Architecture Way Ahead

Air Force Network Integration Center

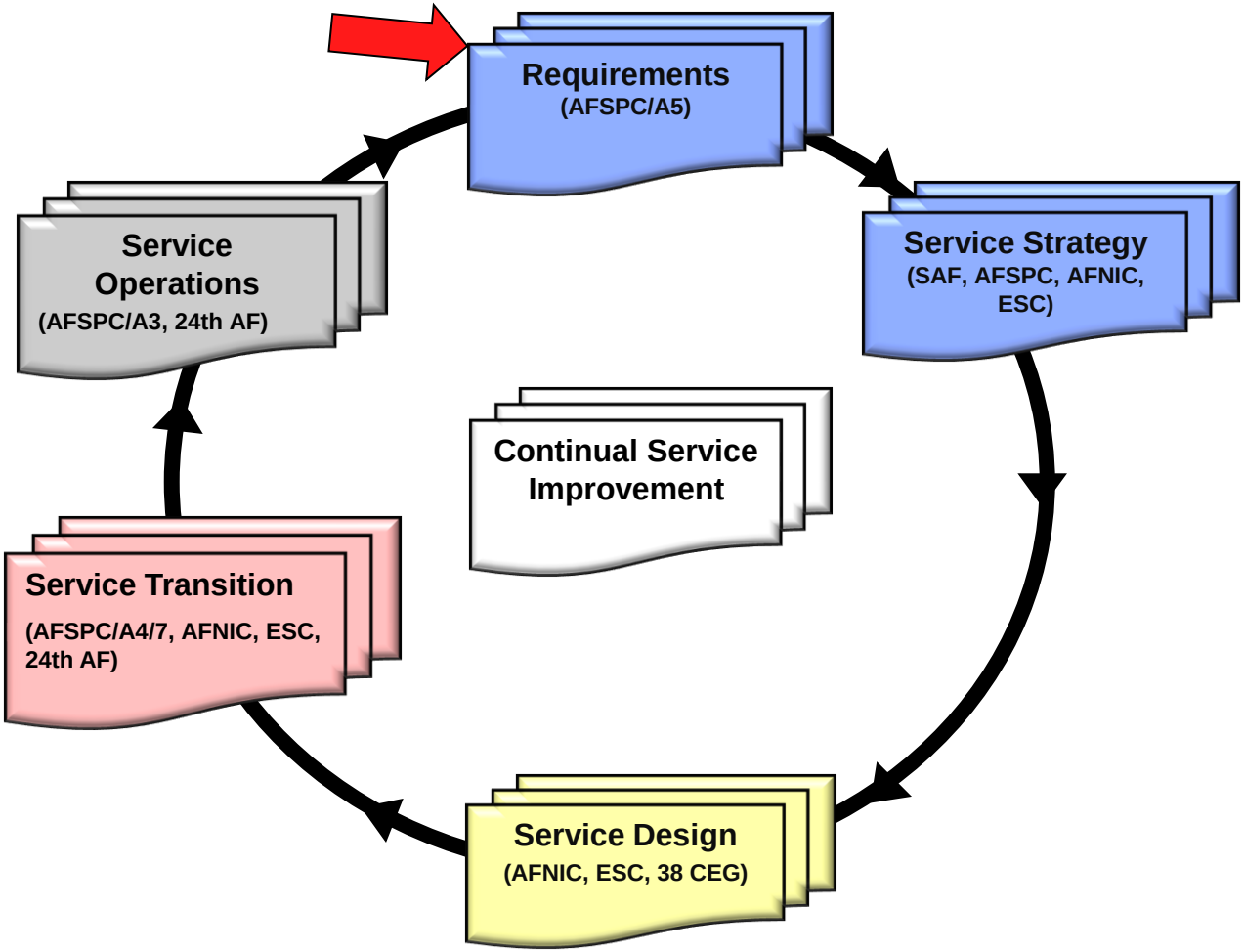
AFNIC/NA

19 Sep 2012
Steve Stoner
AFNIC/NAS

Overview

- Uses of Architecture
- Cyberspace is changing
- AFSPC/AFNIC Architecture products
- Way Ahead

Define the Architectures and Standard Teaming Opportunities



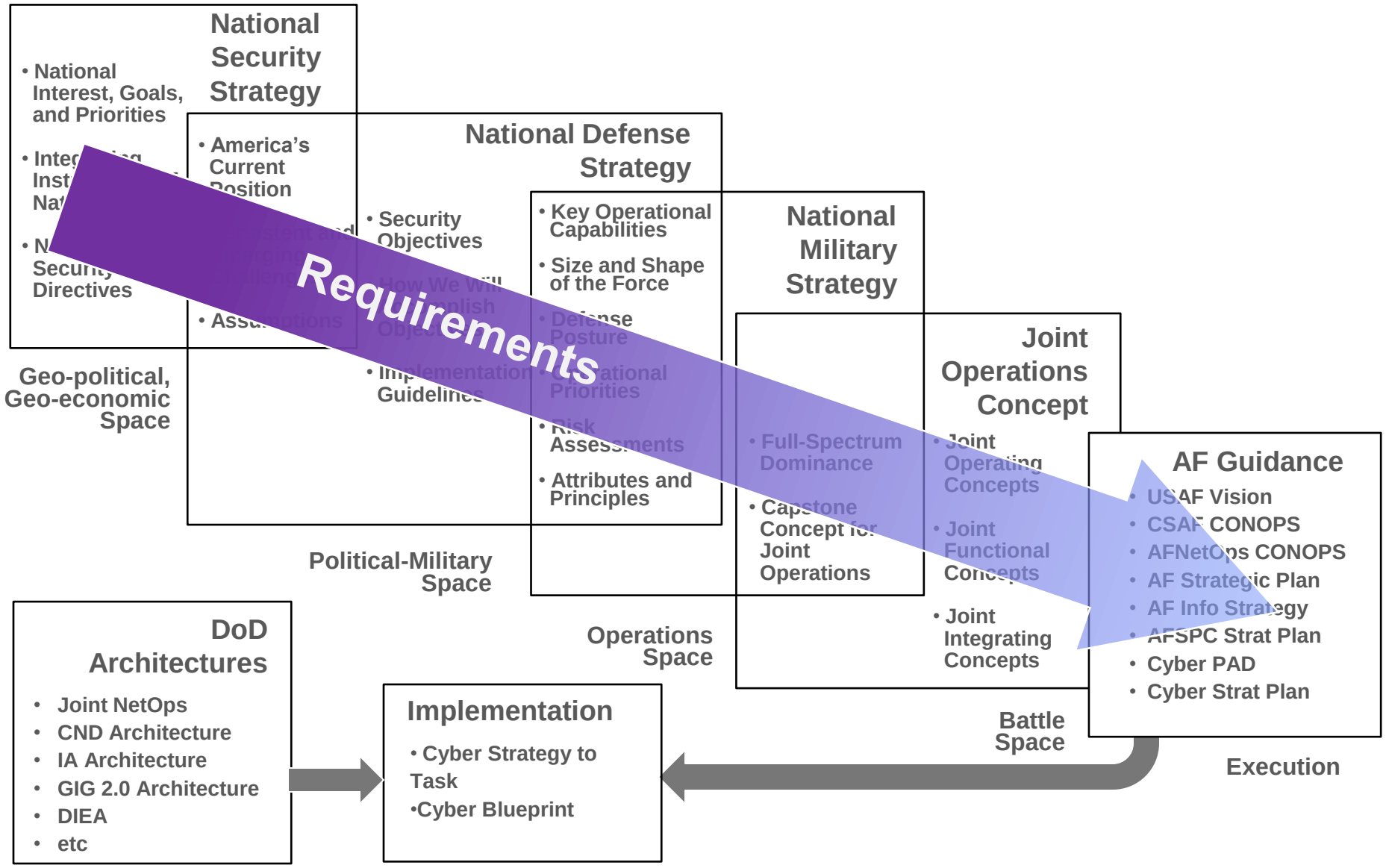
Objectives

- Reduce Complexity
- Standardize Processes
- Normalize Tools
- Standardized Configurations

Benefits

- Strategic Alignment
- Unity of Effort
- Reduced TCO
- Operational Efficiencies

Strategic Guidance



AF Use of Architecture

ARCHITECTURES

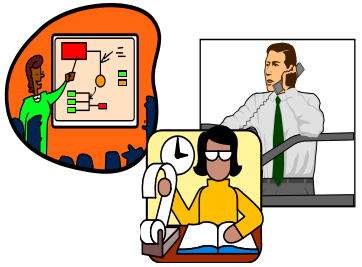
Building a repository of decision-supporting information sources

5 ....OTHER USES

1. Education and Training
2. Exercise/Innovation
3. Test and Evaluation
4. …etc.

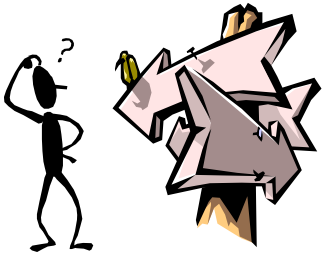
4 PORTFOLIO Mgmt

Applying Ref Models to promote std descriptions of activities, orgs, systems, data, technologies, and functionality for redundancy ID and reuse



1 CAPABILITY BASED PLANNING

Supporting operational planners analyses by defining ops activities, system functions, info/data needs and their relationships (e.g., CRRA HPTs)



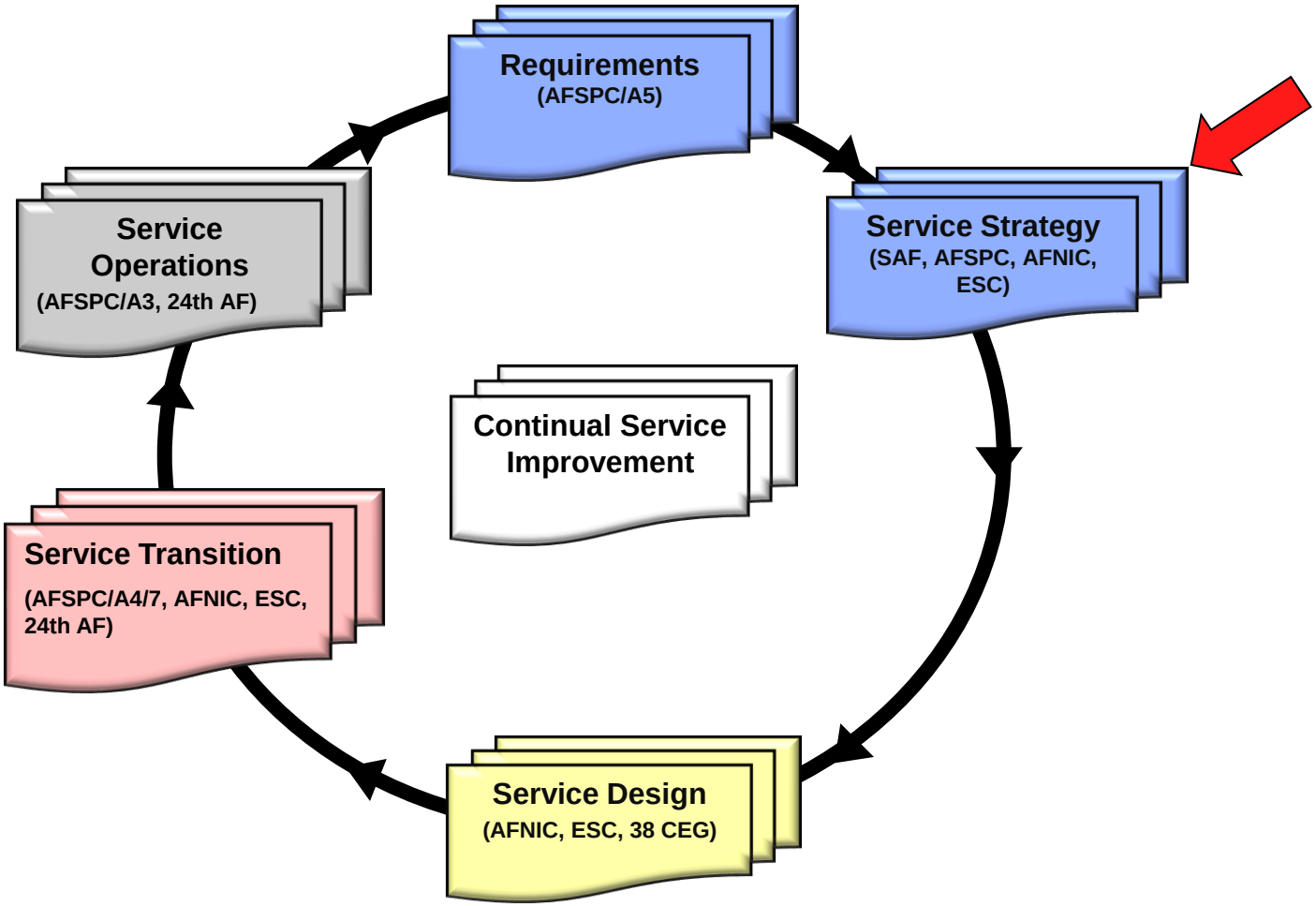
2 RESOURCE PLANNING & MGMT

Who should buy what, i.e., PPBE support to Capital Planning and Investment Control (CPIC) process; comparative analyses of proposed investment strategies

3 SYSTEM DEVELOPMENT & ACQUISITION

Required functionality, interfaces, information exchanges, services and information infrastructure, including technical standards

Define the Architectures and Standard Teaming Opportunities



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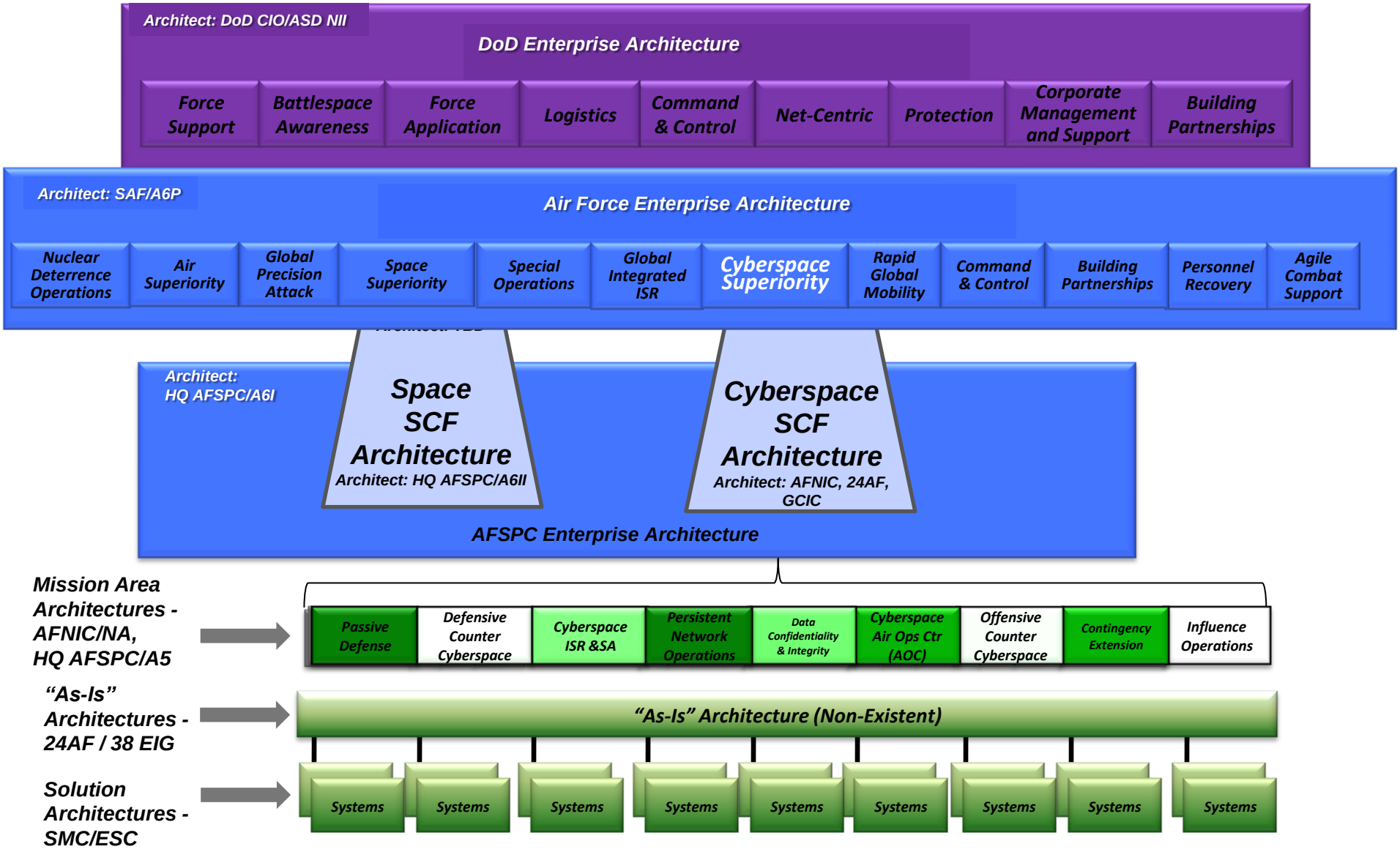
Enterprise Architecture Layered Approach



AF Use of Architecture Functional Specifications

Applications / Web Services

Presentation
- Provide Presentation Services
- Provide Widget Library
- Provide User Defined Operational Picture
- Provide Web Browsing
- Provide Automated User Assistance

Enterprise Mgmt
- Provide Service Desk Capabilities
- Provide Patch Mgmt
- Provide Asset Mgmt
- Dynamically Discover Assets
- Provide Problem Mgmt Services
- Provide Configuration Mgmt
- Establish Space Timing/Positioning (GPS)
- Information Correlation
- Provide Digital Policy
- Provide Quality of Protection
- Provide Email System Mgmt
- Provide Enterprise Info Mgmt/ Enterprise Info Services
- Prioritize System Restoration
- Perform Trend Analysis
- Detect & Remediate System Vulnerabilities
- Conduct Modeling & Simulation

Device Ops/Mgmt
- Provide Client Device Processing
- Monitor Computer Devices
- Provide Deployed Personal Edge Devices

Network Ops/Mgmt
- Provide Domain Name Services
- Provide Directory Services
- Establish Bandwidth Mgmt
- Monitor and Analyze Network Events
- Perform Traffic Mgmt
- Provide Policy Mgmt
- Route Based on Content
- Provide Spectrum Mgmt
- Control Multicast Traffic
- Transfer Data via Dynamic Precedence
- Enforce Policy based Routing
- Respond to Network Security Incidents
- Develop CND Courses of Action
- Execute Network Design Plan
- Assist Network Design Planner

Application Ops/Mgmt
- Monitor Application Perf Mgmt
- Maintain Application
- Provide Application Library/Store
- Provide Project Mgmt Services
- Provide COOP Services
- Monitor Cloud Virtual Machines

Enterprise Applications
- Provide Email Services
- Provide Collaboration Services
- Provide Office Automation App Services

Application Foundation
- Provide Web Services Discovery
- Provide Web Services Directory
- Provide Work Flow Services (e.g., Case Mgmt Support)
- Host Application
- Provide Web Hosting
- Provide Web Caching
- Provide Web Services
- Provide Load Balancing
- Provide Discovery Mgmt
- Provide Geographic Info Services

Data/Information
- Mediate Information
- Provide Asynchronous Messaging
- Provide Synchronous Messaging
- Publish and Subscribe
- Provide Database Services
- Aggregate Data
- Mediate Protocols
- Translate Human Language
- Trans-code Data
- Provide Enterprise Document Mgmt
- Compress/Decompress Data
- Mine Data
- Provide Metadata Tagging Capability

Computing Services
- Provide Operating System Services
- Establish Media Synchronization Functions
- Provide Audio Production
- Provide Virtualization Capabilities
- Provide Grid Computing
- Provide Fault Tolerant Services
- Provide Backup and Recovery
- Archive/Retrieve Data
- Provide Cloud Computing Services

Storage
- Replicate Stored Data
- Provide SAN
- Provide Storage Array Systems
- Provide Storage Mgmt Service
- Compress Data within Storage Area
- Provide Storage Virtualization
- Provide Network Attached Storage
- Provide Online Disk Mgmt Services

Network/Communications
- Provide Network Timing
- Establish Streaming Media
- Establish Streaming Audio
- Establish Streaming Video
- Route Data
- Negotiate Services Across Networks
- Establish Programmable Radio Networks
- Control Radio/Terminal Equipment Interface
- Provide Telemetry Connectivity
- Provide Mobile (Ad Hoc) Computing
- Establish SATCOM Connectivity
- Establish Cognitive/Intelligent Spectrum Utilization
- Provide IPv6 Capabilities
- Transport Classified Data
- Transfer of Information/Data
- Establish Mobile Radio Connectivity
- Provide Radio Frequency Identification (RFID)
- Provide Tactical Data Link
- Manage Information Delivery

Security
- Provide Authentication
- Control Access
- Enforce Access Control
- Provide Access Control Services
- Implement Identity Mgmt
- Provide Authorization/ Privilege Mgmt
- Provide Public Key Infrastructure (PKI)
- Implement Ports, Protocols, and Services Policies
- Configure IPS
- Protect Network Boundaries
- Protect Critical System Information
- Provide Cryptographic Services
- Support Investigations & Forensics
- Provide Proxy Services Mgmt
- Provide Firewall Mgmt Srvcs
- Provide Virtual Private Network (VPN)
- Protect Information
- Provide Multi-Domain/ Enclave Security
- Secure Multi-Level Authenticate
- Protect Data At Rest
- Protect Data in Transit
- Protect Data in Processing
- Provide Email Hygiene

Architecture Process

AFSPC

Service Core Functions (SCF) *

- Nuclear Deterrence Operations
- Air Superiority
- Space Superiority
- **Cyberspace Superiority**
- Command and Control
- Global Integrated ISR
- Global Precision Attack
- Special Operations
- Rapid Global Mobility
- Personnel Recovery
- Agile Combat Support
- Building Partnerships

2

AFSPC/A5

- Defining / Determining 9 Mission Area Architectures (MAA) to support the Cyberspace Superiority Core Function

- Passive Defense
- Defensive Counter Cyberspace
- Cyberspace ISR & SA
- Persistent Network Operations
- Data Confidentiality & Integrity
- Cyberspace Air Ops Ctr (AOC)
- Offensive Counter Cyberspace
- Contingency Extension
- Influence Operations

5

AFSPC/A5/A8

- Prioritize and align funding for Programs with BTA

6

AFMC/ESC

Infrastructure PMOs

- Build the Prog Arch (PA) aligned to BTA
- Produce SUPs

7

3

4

1

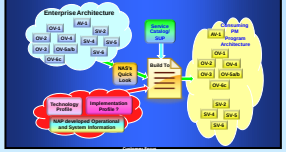
AFNIC

AFNIC/NAS

- Develop the AFNet Architecture to the support CyberSpace Superiority Core Function

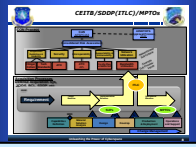
AFNIC/NAS/P

- Build the 9 Mission Area Architectures
- Develop " Build To" Architectures (BTA)



AFNIC/NV/NW

- Validation that product from ESC/PMOs matches the Build To Architectures
- Issue Certificate of Networthiness (CoN)



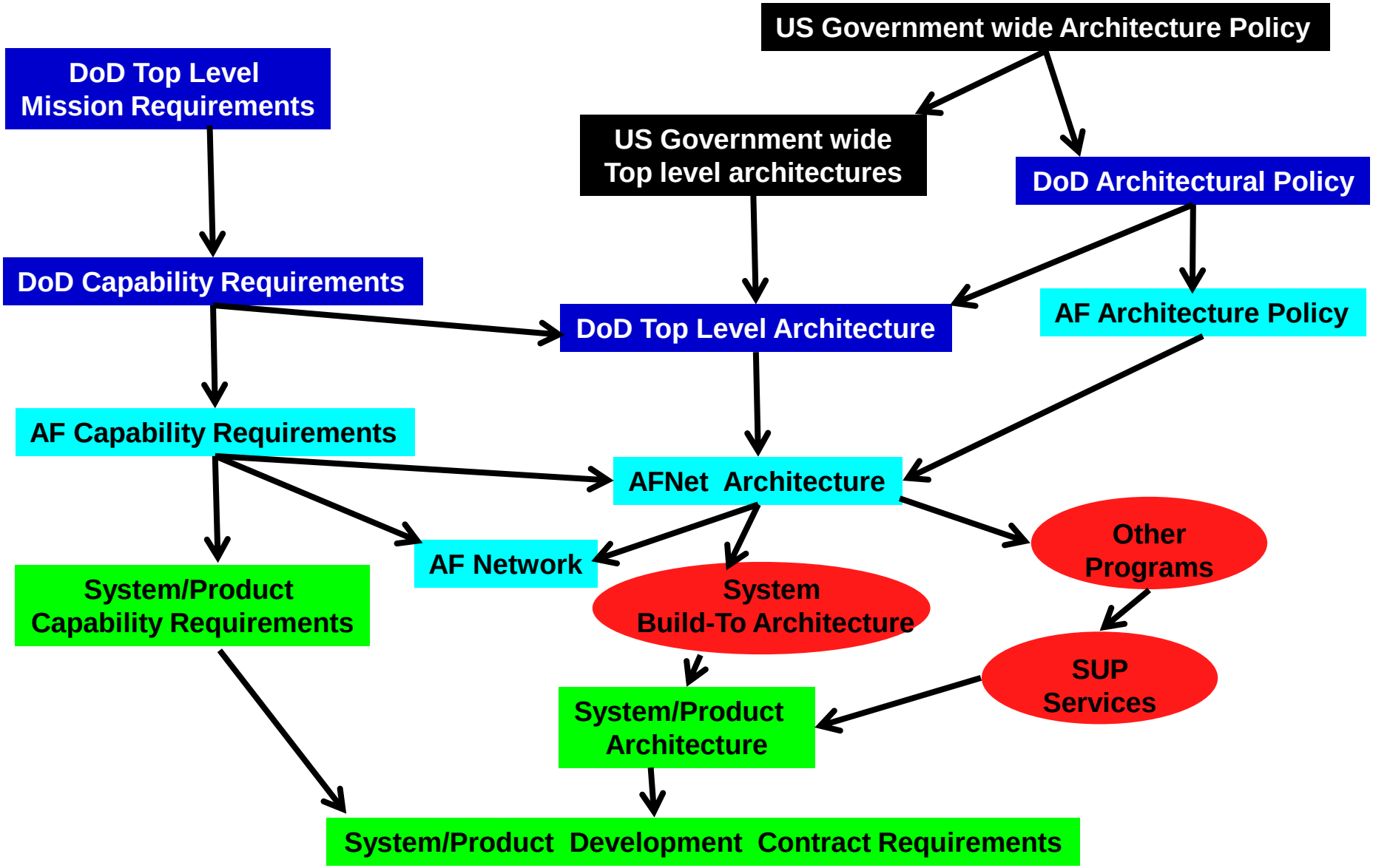
8

24AF

- Build Operational System Architecture

* AFDD1

Build-To Architecture



Standards...Interface to Service
A Different Perspective

OPERATIONAL COMMUNITY

Network Operations (24th)

Network Operations Service Support

Providing PMO

Service Architect

Operational Baseline Implementation Description

Interface Information for Support

Architectural Information

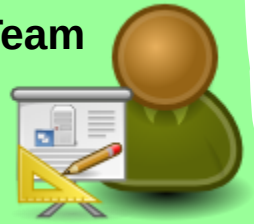
Service Utilization Profile

SERVICE CATALOG

Architectural & Technical Description

Consuming PMO

Design Team



Architect

Interface Architecture

Detailed Interface Design Information

Service Engineer/Developer

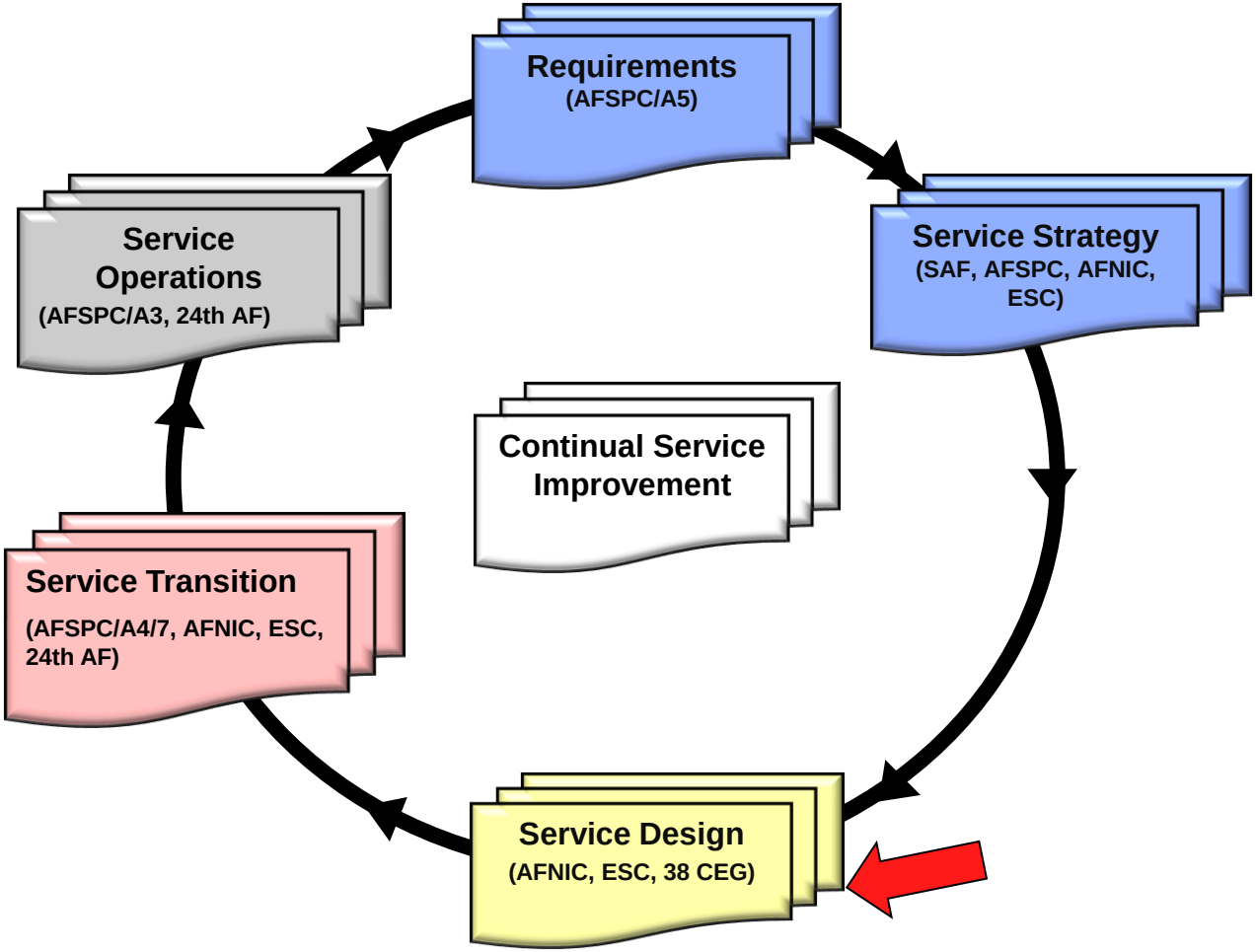
Manages Service Catalog

AFNIC

Detailed Interface Design Information

Developer/Engineer

Define the Architectures and Standard Teaming Opportunities



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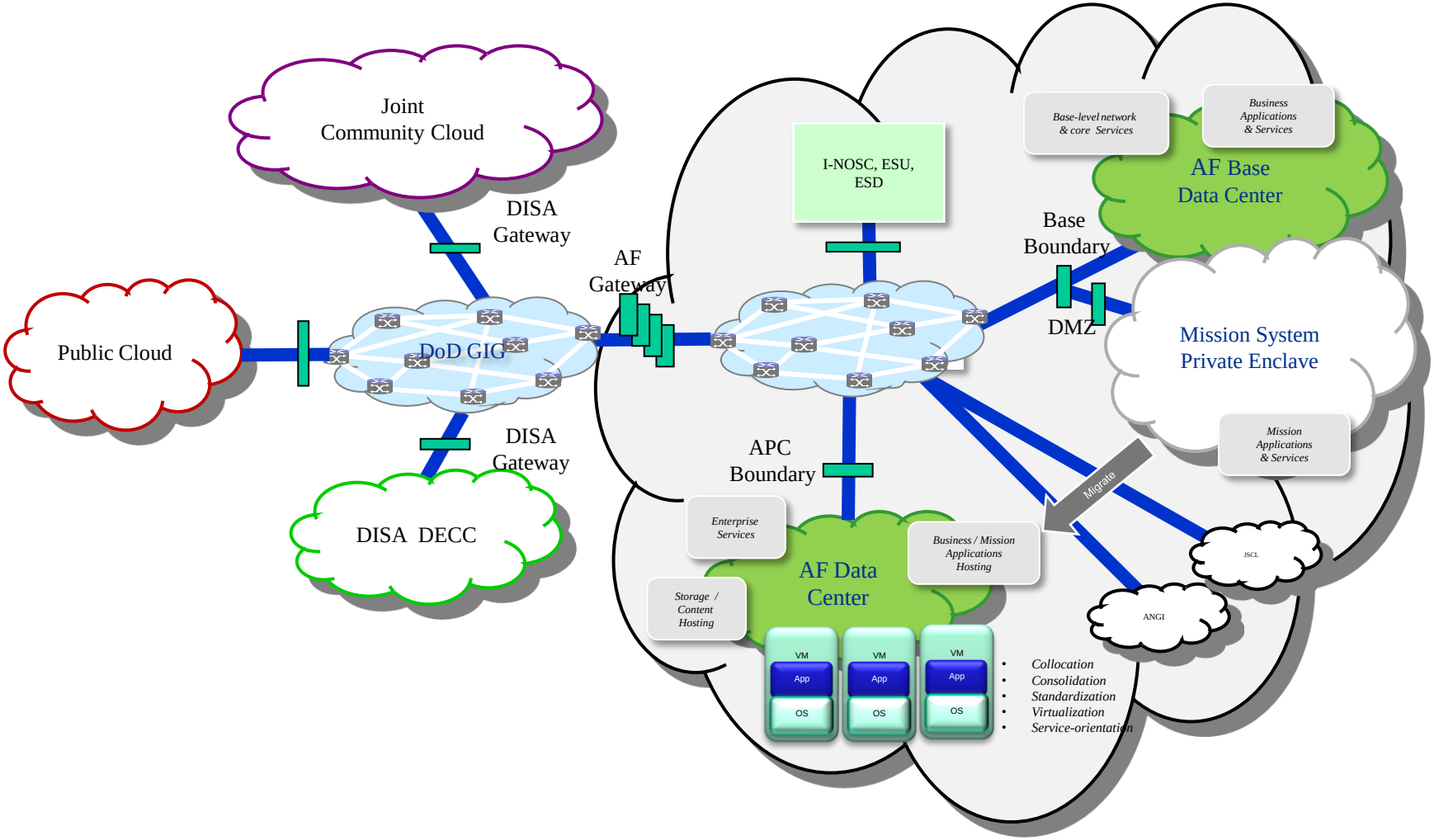
Cyberspace is Changing

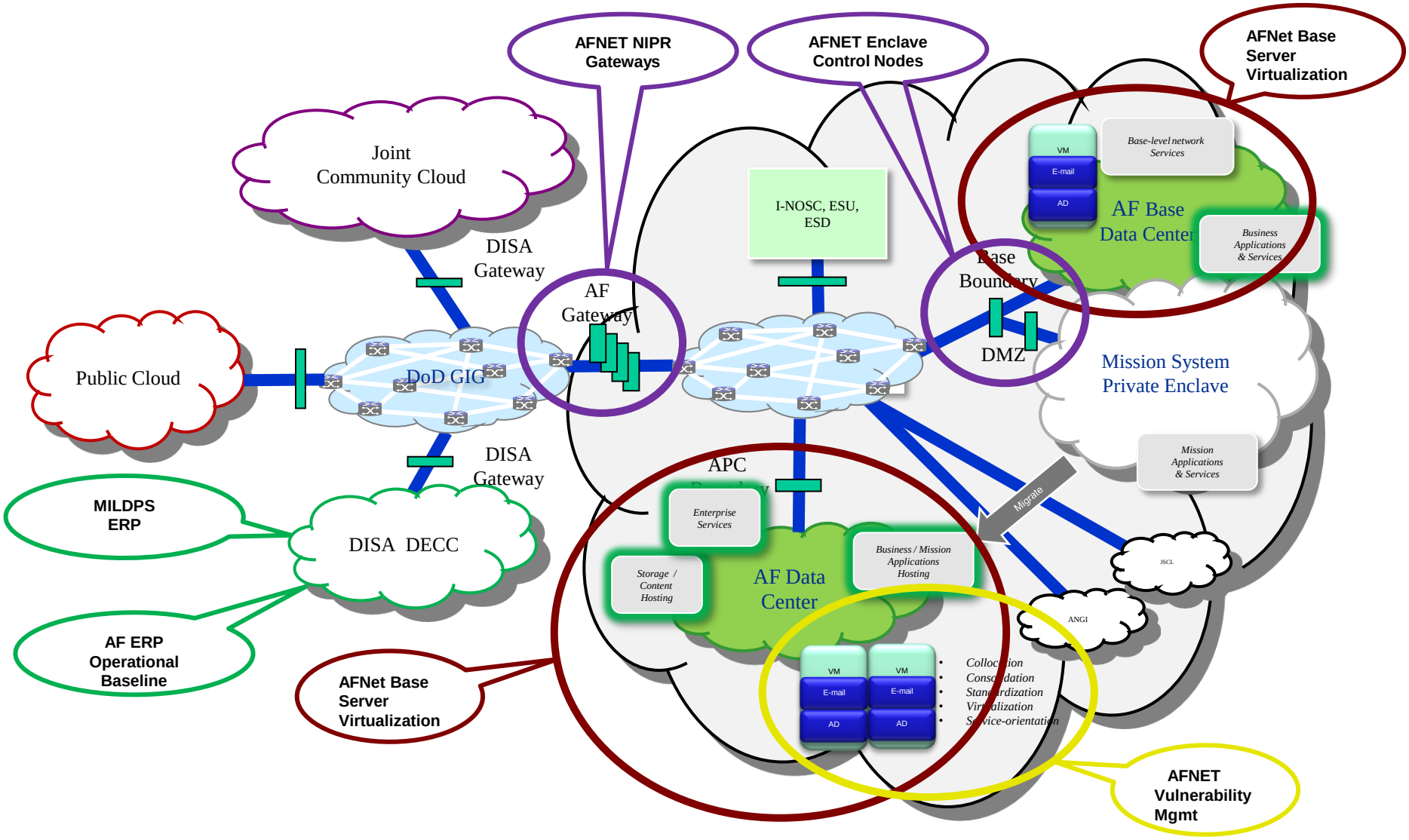


Architecturally-Driven Design Patterns

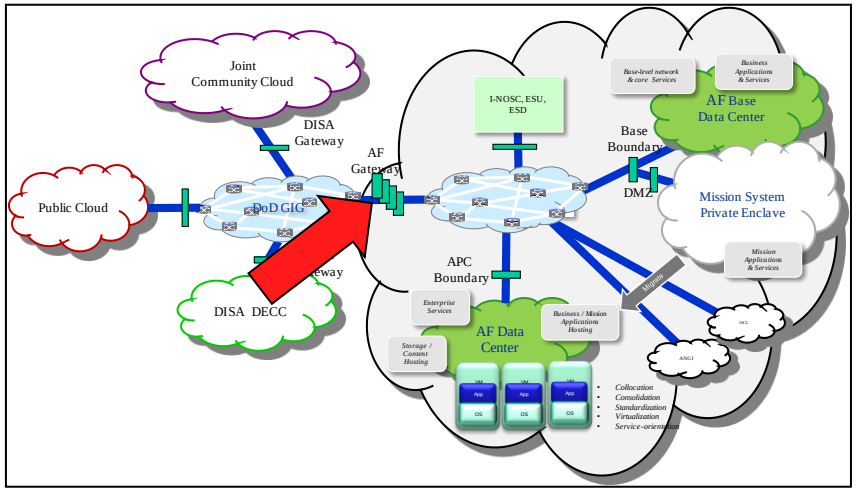
The AFNet Architecture contains a number of "design patterns" and Usage Notes for selecting/applying the patterns. The design patterns are associated with one of five Product Life Cycle categories, designated: (a) *Emerging* (b) *Mainstream* (c) *Containment* (d) *Sustainment* (e) *Retirement*.

Only design patterns that are considered *Mainstream* can be installed on the AF network without an approved waiver from the AFNet Configuration Control Board.

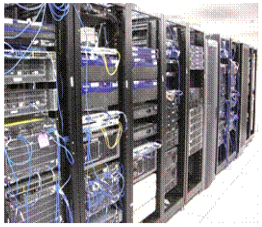
AFNet Architecture

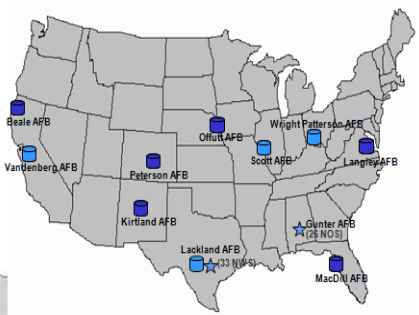


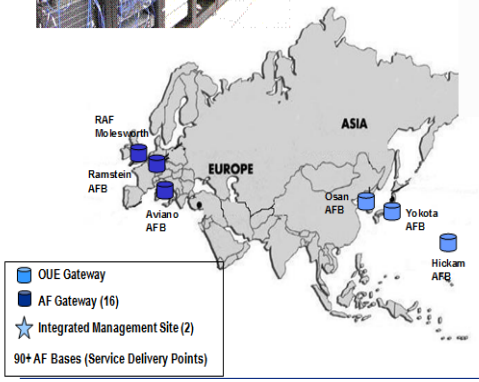
AF Gateways

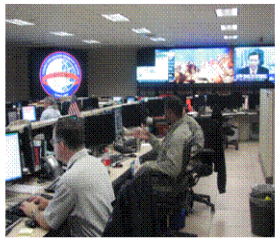


- AF Gateways are primary external security boundary
- Reduced 100+ network entry points to 16
- Implements network boundary intrusion protection system (firewall, web proxy, mail relay), host intrusion protection system, network traffic analyzer



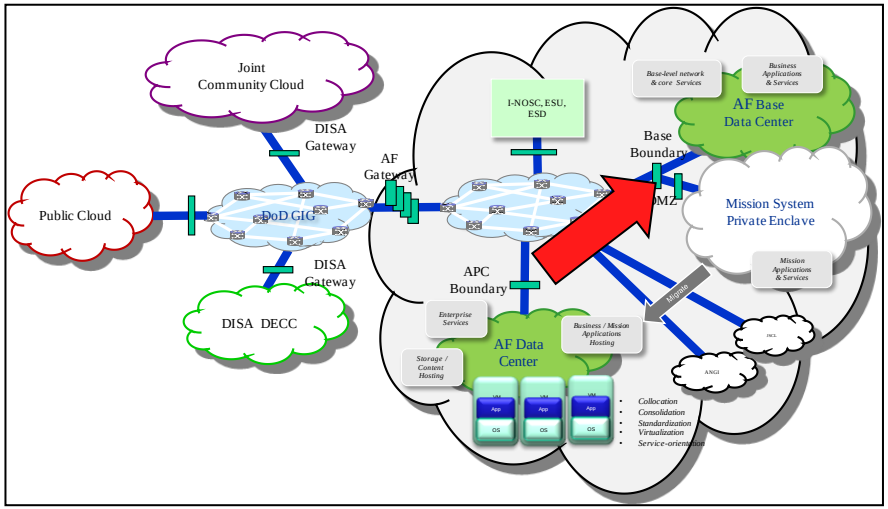




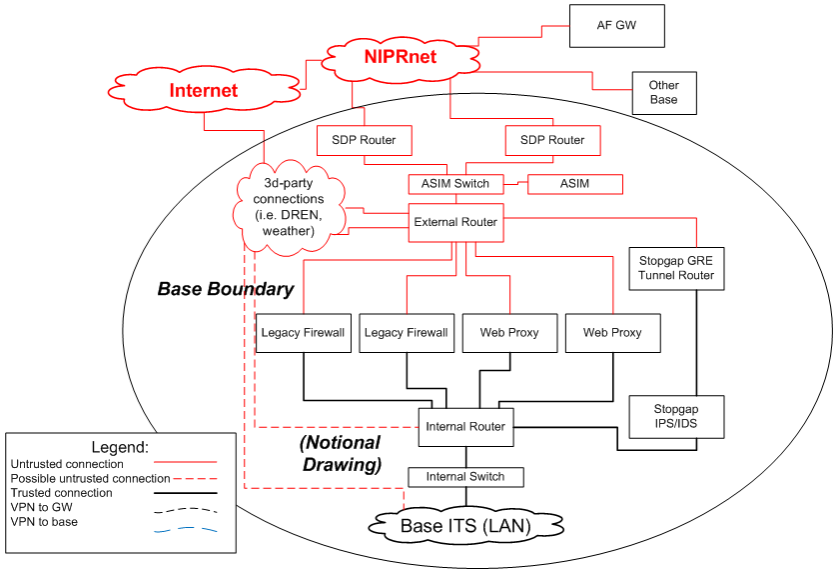


- Enables centralized defense, operation and management of Air Force network enterprise

AFNet Enclave Control Node

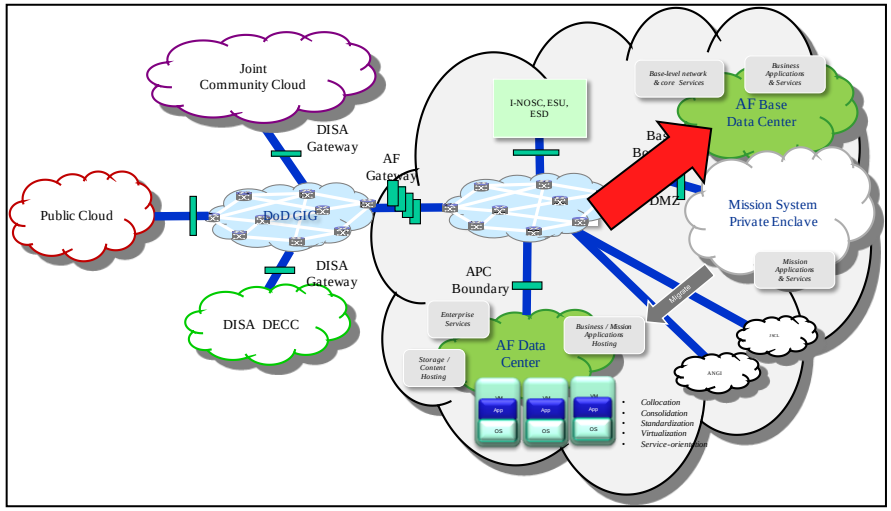


- **Replace AF Intrusion Protection/Detection System (IPS/IDS)**
- **Standardizes GSU and 3rd party connections (DoD compliant)**
- **Eliminates Generic Routing Encapsulation (GRE) tunnels**



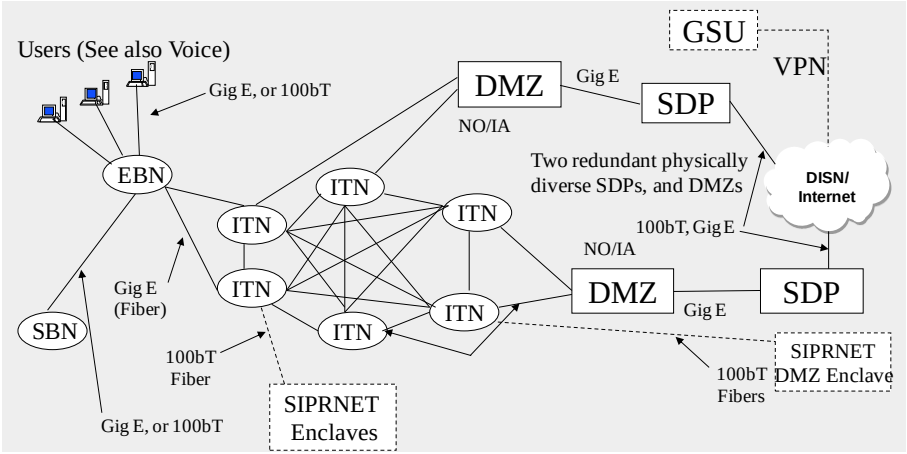
- **Standardizes and simplify existing based enclaves behind GW**

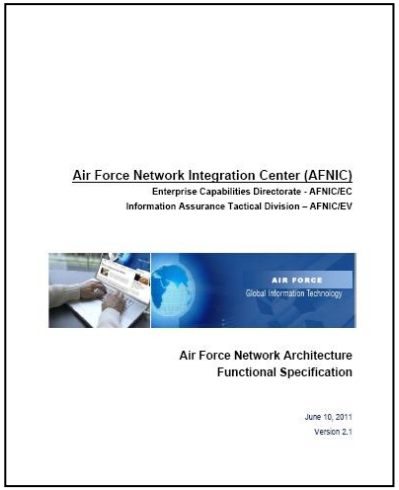
Infrastructure Transport System



Fixed Base Infrastructure

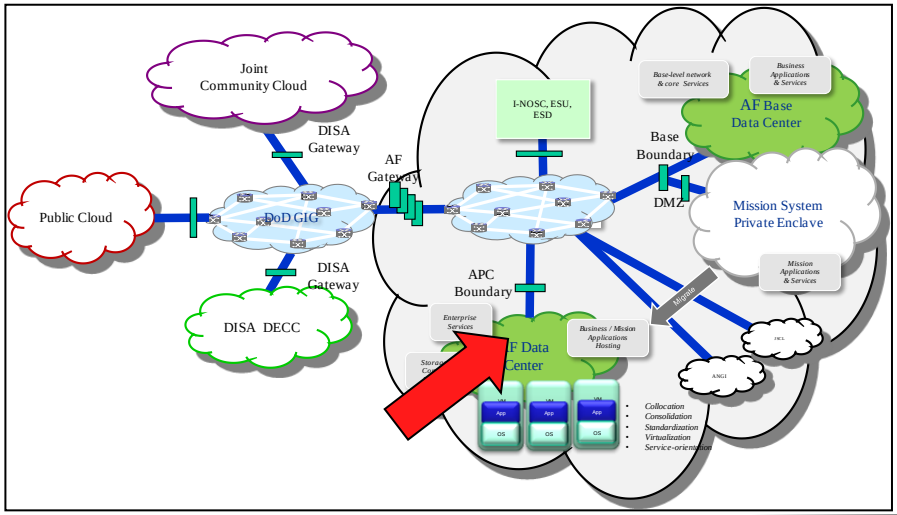
- Includes system views, physical nodes (locations), and interfaces for fixed base terrestrial environment
- Contains “design patterns” and Usage Notes
- Design patterns associated with Life Cycle categories:
  - Emerging
  - Mainstream
  - Containment
  - Sustainment
  - Retirement



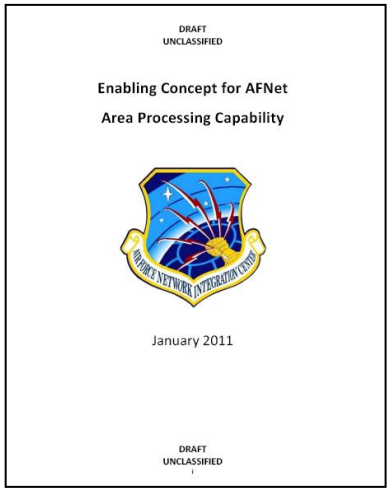


Base Network Function Specification 2011

AF Area Processing Centers



- Establish standard systems, configurations & procedures
- Reduce Total Cost of Ownership for hardware, software and operations
- Increase overall IT security posture
- Support AF-unique requirements


DRAFT
UNCLASSIFIED

Enabling Concept for AFNet

Area Processing Capability

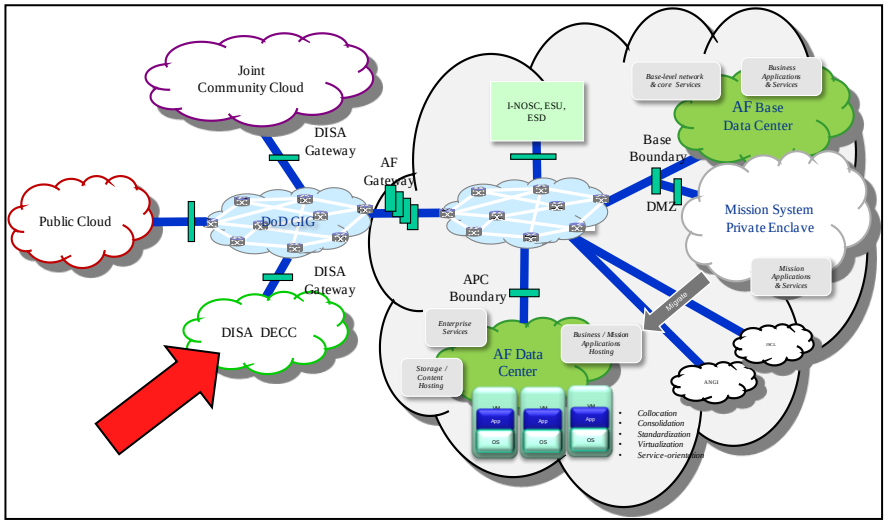
January 2011

DRAFT
UNCLASSIFIED

APC Architecture Approved by AIPT

- Supports Federal Data Center Consolidation requirements

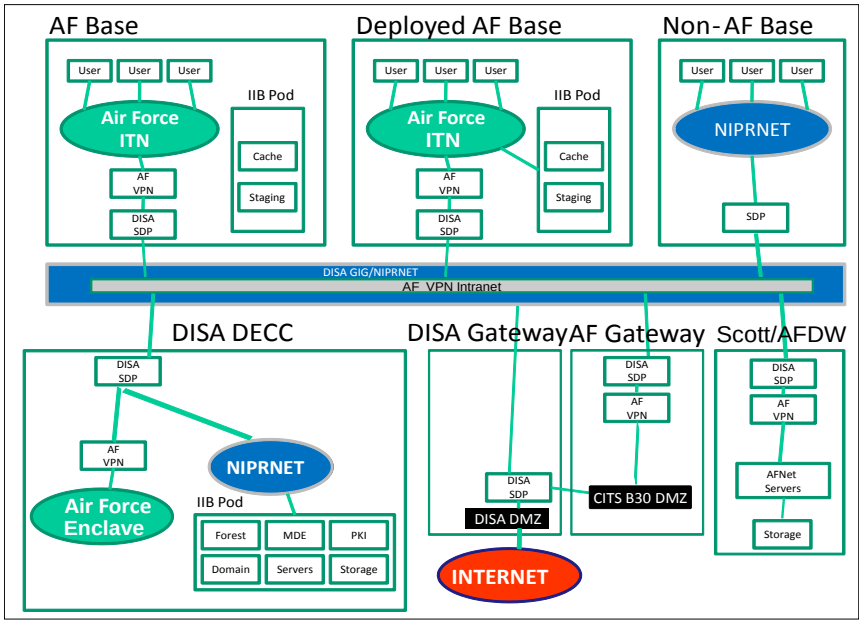
Non-AF Application Hosting



'DISA first' for data center consolidation, says Army and Air Force

The Defense Information Systems Agency will be the provider of first choice for Air Force, Army and Defense Logistics Agency data centers, says a Nov. 6 consolidation plan from the DoD chief information officer.

The report, posted online before Thanksgiving, says the two services and the DLA have instituted policy to consider DISA enterprise computing centers before pursuing other options in their quest to reduce the total number of data centers within the Defense Department. DISA operates 14 DECCs, one of which recently suffered a hardware failure, causing the DISA website to go offline for about 6 days and affecting other services, too.



UNCLASSIFIED

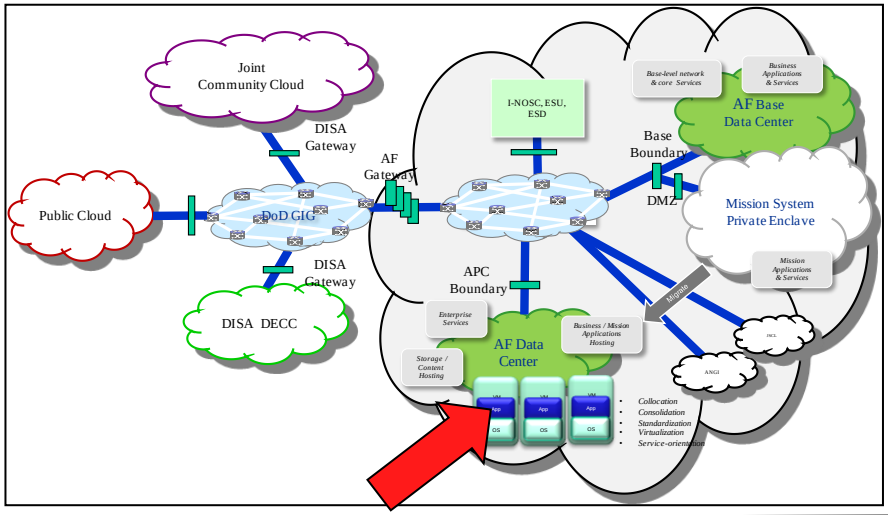
AF - DISA
Core Enterprise Services Enclave
Joint Program Management Office
Concept of Operations

Version 0.1
30 Mar 09

UNCLASSIFIED

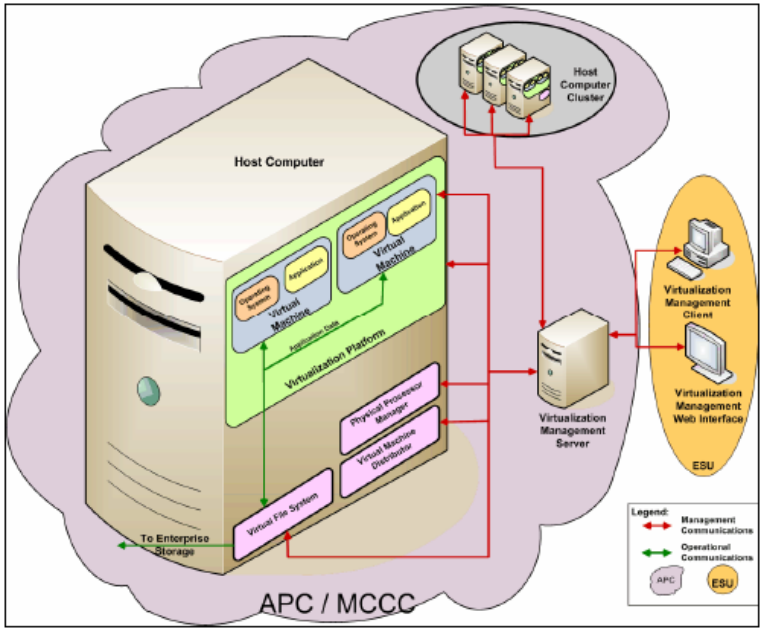
DECC Architecture and SLA completed in 2009

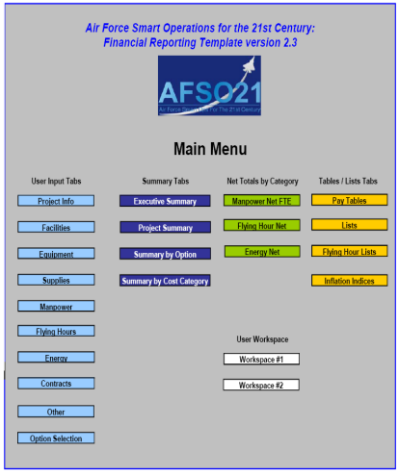
Virtualization



Server Virtualization Profile

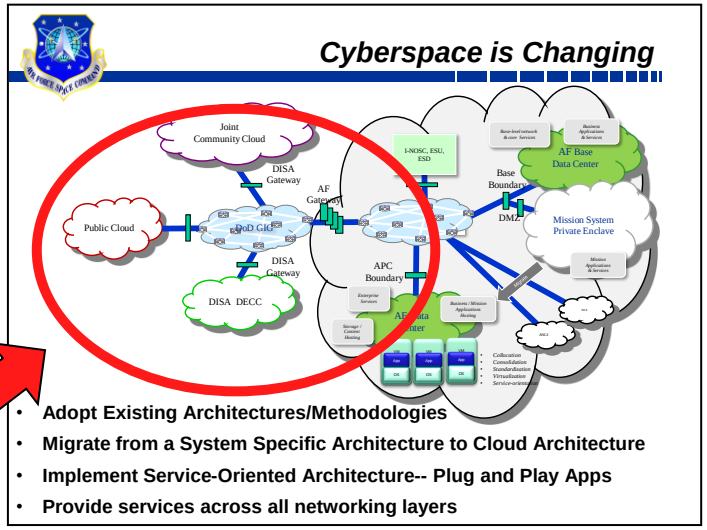
- Identifies how server virtualization is to be applied to Air Force enterprise
- Identifies mandatory guidance and helpful information
- Cost savings via hardware reductions
- Manpower efficiencies
- Reduced physical “footprint,” power & HVAC requirements



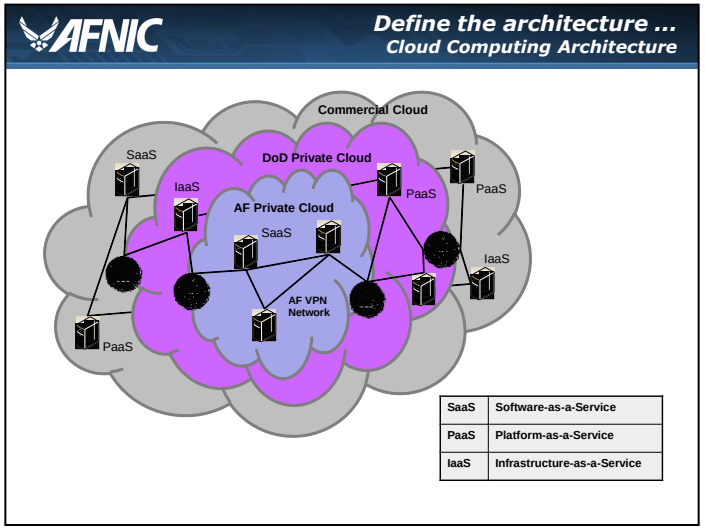


Virtualization Profile and BCA will standardize implementation across the AF

Migrate to a Cloud Computing Architecture

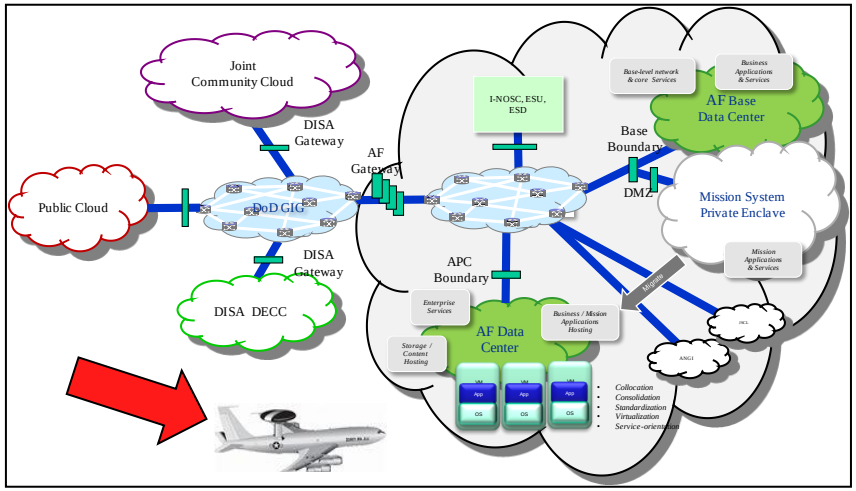


- **DoD and AF are migrating to Cloud Computing**
  - **Key attributes**
    - **Dynamic Resource Provisioning**
    - **Virtualization**
- **Hybrid Cloud**
  - **Composition of two or more clouds**



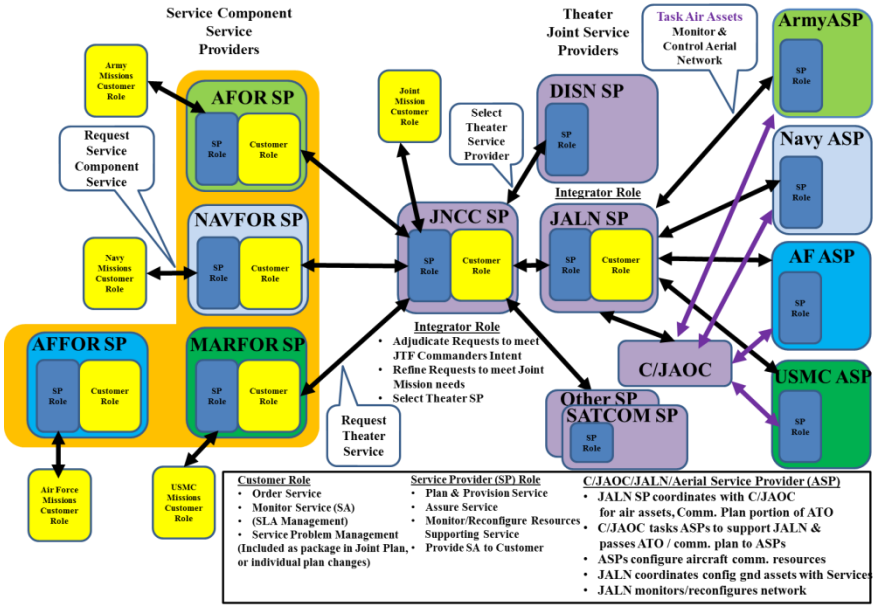
- **13 DoDAF Products in SME coord**

Airborne Network Segment Architecture



Progress/Recent Accomplishments

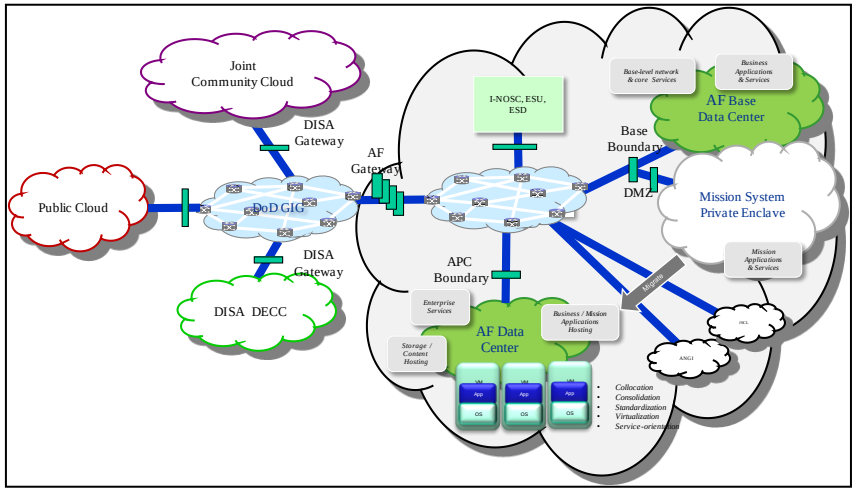
- ConstellationNet 2005 included AN portion
- Draft SV-1 & SV-2 updated w/ JALN results
  - Identified NetOps & Security Policy Enforcement Points
- Draft AV-1 and OV-2 complete
- Draft OV-3 IERs



Extending the IP network to the aerial layer

Capability: Successfully achieving desired operational effects

AFNet 20XX Way Ahead



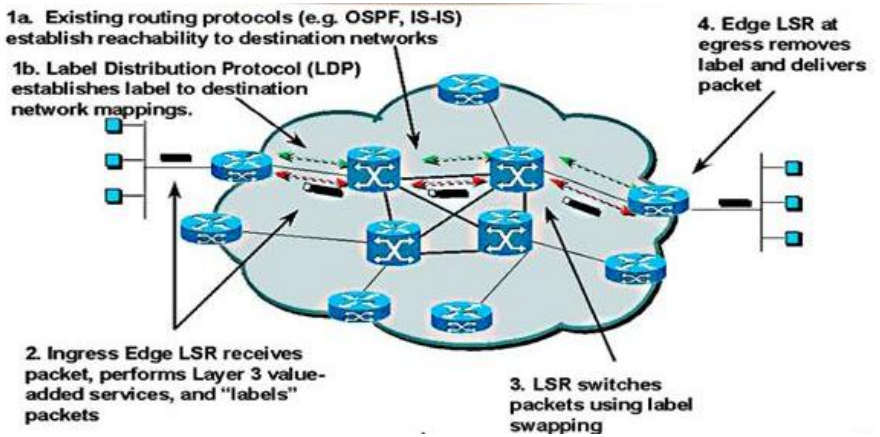
Near Term Efforts

- SIPRNet Modernization
- Base Boundary Redesign
- AF ISR Information Architecture
- Joint Information Environment
- Commercial Mobile Technology
- Web Services Management
- End-to-End Quality-of-Service
- Mission Systems Integration

- Commercial Mobile Technology

- Web Services Management

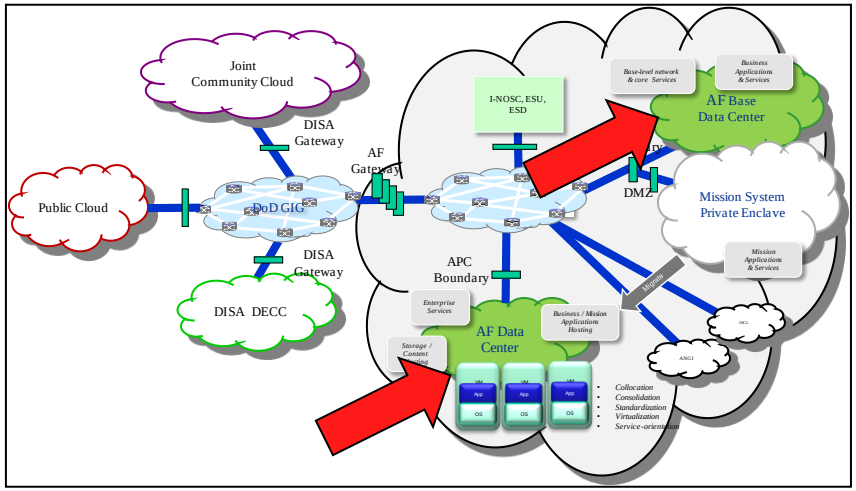
Quality of Service



- End-to-End Quality-of-Service

Capability: Successfully achieving desired operational effects

AFNet Migration

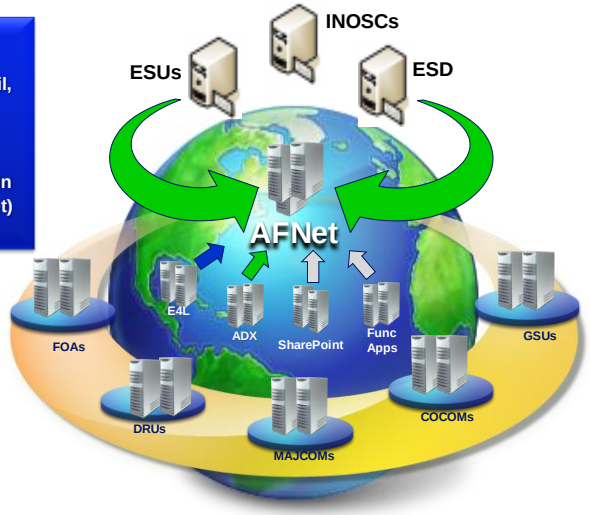


Focus Areas

- **Consolidate existing stand-alone MAJCOM/Field Operating Agency/Direct Reporting Unit/ Geographically Separated Unit network, e-mail, and directory service environments into a single, centrally managed Active Directory (AD) structure within the Air Force Network (AFNet)**

Purpose/Goal

Consolidating the existing "stand-alone" network, e-mail, and directory service environments into a single, centrally managed Active Directory (AD) structure within the Air Force Network (AFNet)



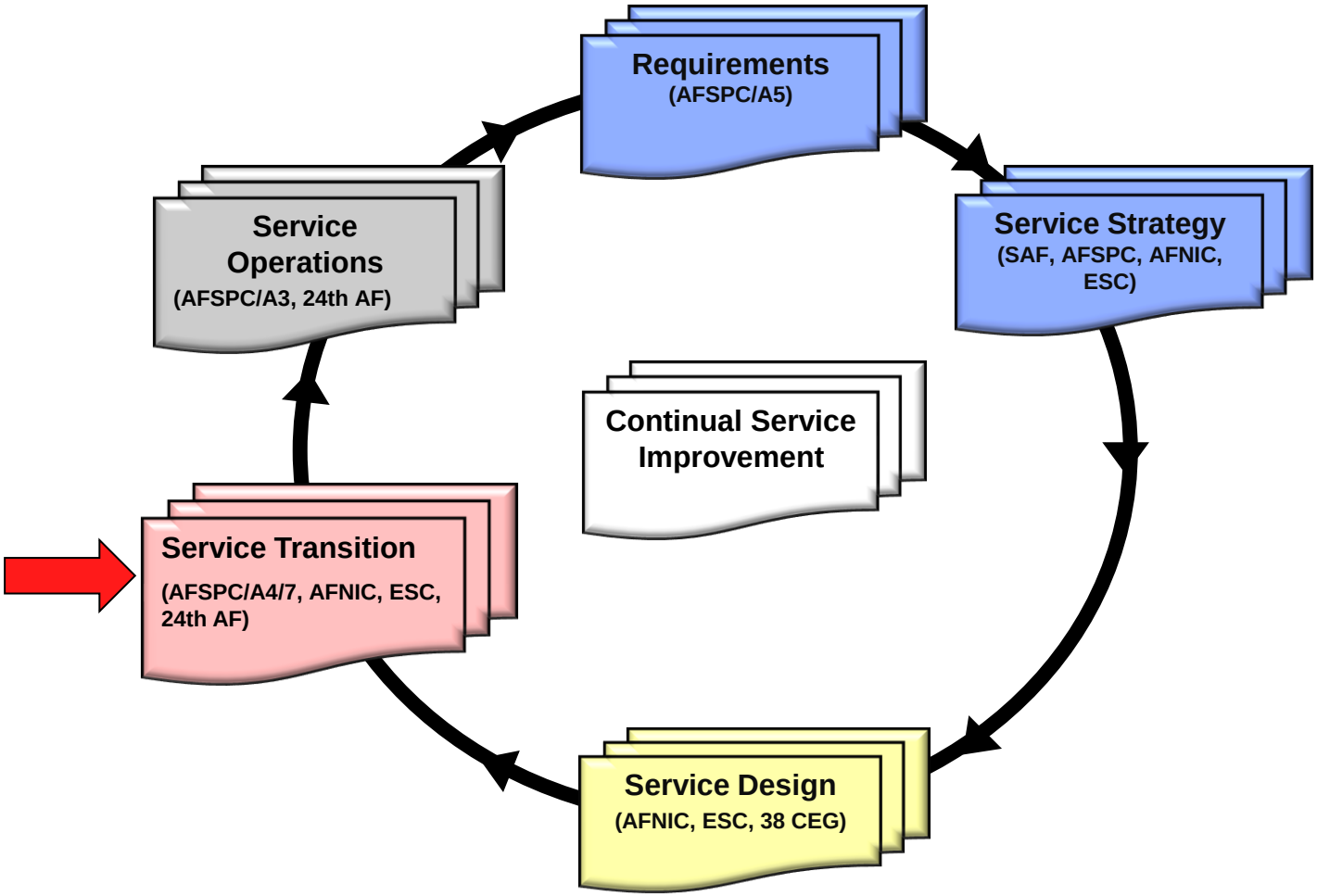
Benefits
- ✓Improved Security
- ✓Reduced Cost
- ✓Consolidation
- ✓Standardization

Standards = Success

Future Focus

- **Focused migration activities for Sep 2013 completion**
- **Ensure all acquisitions/Area Processing Center build-outs/upgrades remain on target**
- **Implement migration of SIPR via program of record beginning in FY14**
- **AD Service Utilization Profile**

Define the Architectures and Standard Teaming Opportunities



Objectives

- Reduce Complexity
- Standardize Processes
- Normalize Tools
- Standardized Configurations

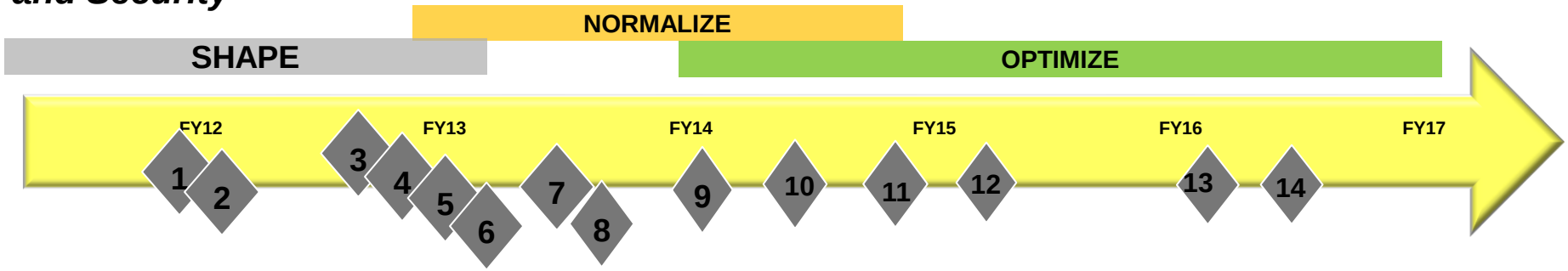
Benefits

- Strategic Alignment
- Unity of Effort
- Reduced TCO
- Operational Efficiencies

JIE AF Network POA&M

CONNECT

Network Normalization and Security

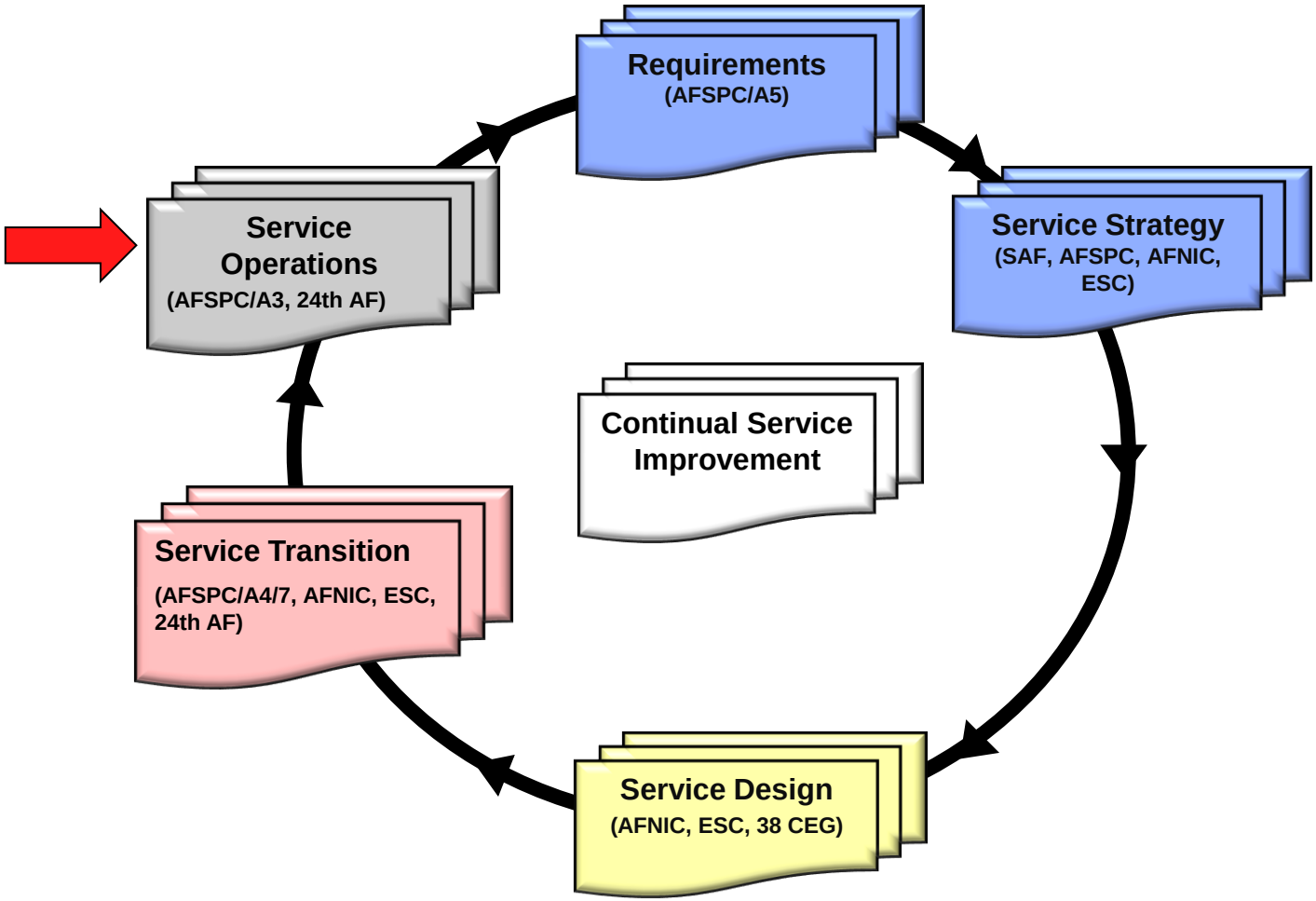


1) Identify Aggregation Points and security design (Note A)
2) Designate AF Gateways as APs in close proximity to Proof of Concept site – Europe (Note B)
3) Security Standards Defined & Established
4) Transition/Install JIE Security Boundary on APs
5) Europe Test Cases; core services, security, and transport (Note C)
6) ADX complete (current schedule), enabler for enterprise email – maintain AF AD until replaced by Joint (Note C)
7) Retire/reuse European excess boundary equipment replaced by JIE (Note E)
8) Stand up W-P Core Data Center, AP and secondary AP
9) Start collapsing AF Gateways in Pacific to APs
10) Retire/reuse Pacific Gateway equip (Note E)
11) Collapse 10 AF CONUS Gateways, not to exceed eight (8) AF Managed Core APs (Notes D and E)
12) Activate AF-managed Core Data Centers (Note D)
13) Decommission APCs – no Service owned data centers
14) Sustain

Notes:

A. Aggregation Points can be DISA or Service owned/operated to Joint standards, 2 AP per region
B. AF Gateways are standard boundaries collocated with DISN Core/Mega Sites
C. JIE (Europe) proof of concept complete before transitioning operational enterprise services
D. Proposed AF DCs for Core consideration: Andrews AFB, Scott AFB, Wright-Patterson AFB, Peterson AFB, McConnell AFB; additional consideration, AF Sponsored COCOM sites (Offutt, MacDill)
E. Realign/reuse excess Gateways for SIPR

Define the Architectures and Standard Teaming Opportunities



Objectives

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Benefits

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Operational Activity Models & Mission Threads

- **Describes the operations that are normally conducted in the course of achieving a mission**
- **Provides foundation for depicting activity sequencing and timing**

AFNet Architecture Development Status

Task

- Develop DoDAF-compliant Architectures for:
  - JCIDS requirements
  - Integrated Support Plans
  - DIACAP Certification and Accreditation
  - Build to Architectures
  - Service Utilization Profiles
  - Architecture Integration Reviews
  - Certificate of Networthiness

Status

- AFNet 2012 Arch approved & released -- 9/09
- 624 OC Architecture
  - Draft Ops Models complete
  - STRATCOM placed "on hold"
- AFNet 2014 Arch
  - Draft products in SME coord
  - Aligned to Target Baseline, DoD IEA 2.0 and Service Core Functions
- Cloud Computing Architecture
  - Draft products in SME coord
- Airborne Networking/NetMgt Architecture
  - Under construction

Issues/Concerns

- Defined processes for Architecture use
- Identify architecture content gaps
- Contract status
- Multiple Users/processes/purposes for architectures
- Need for SME support/participation
- Architecture approval process

Way Ahead

- AFNet 2014 Architecture -- 6/30/12
- AF ALN NetMgt -- 6/30/12
- AF Cloud Computing Arch -- TBD
- AF ISR Info Arch – TBD
- AF Mission Area Architectures – TBD
- Service Utilization Profiles – TBD
- Build to Architectures – TBD
- Architecture Reviews/Integration - Ongoing

Architecture…The AFNIC Advantage

Questions?