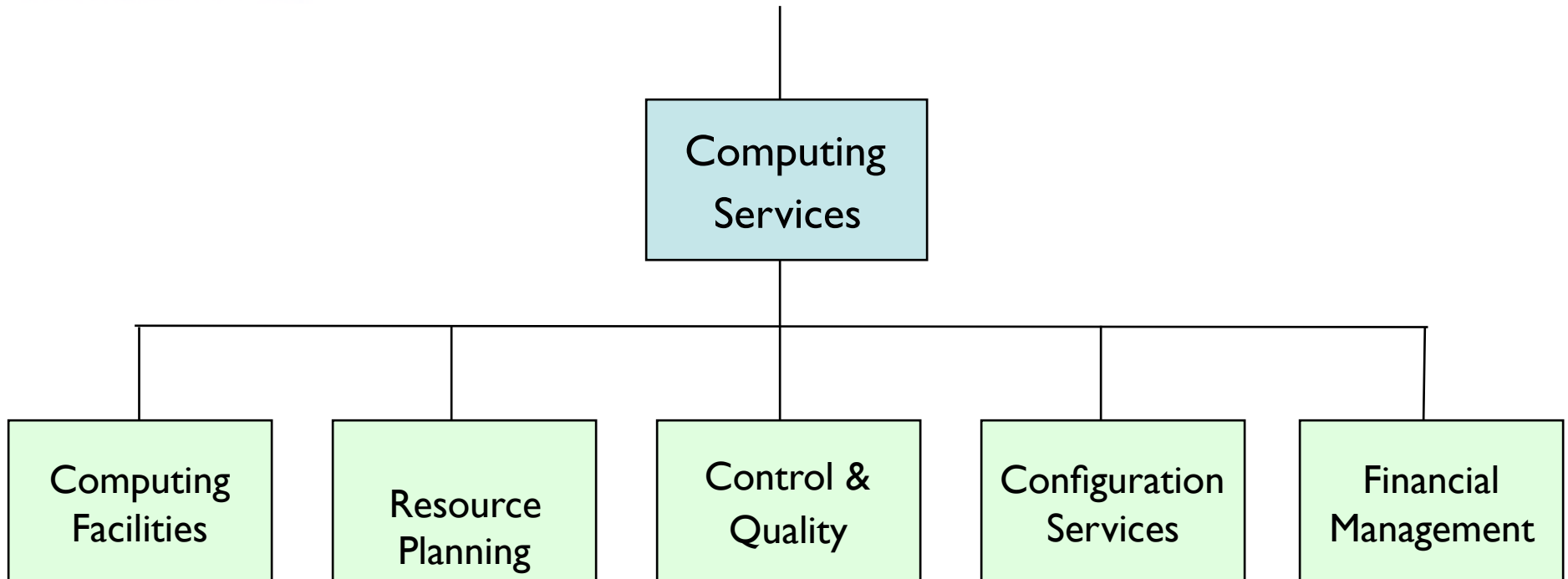
GIG NetOps

- **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



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?**

Part 3

SOA Implementation: NCES

Current Scope of DISA/NCES

Messaging

Collaboration

Mediation

Content
Discovery

Content
Delivery

People
Discovery

Service
Availability

MetaData
Registry

NCES User Test #4, March 2008

- 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.
-

NCES Milestones

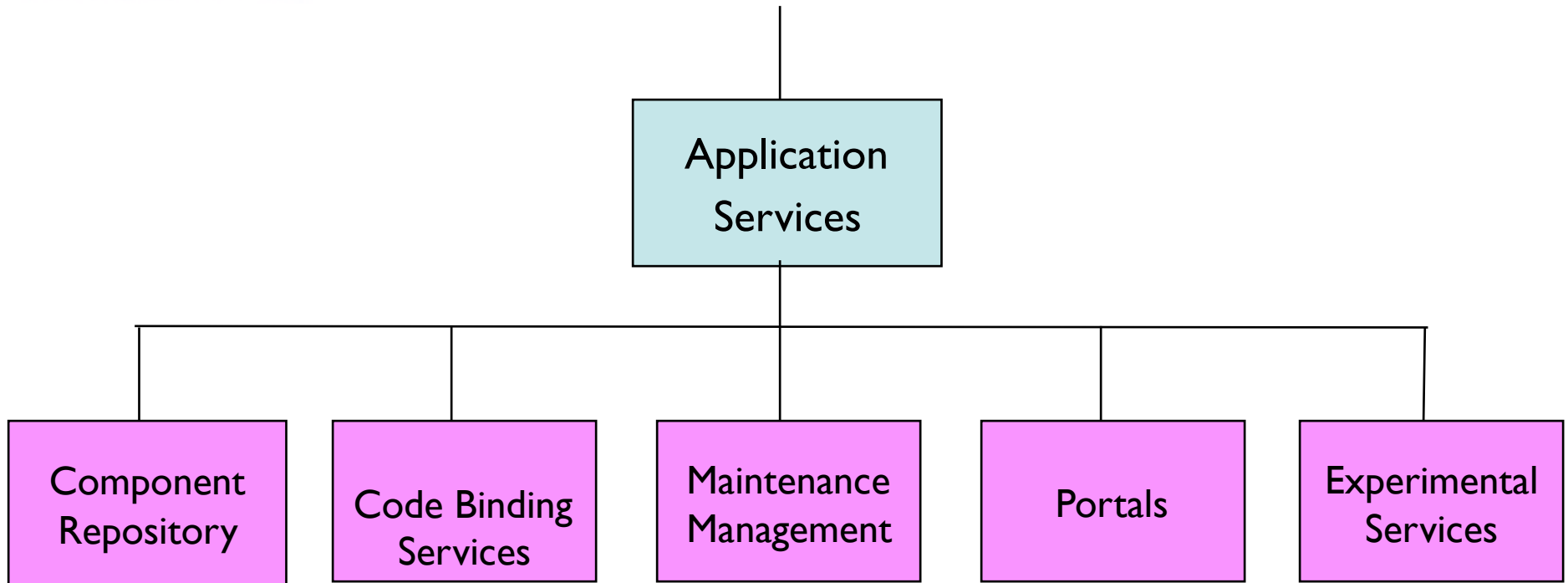
- **Milestone C, March 2008**
- **Limited Operational Availability, April 2008**
- **Initial Operational Test and Evaluation, July 2008**
- **Initial Operational Capability, January 2009**
- **SOA Application Migration, 2010 - ?**

ISSUE

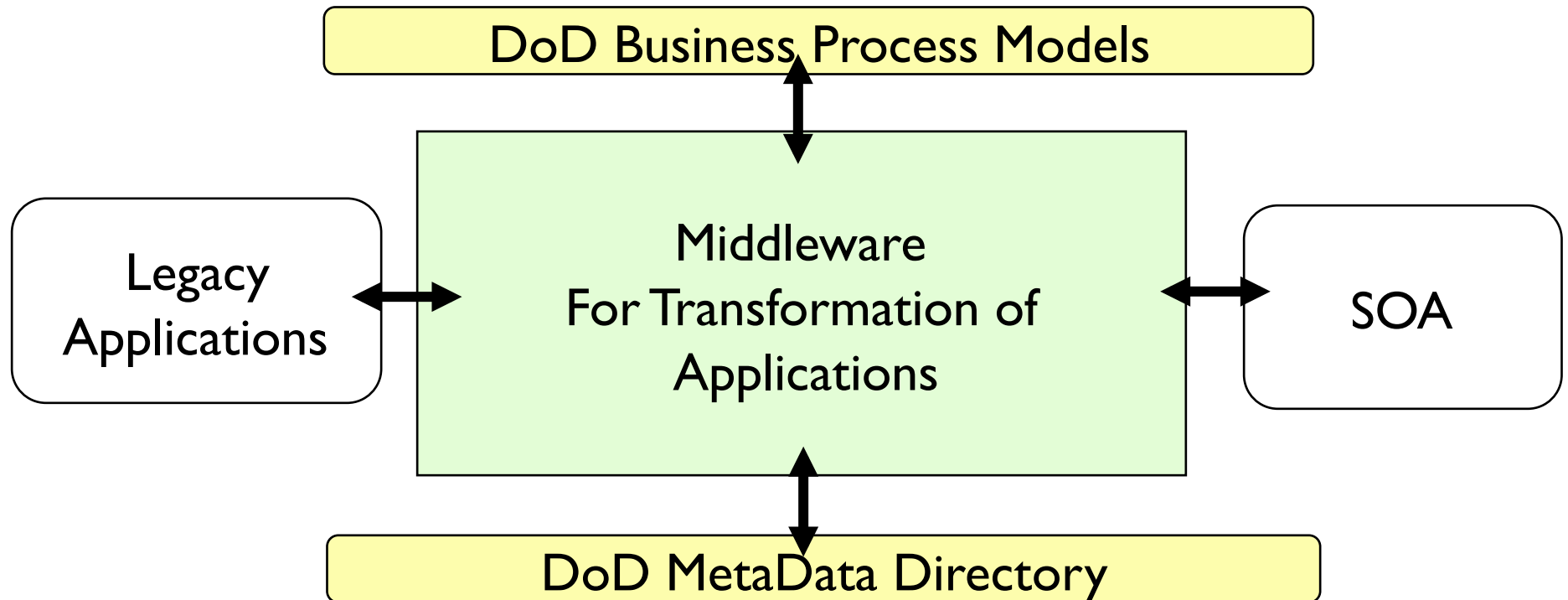
- **Is progress fast enough? Is there adequate investment?**
- **Which Project Plans anticipate NCES availability?**
- **MetaData Registry Inclusion into Projects is Unknown.**

What is Missing?

Organization of Application Services



Transformation for SOA Migration



SOA Middleware Vendors (Partial)

- **Ab Initio**
- **BEA Systems**
- **IBM**
- **InterSystems**
- **Metastorm**
- **Oracle**
- **Pegasystems**
- **SAP**
- **Software AG**
- **Tibco**
- **Sun Microsystems**
- **Vignette**
- **VMWare**

Requires Compliance with SOA Standards (Partial)

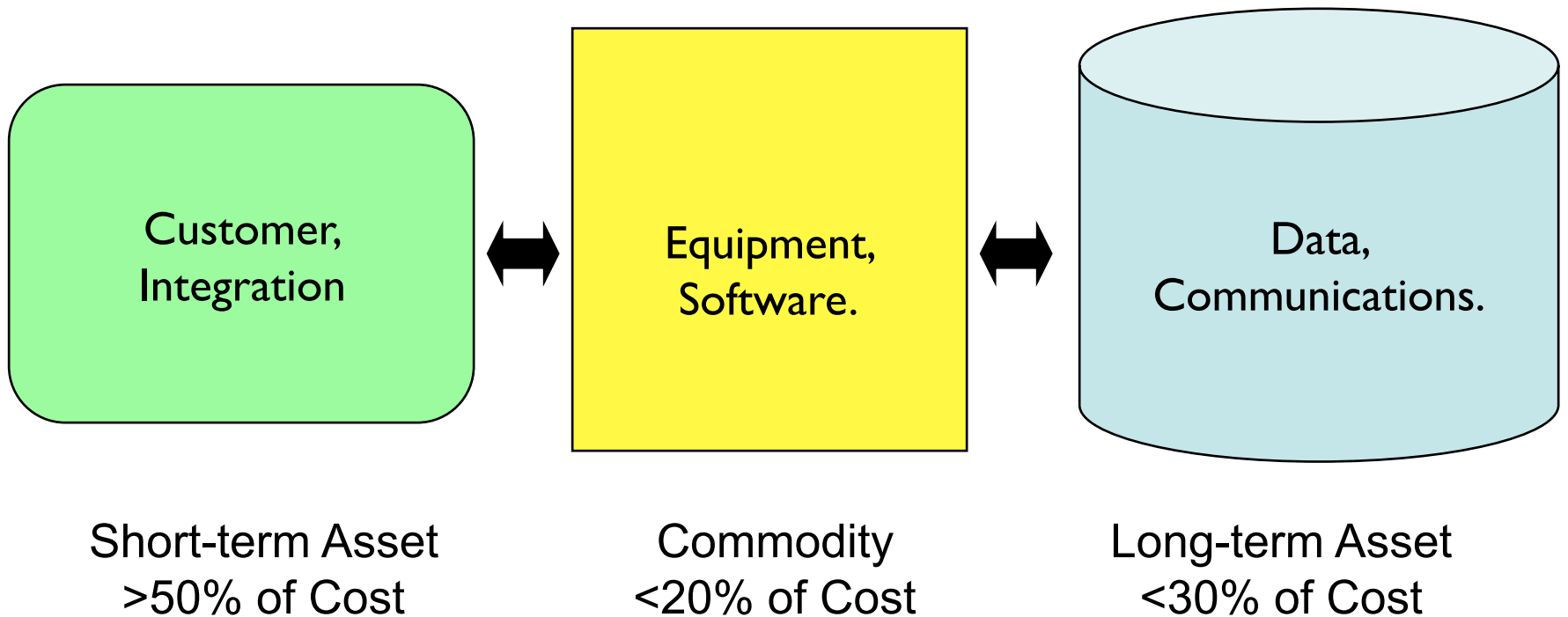
- Universal Description, Discovery, and Integration, **UDDI**. Defines the publication and discovery of web service implementations.
- The Web Services Description Language, **WSDL**, is an XML-based language that defines Web Services.
- **SOAP** is the Service Oriented Architecture Protocol. It is a 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.

Example of Missing Application Services

- **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.

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 |
| 3 | 1995 - 2005 | Integrate Processes within a Function | 100,000 |
| 4 | 2005 - 2015 | Integrate Functions within an Organization | 10 Million |
| 5 | 2015 - 2020 | Innovate Processes As Needed | 1 Billion |
| 6 | 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.**

- **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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Web: www.strassmann.com:

“What is a Service Oriented Architecture”

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