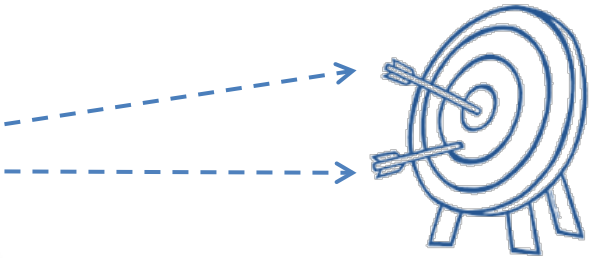
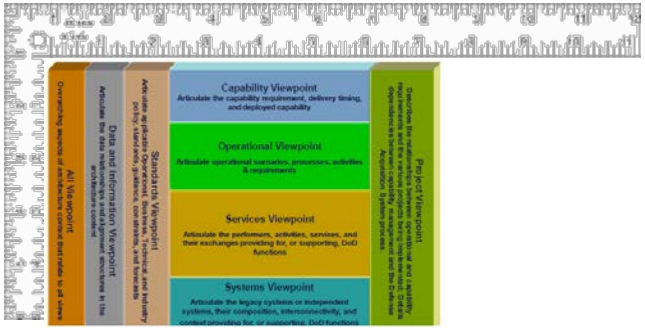
Measuring Architecture Effectiveness

18th Annual Systems Engineering Conference
October 29, 2015
Mike Tinker

Vexing Questions

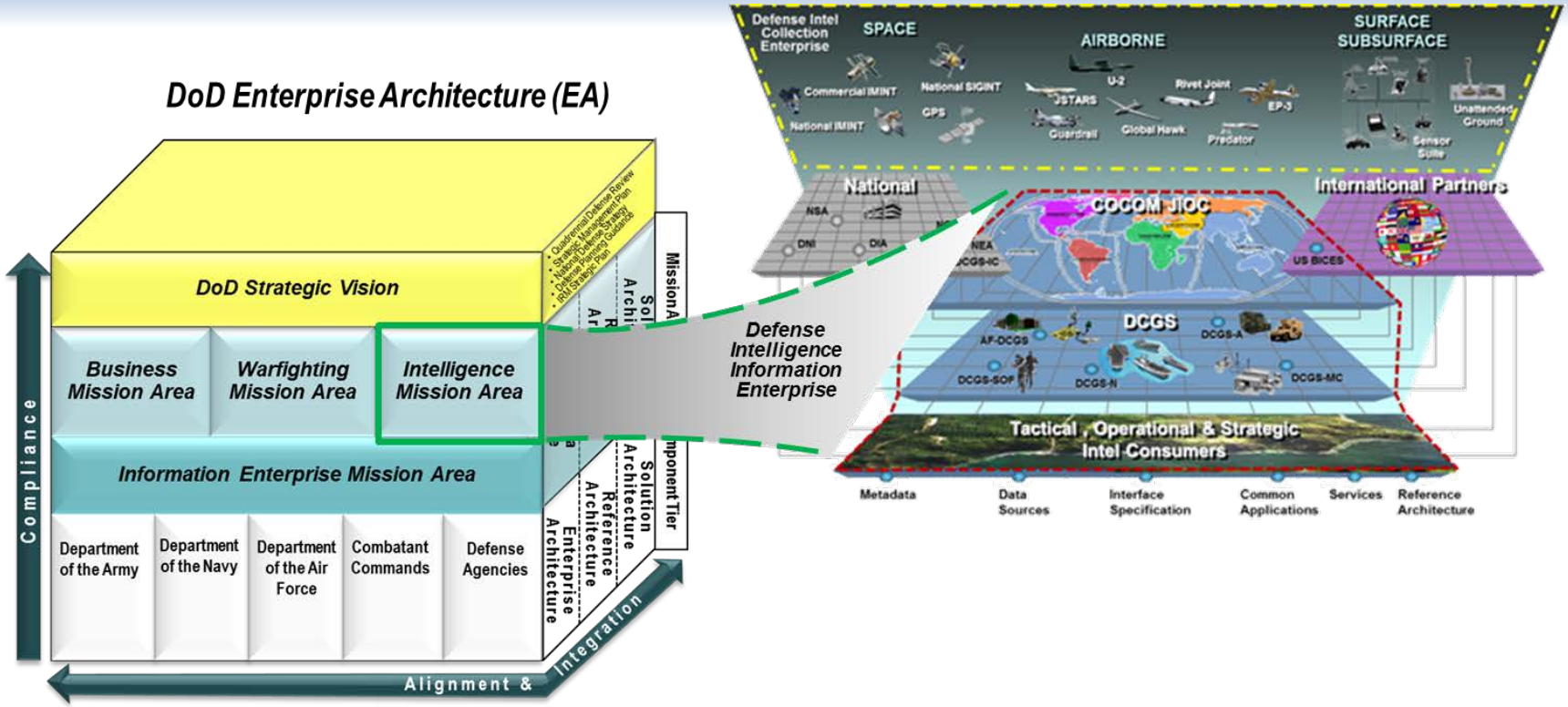


How can you tell when your objective architecture is accurate?



Is the enterprise really using the architecture and is it effective?

What Is DI2E?



DI2E IS the Intelligence Mission Area Enterprise Architecture

DI2E Services View 4

DI2E SvcV-4 — **22 April 2015**

3.1 Planning and Direction

3.1.1	**Define and Prioritize Requirements**
3.1.1.1	PIR Management
3.1.1.2	RFI Management
3.1.2	**Workflow Management**
3.1.2.1	Define Workflows
3.1.2.2	Identify Resources
3.1.2.3	Execute Workflows
3.1.2.4	Task Summary
3.1.2.5	Task Manager
3.1.2.6	Enterprise Workflow Reporting
3.1.3	**Planning**
3.1.3.1	Collection Requirements Planning
3.1.3.2	Sensor Cataloging
3.1.3.3	Intelligence Source Selection
3.1.3.4	Exploitation Planning
3.1.3.5	Target Planning
3.1.4	**ISR Asset Reporting**
3.1.4.1	ISR Asset Status Summary
3.1.4.2	ISR Asset Discovery
3.1.5	**Tasking Request**
3.1.5.1	Tasking Message Preparation
3.1.5.2	Task Asset Request
3.1.6	**Sensor Web Enablement**
3.1.6.1	Sensor Observation
3.1.6.2	Sensor Planning

3.2 Collection

3.2.1	**Asset Management**
3.2.1.1	Sensor Provisioning
3.2.1.2	Sensor Cross Queuing
3.2.1.3	Sensor Command Conversion
3.2.1.4	Sensor Alerting

3.3 Processing and Exploitation

3.3.1	**GEOINT Processing**
3.3.1.1	Image Rectification
3.3.1.2	FMV Geoprocessing
3.3.1.3	AOI Processing
3.3.1.4	State Service
3.3.1.5	Image Chipping
3.3.2	**SIGINT Processing**
3.3.2.1	Signal Pattern Recognition
3.3.3	**CI/HUMINT Processing**
3.3.3.1	Source Management
3.3.4	**Data Exploitation**
3.3.4.1	Language Translation
3.3.5	**MASINT Processing**
3.3.6	**Support to Targeting**
3.3.6.1	Target Management
3.3.6.2	Target Data Matrix
3.3.6.3	Target Validation
3.3.6.4	Target Folder
3.3.6.5	Target List
3.3.6.6	Target Mensuration
3.3.6.7	BDA/CDA

3.4 Analysis, Prediction and Production

3.4.1	**GEOINT Analysis**
3.4.1.1	Change Detection
3.4.1.2	Triangulation
3.4.1.3	Resection
3.4.1.4	Geomensuration
3.4.1.5	DPPDB Mensuration
3.4.1.6	Image Registration
3.4.1.7	MTI Tracking
3.4.1.8	Topographical Survey
3.4.1.9	Automatic Target Recognition
3.4.1.10	Sensor Model Instantiation
3.4.1.11	GEO-Calculations
3.4.2	**SIGINT Analysis**
3.4.2.1	SIGINT Analysis and Reporting
3.4.2.2	Emitter Correlation
3.4.2.3	Emitter Geolocation
3.4.2.4	COMINT Externals Analysis
3.4.3	**HUMINT Analysis**
3.4.3.1	Entity Activity Patterns
3.4.3.2	Identity Disambiguation
3.4.4	**MASINT/AGI Analysis**

3.5 BA Data Dissemination and Relay

3.5.1	**Dissemination Management**
3.5.1.1	Dissemination Authorization
3.5.1.2	Package Product
3.5.1.3	Tear Line Reporting
3.5.1.4	Foreign Disclosure Management

3.5 Production

3.4.5	**Production**
3.4.5.1	Reporting Services
3.4.5.2	Production Workflow
3.4.5.3	Digital Production
3.4.6	**Analytic Decision Support**
3.4.6.1	Timelines Analysis
3.4.6.2	Structured Analytic Techniques
3.4.6.3	Argument Mapping
3.4.6.4	Alternative Future Analysis
3.4.6.5	Link Analysis
3.4.7	**Modeling and Simulation**
3.4.7.1	War Gaming
3.4.7.2	Scenario Generation
3.4.7.3	Model Building
3.4.7.4	Sensor Modeling
3.4.7.5	Target Solution Modeling
3.4.7.6	Orchestration Modeling
3.4.8	**Analysis Support to C2**
3.4.8.1	Order of Battle Analysis
3.4.8.2	Intelligence Preparation of the Battlefield
3.4.8.3	Mission Planning and Force Execution support
3.4.8.4	Weather Effect Planning

3.5 BA Data Dissemination and Relay

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3.5.1.1	Dissemination Authorization
3.5.1.2	Package Product
3.5.1.3	Tear Line Reporting
3.5.1.4	Foreign Disclosure Management

3.0 Mission Services

2.1 Collaboration

2.1.1	**Information Boards**
2.1.1.1	Bulletin Board
2.1.1.2	Wiki
2.1.2	**Environment Sharing**
2.1.2.1	Desktop Sharing
2.1.2.2	Whiteboard
2.1.2.3	Web Conferencing/VTC
2.1.3	**Collaborative Messaging**
2.1.3.1	Instant Messaging
2.1.3.2	Audio Messaging
2.1.3.3	E-Mail
2.1.4	**Social Networking**
2.1.4.1	Shared Calendaring
2.1.4.2	Community of Interest Find

2.2 Visualization

2.2.1	**Web Visualization**
2.2.1.1	Web Browser
2.2.1.2	Widget Framework
2.2.2	**Geographic Visualization**
2.2.2.1	Geographic Information Display
2.2.2.2	Web Coverage
2.2.2.3	Web Feature
2.2.2.4	Web Map
2.2.2.5	Weather Visualization
2.2.3	**Analytics Visualization**
2.2.3.1	Analytic Rendering
2.2.3.2	Common Operational Picture (COP)

2.3 Data Discovery

2.3.1	**Content Discovery and Retrieval**
2.3.1.1	Content Search
2.3.1.2	Brokered Search
2.3.1.3	Retrieve Content
2.3.1.4	Deliver Content
2.3.1.5	Describe Content
2.3.1.6	Query Management
2.3.1.7	Query Results Management

2.4 Data Mediation

2.4.1	**Data Preparation**
2.4.1.1	Schema Validation
2.4.1.2	Data Validation
2.4.1.3	Data Transformation
2.4.1.4	Schema Transformation
2.4.1.5	Image Transformation
2.4.1.6	Data De-Duplication
2.4.1.7	Data Compression/Decompression

2.5 Data Analytics

2.5.1	**Data Enrichment**
2.5.1.1	Entity Extraction
2.5.1.2	Entity Association
2.5.1.3	Categorize Content
2.5.1.4	Data Commenting
2.5.2	**Media Monitoring**
2.5.2.1	Chat Monitor
2.5.2.2	Video Monitor
2.5.2.3	Audio Monitor

2.6 Data Handling

2.6.1	**Content Management**
2.6.1.1	Content Repository
2.6.1.2	Content Navigation
2.6.1.3	Object Processing
2.6.1.4	Object Folders
2.6.1.5	Managed Content Discovery
2.6.1.6	Content Versioning
2.6.1.7	Object Relationship
2.6.1.8	Content Policy
2.6.2	**Database Management**
2.6.2.1	Database Describe
2.6.2.2	Data Object Processing
2.6.2.3	Database Definition
2.6.2.4	Database Administration
2.6.2.5	Data Object Tagging

2.6.3

2.6.3	**Workspace Management**
2.6.3.1	Manage Workspace
2.6.3.2	Share Workspace
2.6.4	**Data Quality**
2.6.4.1	Data Quality Definition
2.6.4.2	Data Quality Extraction
2.6.4.3	Data Quality Measurement
2.6.5	**Records Management**
2.6.5.1	Record Annotations
2.6.5.2	Record Authorities
2.6.5.3	Record Categories
2.6.5.4	Record Dispositions
2.6.5.5	Record Documents
2.6.5.6	Managed Records
2.6.5.7	Record Query
2.6.5.8	Record Authentications
2.6.5.9	Record Attribute Profiles
2.6.5.10	Change Agent

2.0 Common Services

2.6.4

2.6.4	**Data Quality**
2.6.4.1	Data Quality Definition
2.6.4.2	Data Quality Extraction
2.6.4.3	Data Quality Measurement

1.1 Enterprise Management

1.1.1	**Metrics Management**
1.1.1.1	Metrics Measurements Collection
1.1.1.2	Metrics Reporting
1.1.2	**Translation and Synchronization**
1.1.2.1	Domain Name System (DNS)
1.1.2.2	Time Synchronization
1.1.3	**Enterprise Monitoring**
1.1.3.1	Fault Detection
1.1.3.2	Fault Isolation
1.1.3.3	Site Monitoring
1.1.3.4	Enterprise IT Inventory
1.1.4	**Event Notification**
1.1.4.1	Notification Producer
1.1.4.2	Notification Broker
1.1.4.3	Notification Consumer
1.1.5	**Enterprise Resource Management**
1.1.5.1	Global Unique Identifier (GUID)
1.1.6	**Configuration Management**
1.1.6.1	Configuration Identification
1.1.6.2	Configuration Control
1.1.6.3	Configuration Verification and Audit
1.1.7	**Audit Management**
1.1.7.1	Audit Log Management
1.1.7.2	Audit Log Reporting

1.2 CyberSecurity Management

1.2.1	**Identity and Access Management**
1.2.1.1	Local Identity Management
1.2.1.2	Credential Management
1.2.1.3	Resource Policy Management
1.2.1.4	Authentication Service
1.2.1.5	Policy Decision Point
1.2.1.6	Policy Enforcement Point
1.2.1.7	Policy Access Point
1.2.1.8	Security Token Service
1.2.1.9	Federation Service Management
1.2.1.10	Attribute Access
1.2.1.11	Certificate Validation
1.2.2	**Cryptography Management**
1.2.2.1	Encryption/ Decryption
1.2.3	**Security Metadata Management**
1.2.3.1	Data Security Marking
1.2.3.2	Security Label Format Validation
1.2.4	**System and Communication Protection**
1.2.4.1	Vulnerability Reporting
1.2.4.2	Intrusion Detection
1.2.4.3	Intrusion Prevention
1.2.4.4	Virus Protection
1.2.4.5	Incident Response
1.2.4.6	Data Loss Prevention
1.2.5	**Cross Domain**

1.3 Service Management

1.3.1	**Repository and Registry**
1.3.1.1	Service Inquiry
1.3.1.2	Service Subscription
1.3.1.3	Service Publishing

1.4 Orchestration Management

1.4.1	**Orchestration Planning**
1.4.1.1	Matchmaking
1.4.1.2	Optimization
1.4.2	**Orchestration Execution**
1.4.2.1	Execution Engine
1.4.2.2	Protocol Mediation
1.4.3	**Application and Website Hosting**
1.4.3.1	Web Content Delivery
1.4.3.2	Proxy Management
1.4.3.3	Transaction Processing
1.4.3.4	Application Management

1.0 Infrastructure Services

1.4.2

1.4.2	**Orchestration Execution**
1.4.2.1	Execution Engine
1.4.2.2	Protocol Mediation

Mission Layer

Common Layer

Infrastructure Layer

The SvcV-4 is a core DI2E architecture artifact

DI2E Enterprise Metrics

Plan

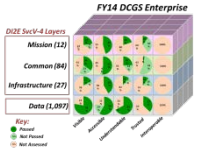
Plan the upcoming cycle

Collect

Conduct Annual Data Call (ADC)

Assess

Provide criteria for Enterprise Assessments (EA)

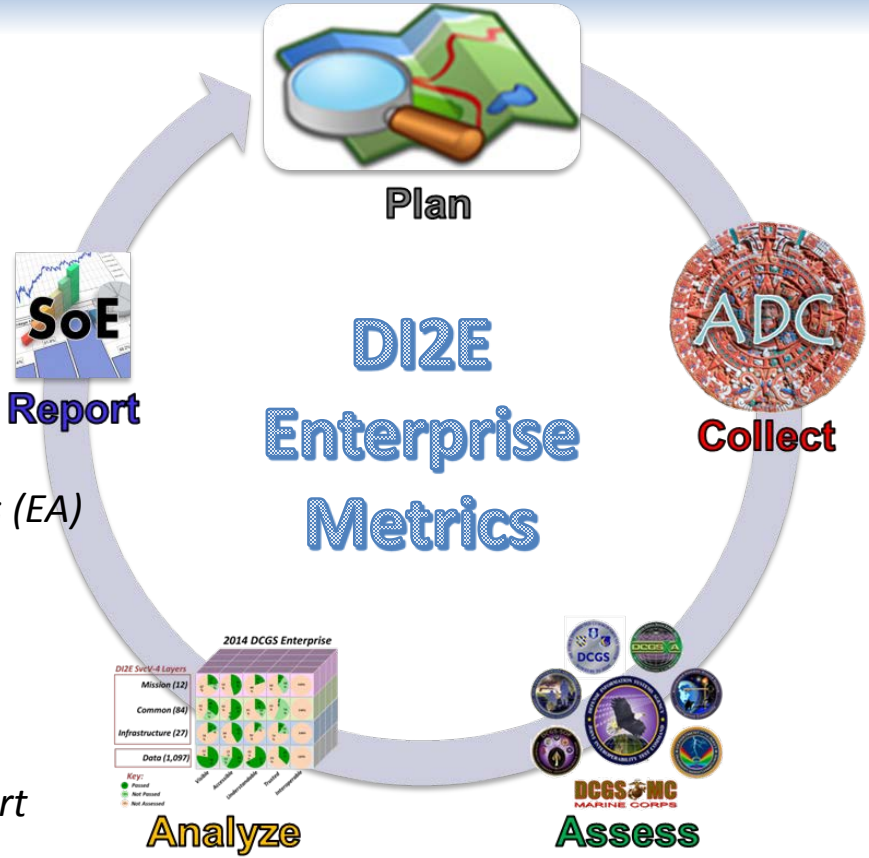


Analyze

Analyze ADC and assessment results

Report

Produce State of the Enterprise (SoE) Report

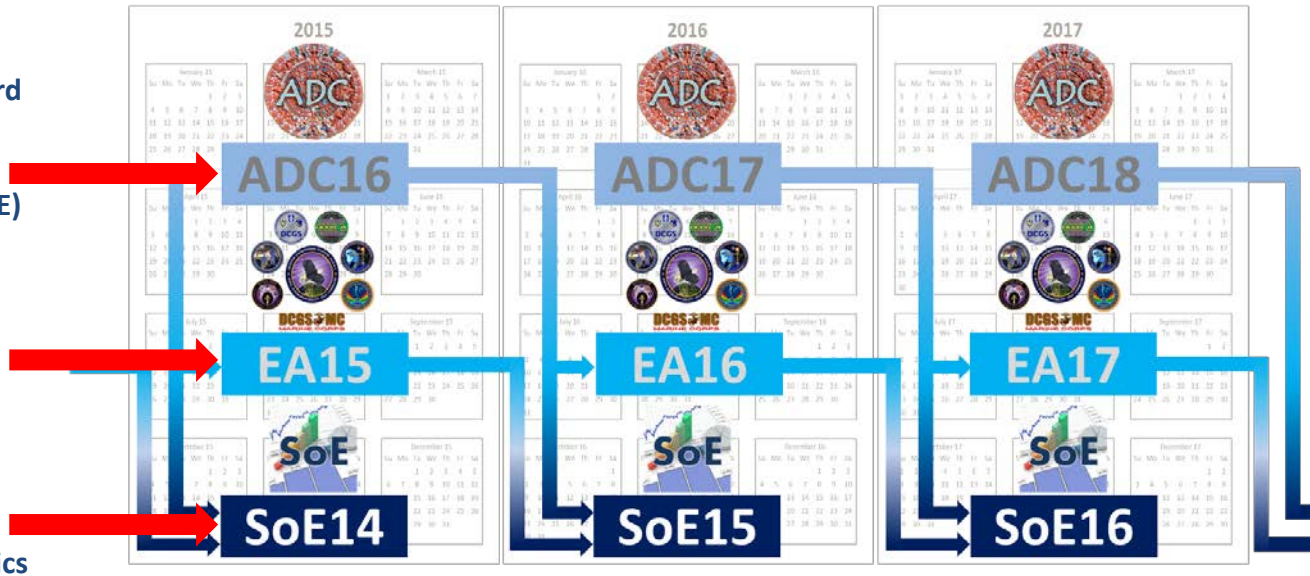


ADC/EA/SoE

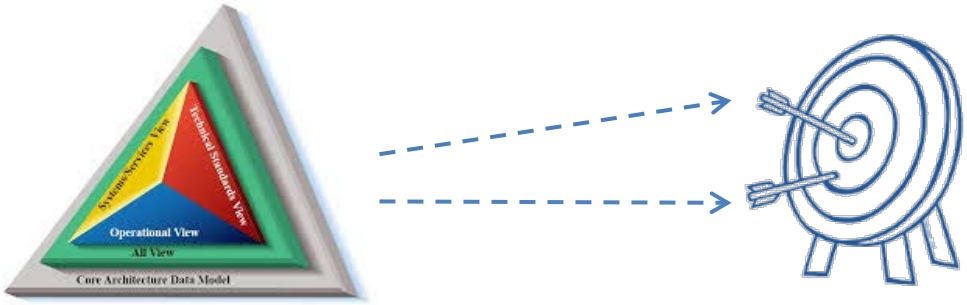
Annual Data Call/Enterprise Assessment/State of the Enterprise

Annual Cycle with 3-Year Dependencies

- **Annual Data Call (ADC)**
  - gathers IT services and data information from Programs of Record
  - defines candidates for Enterprise Assessment (EA)
  - supports State of the Enterprise (SoE) Report
- **Enterprise Assessment (EA)**
  - assesses exposed candidates
  - supports SoE Report
- **SoE Report**
  - reviews specification maturity
  - contains IT services and data statistics
  - provides assessment results analysis



Vexing Question #1



Q: How can you tell when your objective architecture is accurate?

A: Measure SvcV-4 "Hits" and "Misses"

SvcV-4 Hits & Misses

- **A "Hit" occurs when a Program of Record reports using a Tier 4 service in its ADC response**

Goal:	100% of Tier 4 services on SvcV-4 are identified by at least one PoR in ADC.
Measure:	$Hits = \frac{count\ of\ unique\ Tier\ 4\ services\ with\ At\ Least\ One\ PoR}{count\ of\ Tier\ 4\ services\ on\ SvcV\text{–}4}$

drive this to 100%!

Service Tiers

EXAMPLES
Tier 1: 2 Common Services
Tier 2: 2.1 Collaboration
Tier 3: 2.1.1 Information Boards
Tier 4: 2.1.1.1 Bulletin Board

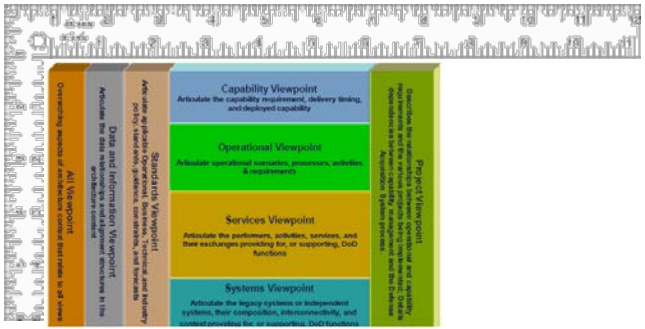
- **A "Miss" occurs when a Program of Record reports a service in its ADC response that**
  - does not map to SvcV-4 (e.g., "None", missing)
  - maps to Tiers 1 through 3 of SvcV-4

Goal:	0% of services reported on ADC that are not Tier 4 services on SvcV-4.
Measure:	$Misses = \frac{count\ of\ non\text{–}Tier\ 4\ services\ reported\ on\ ADC}{count\ of\ all\ services\ reported\ on\ ADC}$

drive this to 0%!

NOTE
The following services are set aside for Misses calculations:
0.1 Program of Record unique (ADC allows)

Vexing Question #2



Q: Is the enterprise really using the architecture and is it effective?

A: Measure technical guidance development, adoption, and conformance *vis-a-vis* SvcV-4 services

Measure *vis-a-vis* SvcV-4

3.5 BA Data Dissemination and Relay				
3.5.1	**Dissemination Management**			
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Summary status

- Specifications/Profiles
  - Available
  - Approved
- Components
  - Available
  - Passed conformance test
- Implementation
  - One program
  - All programs

Legend:

Guidance available
Guidance approved
DI2E Clearinghouse component available
" " conformant component available
Guidance implemented by at least one pgm
" " by all applicable programs

Ideas for The Future

- 

  - Common Profile Framework
  - Information Interoperability Framework
- Decomposed Operational Mission Threads
- Supplement ADC with Net Ready Key Performance Parameters (NR KPP) and DoD Architecture Framework artifacts
  - Sync up Net-Ready Key Performance Parameter and Common Profiles

Questions?

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