The Deployment Readiness Service: A Case Study of the Challenges of Implementing a Service Oriented Architecture in a Legacy System Environment

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Overview

- What Problem is being solved by DRS?
- What is a Service Oriented Architecture?
- What are the Challenges?
- How can these Challenges be overcome?

The views expressed in this presentation are those of the author and do not reflect the official policy or position of the United States Air Force, Department of Defense, or the U.S. Government.
What Problem is being solved by DRS?

- **Unit Deployment Managers**
  - Must pull information from many sources
    - Personnel Information
    - Immunization and medical records
    - Training
    - Etc….

- **Commanders (at all levels)**
  - Need a snapshot of Unit readiness
  - Need ability to Identify problem areas and trends
"As Is" Readiness Data Challenge
Example: Training Completion Data Origination Process (Generic)

Student Completes Course

Authoritative Source (Instructor) Creates Completion Record
- Course certificate
- Attendance list / Graduation roster

UDM / UTM Obtains Copy of record
- Fax/Copier
- Email
- Specialized System
- In-Person
- Time Flow

UDM / UTM Manages Record Copy
- Files Copy in Mobility Folder
- AND (May)

Manually enter some data elements from record into one or more of the following systems:
- ACES-PR
- CAMS
- LOGMOD
- G081
- ARMS
- Other Functional Systems (MRDSS, LSA, etc.)
- Local Solutions (Excel, Access, Custom Apps)
Deployment Readiness Service

• What is DRS?
  – AF personnel deployment readiness solution
  – Automates a manually intensive process
  – Subscribes to data from multiple sources
  – *Pathfinder to integrate data on GCSS-AF*

• Initial Users:
  – Commanders
  – Installation Deployment Officers
  – Unit Deployment Managers
  – Unit Training Managers

• Why DRS?
  – Creates standard service to across AF
  – Integrates diverse readiness indicators (med, trng, etc.)
  – Automates review, forecasting (by AEF), and scheduling
  – Eliminates dual data entry (same data; multiple systems)
  – Eliminates record re-creation (PCS/PCA)
### Identify Information Needs

**Integrity - Service - Excellence**

**DRS (Defense Readiness Scorecard)**

**Summary**

- **Members AEF**
- **Color = forecast**
- **DAV Status**
- **Next Requirement Expires**

**Individual Readiness Summary (IRS) Wireframe**

Logged in as: Airferce, Uiz D.  
Rank: TSgt (E6)  
Login Role: UDM  
Login Unit: 20 SVS, 20 FW, Shaw AFB

Displayed individual: Flien, Keepe, M.  
Rank: TSgt (E6)  
Assigned Unit: 20 SVS, 20 FW  
Assigned Base: Shaw AFB

- **Medical**
- **Equipment**
- **Training**
- **Administrative**
- **Legal**

- **Requirement** displays solutions corresponding to the requirements, e.g., if only completed is using a training requirement, except the requirement itself should be listed in cases where nothing has been completed.

- **Box Color Reflects Category Readiness**
- **Click here for other display formats**
- **Click on box to initiate DAV Code query for currently displayed person (waivers can be applied from query results screen)**

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**AV Frame Work**

- **Version 0.91 9 Apr 07**
- **Click here to create AF 4005 with displayed data**
- **Box Color Reflects Category Readiness**
- **Click here for other display formats**

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**Integrity - Service - Excellence**
Current State

- MILPDS ADS
- ACES-PR ADS
- DRS ADS
- PIMR ADS
- ADLS ADS
- SFMIS ADS

NIPRNET
In a Service-Oriented Viewpoint Operations drive Services and Services drive Systems – effectively decoupling Operations from Systems.
Future State

NIPRNET/GCSS ESB Metadata Environment

- Personnel Service
- Medical Readiness Service
- Ancillary Training Service
- Chem Warfare Training Service
- Readiness Service
- Small Arms Training Service
Deployment Readiness Service (DRS)
SV-4 Pathfinder Authoritative Data Sources Summary

Organization Data Sources:
- MilPDS
- MPES

Task Data Sources:
- DRS

Readiness Aggregation Sources:
- DRS
- MilPDS
- PIMR

Course Management Data Sources:
- ACES–PR
- SFMIS
- ADLS
- UDM (DRS)

Event Data Sources:

Readiness Evaluation Data Sources
- DRS

Readiness Reporting Systems
- DRS
Readiness COI
Preliminary Authoritative Data Sources*

- ACES-PR
  - Chemical Warfare Training
- SFMIS
  - Arming Group
  - Small Arms Training
- MPES
  - Position Number
- PIMR
  - Deployment Limiting Condition
  - Equipment
  - Immunizations
  - Individual Medical Readiness Overall
  - LAB
  - Physical Health Assessment
- ADLS
  - Explosive Ordnance Recognition (EOR) Training
  - Information Assurance
  - Language and Cultural Training
  - Law of Armed Conflict (LOAC)
  - Self-Aid/Buddy Care
  - Trafficking in persons Awareness
- MilPDS
  - Air Expeditionary Force Indicator
  - Assigned Flight (office symbol if flight unavailable)
  - Assigned Group
  - Assigned Installation
  - Assigned Squadron or Unit
  - Assigned Wing
  - Control Air Force Specialty Code
  - Duty Air Force Specialty Code
  - Deployment Availability Codes
  - Duty Status Code
  - First Name
  - Gender
  - Grade
  - Grade Description
  - Last Name
  - Middle Name
  - Office Symbol
  - Primary Air Force Specialty Code
  - Parent Personnel Accounting Symbol Code
  - Personnel Accounting Symbol Code
  - Social Security Number
  - Special Experience Identifier Code
  - Special Experience Indicator Type
  - Suffix (Name)
- UDM
  - BAGGAGE TAGS (2 Sets)
  - Date Placed on Deployment Status
  - Dependent Care Certification, AF Fm 357
  - Dog Tags (ID Tags and Chains)
  - Emergency Data Card DD Form 93
  - Expeditionary Combat Skills Training
  - Force Protection Familiarization
  - Foreign Clearance Guide Briefing
  - Gas Mask Spectacle Inserts
  - Geneva Convention Card, DD Form 1934
  - Hand Receipt, AF Form 1297
  - Hazardous Cargo Certification (If Req’d)
  - Hearing Aids
  - ID Card
  - Leave & Earnings Statement, DFAS Fm 700
  - Line Badge, USAF Restricted Area Badge
  - Locator Card, AF Form 245 (Employment Locator and Processing Checklist)
  - Pallet Build-Up/Cargo Preparation (If Req’d)
  - Personal Clothing Requirements
  - Personnel Reliability Pgm (PRP), AF Fm 286
  - Power of Attorney
  - Prescription Glasses
  - Professional Equipment
  - Religious Sensitivity Briefing
  - Shot Record, PHS 73 1
  - U.S. Government Driver's License
  - Will

* Initial set based on Spiral 0
Example Use Cases: Log-in For All Use Cases and Users

- User logs-in to AF Portal
- User clicks on DRS
- DRS comes up with specific role for current user based on Portal log-in
- Screen shows
  - User summary: % of unit (or wing) ready, # overdue, # expiring
    - Print/export to Powerpoint option
  - User name, rank, date, unit name, base, etc.
- Selectable options
  - Reports, Query, Create (Requirements, Notifications, Thresholds), Mass Actions (Updates, Printing), My Account, etc.
## Example Survey based off of Use Cases

<table>
<thead>
<tr>
<th>Readiness Reporting</th>
<th>1 Strongly Disagree</th>
<th>2 Disagree</th>
<th>3 Neutral</th>
<th>4 Agree</th>
<th>5 Strongly Agree</th>
<th>Avg</th>
</tr>
</thead>
<tbody>
<tr>
<td>i. DRS provided easy to interpret readiness indicators</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>11</td>
<td>9</td>
<td>4.2</td>
</tr>
<tr>
<td>ii. DRS accurately produced AF Forms 4005</td>
<td>1</td>
<td>3</td>
<td>4</td>
<td>10</td>
<td>6</td>
<td>3.7</td>
</tr>
<tr>
<td>iii. DRS accurately printed AF Forms 4005</td>
<td>0</td>
<td>3</td>
<td>6</td>
<td>8</td>
<td>6</td>
<td>3.7</td>
</tr>
<tr>
<td>iv. DRS enabled me to conduct readiness reporting</td>
<td>0</td>
<td>2</td>
<td>7</td>
<td>8</td>
<td>4</td>
<td>3.7</td>
</tr>
<tr>
<td>v. It was easy to notice when there were problems with unit personnel readiness</td>
<td>0</td>
<td>2</td>
<td>1</td>
<td>13</td>
<td>7</td>
<td>4.1</td>
</tr>
<tr>
<td>vi. DRS enhanced my unit readiness briefings</td>
<td>0</td>
<td>2</td>
<td>7</td>
<td>9</td>
<td>3</td>
<td>3.6</td>
</tr>
</tbody>
</table>
Concept Refinement

**Challenges**
- Short Schedule
  - < 5 Months
- Limited Funding
  - NTE $1M
  - No additional Funding for ADS
- Prescribe Performance
  - No Data Warehouse
  - No Pub/Sub
  - Must use Request/Reply
  - Must Follow COI Vocabulary
  - Not yet Developed
- Limited Experience Building Services
  - Hard to map services in DoDAF
Example Original Product From Readiness Community of Interest
## Current Process

### CAMS Report

**LOGMOD 4005**

**Blank 4005**
# Form 4005 Source Matrix

<table>
<thead>
<tr>
<th>Data Field</th>
<th>Data Provider</th>
<th>Method Of Entry</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Top Portion</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Date Placed on Deployment Status</td>
<td>UDM**</td>
<td>Manual Entry in DRS</td>
</tr>
<tr>
<td>Date All Actions Completed</td>
<td>UDM**</td>
<td>Manual Entry in DRS</td>
</tr>
<tr>
<td>Name</td>
<td>MilPDS</td>
<td>Automated Feed</td>
</tr>
<tr>
<td>Grade</td>
<td>MilPDS</td>
<td>Automated Feed</td>
</tr>
<tr>
<td>Documentation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ID Card, DD Form 2AFACT</td>
<td>UDM**</td>
<td>Manual Entry in DRS</td>
</tr>
<tr>
<td>Dog Tags</td>
<td>UDM**</td>
<td>Manual Entry in DRS</td>
</tr>
<tr>
<td>Emergency Data Card, DD Form 93</td>
<td>UDM**</td>
<td>Manual Entry in DRS</td>
</tr>
<tr>
<td>Shot Record, PHS 731</td>
<td>UDM**</td>
<td>Manual Entry in DRS</td>
</tr>
<tr>
<td>Locator Card, AF Form 245</td>
<td>UDM**</td>
<td>Manual Entry in DRS</td>
</tr>
<tr>
<td>Hand Receipt, AF Form 1297</td>
<td>UDM**</td>
<td>Manual Entry in DRS</td>
</tr>
<tr>
<td>Baggage Tags</td>
<td>UDM</td>
<td>Manual Entry in DRS</td>
</tr>
<tr>
<td><strong>Other (if Required)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Geneva Conventions Card, DD Form 1934</td>
<td>UDM</td>
<td>Manual Entry in DRS</td>
</tr>
<tr>
<td>PRP, AF Form 286</td>
<td>UDM</td>
<td>Manual Entry in DRS</td>
</tr>
<tr>
<td>Dependent Care Certification, AF Form 357</td>
<td>UDM</td>
<td>Manual Entry in DRS</td>
</tr>
<tr>
<td>U.S. Government Driver’s License</td>
<td>UDM</td>
<td>Manual Entry in DRS</td>
</tr>
<tr>
<td>Prescription Glasses</td>
<td>UDM</td>
<td>Manual Entry in DRS</td>
</tr>
<tr>
<td>Gas Mask Spectacle Inserts</td>
<td>UDM</td>
<td>Manual Entry in DRS</td>
</tr>
<tr>
<td>Hearing Aids</td>
<td>UDM</td>
<td>Manual Entry in DRS</td>
</tr>
<tr>
<td>Personal Clothing Requirements</td>
<td>UDM</td>
<td>Manual Entry in DRS</td>
</tr>
<tr>
<td>Professional Equipment</td>
<td>UDM</td>
<td>Manual Entry in DRS</td>
</tr>
<tr>
<td>Line Badge, USAF Restricted Area Badge</td>
<td>UDM</td>
<td>Manual Entry in DRS</td>
</tr>
<tr>
<td><strong>Optional</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LES, DFAS Form 700</td>
<td>UDM</td>
<td>Manual Entry in DRS</td>
</tr>
<tr>
<td>Will</td>
<td>UDM</td>
<td>Manual Entry in DRS</td>
</tr>
<tr>
<td>Power of Attorney</td>
<td>UDM</td>
<td>Manual Entry in DRS</td>
</tr>
<tr>
<td>Blank Fields</td>
<td>UDM</td>
<td>Manual Entry in DRS</td>
</tr>
<tr>
<td><strong>Training</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Small Arms</td>
<td>SFMIS</td>
<td>Automated Feed</td>
</tr>
<tr>
<td>Self-Aid/Buddy Care</td>
<td>ADLS</td>
<td>Automated Feed</td>
</tr>
<tr>
<td>Chemical Warfare</td>
<td>ACES</td>
<td>Automated Feed</td>
</tr>
<tr>
<td>Pallet Build-Up/Cargo Preparation (If Required)</td>
<td>UDM</td>
<td>Manual Entry in DRS</td>
</tr>
<tr>
<td>Hazardous Cargo Certification (If Required)</td>
<td>UDM</td>
<td>Manual Entry in DRS</td>
</tr>
<tr>
<td>Religious Sensitivity Briefing</td>
<td>UDM</td>
<td>Manual Entry in DRS</td>
</tr>
<tr>
<td>Foreign Clearance Guide Briefing</td>
<td>UDM</td>
<td>Manual Entry in DRS</td>
</tr>
<tr>
<td>Explosive Ordnance Recognition (EOR) Training</td>
<td>ADLS</td>
<td>Manual Entry in DRS</td>
</tr>
<tr>
<td>Law of Armed Conflict (LOAC) Briefing</td>
<td>ADLS</td>
<td>Automated Feed</td>
</tr>
<tr>
<td>Force Protection Familiarization</td>
<td>ADLS</td>
<td>Automated Feed</td>
</tr>
</tbody>
</table>
Deployment Readiness Service
Readiness Items Grouped by Type
Example

Note: This is by no means a complete set but provides insight to the types of factors involved.
<table>
<thead>
<tr>
<th>Medical</th>
<th>Equipment</th>
<th>Training</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dog Tags</td>
<td>Hearing Aids</td>
<td>Pro Equip</td>
</tr>
<tr>
<td>Gas Mask Inserts</td>
<td>Cloth Req'ts</td>
<td>Custom Req'ts</td>
</tr>
<tr>
<td>Pallet</td>
<td>Haz Cargo</td>
<td>LOAC</td>
</tr>
<tr>
<td>Religious</td>
<td>NBC</td>
<td>EOR FP Trng</td>
</tr>
<tr>
<td>Small Arms</td>
<td>SABC</td>
<td>NBC EOR FP Trng</td>
</tr>
<tr>
<td>Pallet</td>
<td>Haz Cargo</td>
<td>LOAC</td>
</tr>
<tr>
<td>Religious</td>
<td>SABC</td>
<td>NBC EOR FP Trng</td>
</tr>
</tbody>
</table>

### Readiness Requirements
- Shot Rec
- Dental Lab
- Imm. Stat. Profile/422
- HRR
- Overall Stat
- Actions

### Readiness Tasks
- Shot Rec
- Dental Lab
- Imm. Stat. Profile/422
- HRR
- Overall Stat
- Actions

### Evaluation
- Shot Rec
- Glasses
- Imm. Stat.
- HRR
- Overall Stat
- Actions

### Source:
- ADLS
- MilPDS
- SFMIS
- DRS
- ACES-PR
- PIMR
- AFCITA

**Other Checks**

**Organization**

**Person**

**Reporting**

Integrity - Service - Excellence
UDM Selects Airman & Requests Indiv Readiness (4005 + Medical Data)

User needs to review person’s AF Fm 4005. Selects person in unit.

User views welcome screen with their name and role.

Org structure expands to review sub units & people. Person selected.

E.g. calls server app (4005 Service / function).

Build request for person info, readiness req’ts and items to complete 4005.

E.g. creates request for person info (grade, AFSC, DAV codes), readiness requirements, readiness items.

Displays aggregated data in requested 4005 presentation format.

AF Portal

Aggregation Service (BPEL driven)

User views Airman’s 4005.

Collect responses, match item status to requirement, build aggregate object.

Displays aggregated data in requested 4005 presentation format.

Request for User Name & Grade

Receive list of req’d items, identify ADS for each req’d item and request item status.

Receive list of req’d items, identify ADS for each req’d item and request item status.

Collect responses, match item status to requirement, build aggregate object.

Name, Grade, Unit, DAV status, req’t list matched with status.

Aggregated Object Placeholder

Request for Small Arms Trng

Request for Other Ancillary Training

Request for Medical Data

Request for NBC Training

Request for other required items

Request for other required items

Request for other required items

Request for Medical Data

MDE Used to discover at design/development time.
User invokes web application, which uses aggregation service to call the wrappers, and then converts the resulting business object into human readable representation on the AF Portal.

Aggregation service pulls data from multiple services, processes it, and re-packages as single business object.

Complete business Object replied

Note: Aggregation service does not use MDE to determine which Mission Services (Wrappers) to call at runtime.

Design | Develop | Deploy | Execute

---

DRS develop/deploy/use Timeline
UC 11: Use Mission Services (Web App)
DRS Pathfinder SV-1 (DRAFT)

Method 1 – ADS Keeps Local Cache
Method 2 – ADS Uses Regional Cache
Method 3 – ADS Direct Service

Secured SOAP messages

Commanders, IDOs, UDMs and UTMs

GCSS-AF Security Boundary

Method 1
Source Cache (VDE)

Method 2
Filter

Method 3 (Preferred)
Update DoD Architecture Framework (DoDAF) artifacts

<table>
<thead>
<tr>
<th>Applicable View</th>
<th>Framework Product Name</th>
<th>General Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>All Views</td>
<td>AV-1</td>
<td>Overview and Summary Information</td>
</tr>
<tr>
<td>All Views</td>
<td>AV-2</td>
<td>Integrated Dictionary</td>
</tr>
<tr>
<td>Operational</td>
<td>CV-1</td>
<td>High-Level Operational Concept Graph</td>
</tr>
<tr>
<td>Operational</td>
<td>CV-2</td>
<td>Operational Node Connectivity Description</td>
</tr>
<tr>
<td>Operational</td>
<td>CV-3</td>
<td>Operational Information Exchange Matrix</td>
</tr>
<tr>
<td>Operational</td>
<td>CV-4</td>
<td>Organizational Relationships Chart</td>
</tr>
<tr>
<td>Operational</td>
<td>CV-5</td>
<td>Operational Activity Model</td>
</tr>
<tr>
<td>Operational</td>
<td>CV-6</td>
<td>Operational State Transition Description</td>
</tr>
<tr>
<td>Operational</td>
<td>CV-7</td>
<td>Logical Data Model</td>
</tr>
<tr>
<td>Operational</td>
<td>CV-8</td>
<td>Systems Interface Description</td>
</tr>
<tr>
<td>Operational</td>
<td>CV-10</td>
<td>Data Flow Description and Structural Business Process Rules of the Operational View</td>
</tr>
<tr>
<td>Operational</td>
<td>CV-11</td>
<td>Systems Communications Description</td>
</tr>
<tr>
<td>Operational</td>
<td>CV-12</td>
<td>System Communications Description</td>
</tr>
</tbody>
</table>

Refine the Model
# Identify Information Assets

## Organization Data Sources:
- MilPDS
- DCPDS
- Local Data
- Paper
- Local
- USAF
- Joint

## Task Data Sources (automation incomplete):
- AFIs
- UDM spreadsheets
- TPFDD libraries
- Emails
- Web pages
- Phone
- Local policy
- DRS

## Readiness Data Sources:
- LOGMOD
- CAMS/IMDS
- GO81
- Paper
- ARMS
- SFMIS
- MRDSS
- Artifacts
- ACES-PR
- DRS
- ADLS
- UDM Spreadsheets
- MILPDS
- DEERS
- DCPDS
- DIMHRS
- PIMR
- AFCITA
- DMHRSi

## Course Management Data Sources:
- Training spreadsheets
- Paper rosters
- Local Tools
- Dozens of MAJCOM systems
- Emerging tools*: DIMHRS, ADLS, SRRS, DRS, etc.

## Event Data Sources:
- Staff meeting charts
- Outlook calendar
- Local Tools

## Readiness Evaluation Systems
- Mobility folder reviews
- UDM Spreadsheets
- AF Form 4005
- Modified AF Form 4005
- DRS

## Readiness Reporting Systems (Group or higher)
- Manual aggregation and manipulation of local data

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No "as is source" for enterprise Coordination & Orchestration data

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*Integrity - Service - Excellence*
Map Data Flow

User views selected Airman’s IRS can change viewing format or generate 4005

Aggregation Service

ADS (Definitions & Catalogs)
- MILPDS: Get_Detailed_Individual_Data
- DRS: Get_AEF_Definitions
- DRS: Get_AEF_Requirements
- DRS: Get_AEF_Definitions
- DRS: Get_AEF_Requirements
- DRS: Get_AEF_Definitions
- DRS: Get_AEF_Requirements

ADS (Organization)
- DRS: Get_Assigned_Requirements
- SFMIS: Get_Arming_Group

ADS (Requirements)
- DRS: Get_Assigned_Requirements
- SFMIS: Get_Arming_Group

ADS (Readiness Evaluation)
- DRS: Get_Readiness_Eval_Thresholds
- DRS: Get_Readiness_Item

ADS (Readiness Tasks)
- SFMIS: Get_Completed_Training
- ACES-PR: Get_Completed_Training
- ADLS: Get_Completed_Training
- PIMR: Get_Medical_Readiness_Individual
- DRS: Get_Readiness_Item

Display Fields:
- See IRS wireframe
- Sort by display fields
- Export to AF 4005
- Launch DAV code query for user
- Other formats
  • Req’t drill down (future)

Actions:
- Name, Grade, Unit, DAV status, req’t list matched with status

User views selected Airman’s IRS can change viewing format or generate 4005
Figure 5-24: Notional Example: SV-4b: Data Flow Diagram

*Integrity - Service - Excellence*
Overcoming Challenges

- Realistic Schedule
- Realistic Funding
- Rethinking Performance Constraints
  - “Regional Cache”
- Up Front Engineering
  - Created Technical Package
- Iterative Vocabulary Development
Summary

- What Problem is being solved by DRS?
- What is a Service Oriented Architecture?
- What are the Challenges?
- How can these Challenges be overcome?
Questions?