



Defense Information Systems Agency

A Combat Support Agency

# **Enterprise Computing and Cloud Initiatives: A Report Card**

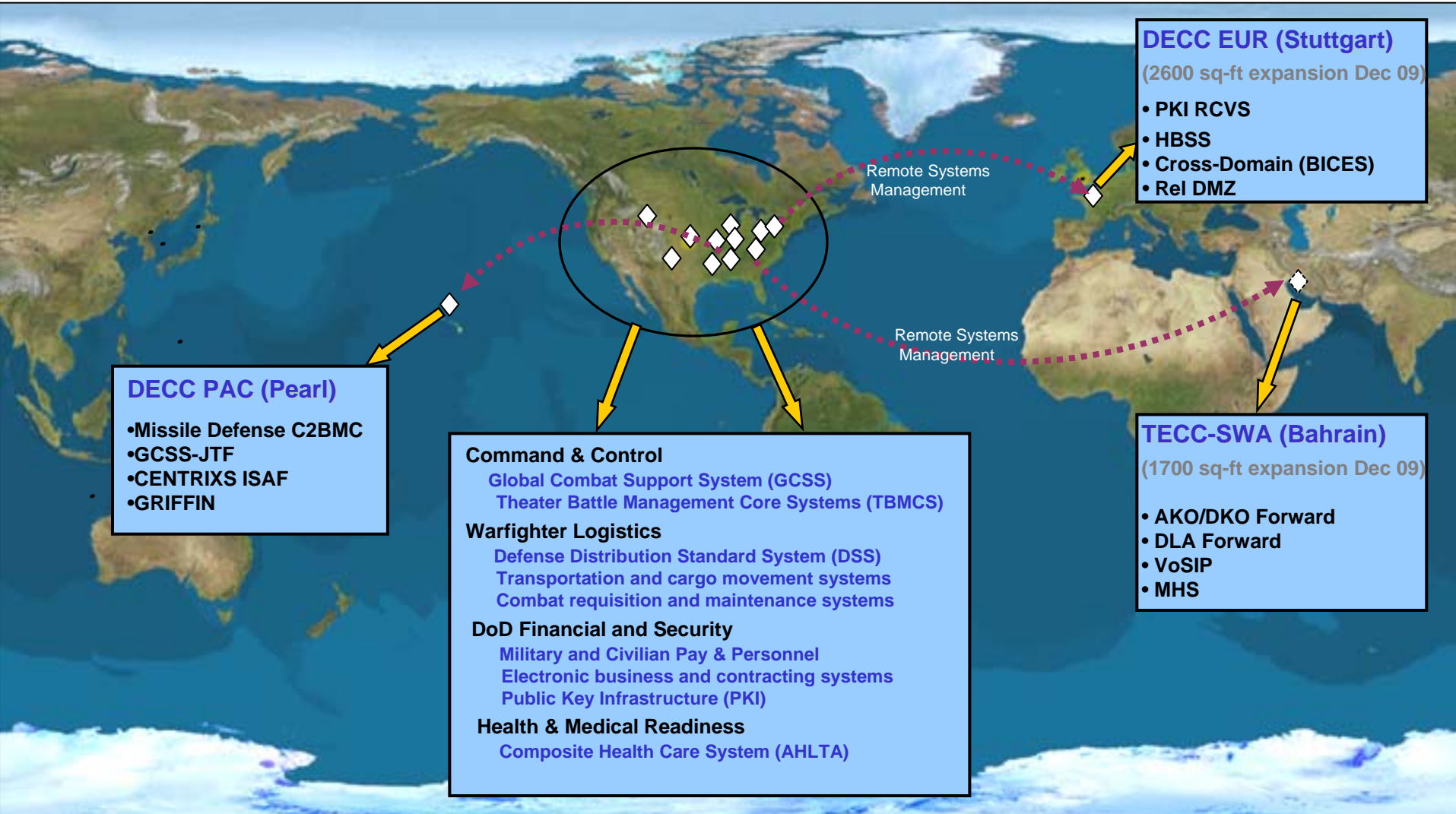
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**Alfred J. Rivera**  
**29 July 2010**  
**Director, Computing Services**  
**DISA**

# Agenda

- **Enterprise Computing in DISA**
  - **Operational, Business, Financial**
  - **Partnerships & Opportunities**
- **“The Cloud”**
  - **DISA’s Tenets**
  - **Progress to date**
  - **Service Models & Future Offerings**

# Enterprise Computing



**Defense Enterprise Computing Centers (DECCs)**

# Computing at the Edge: GIG Content Delivery (GCDS)



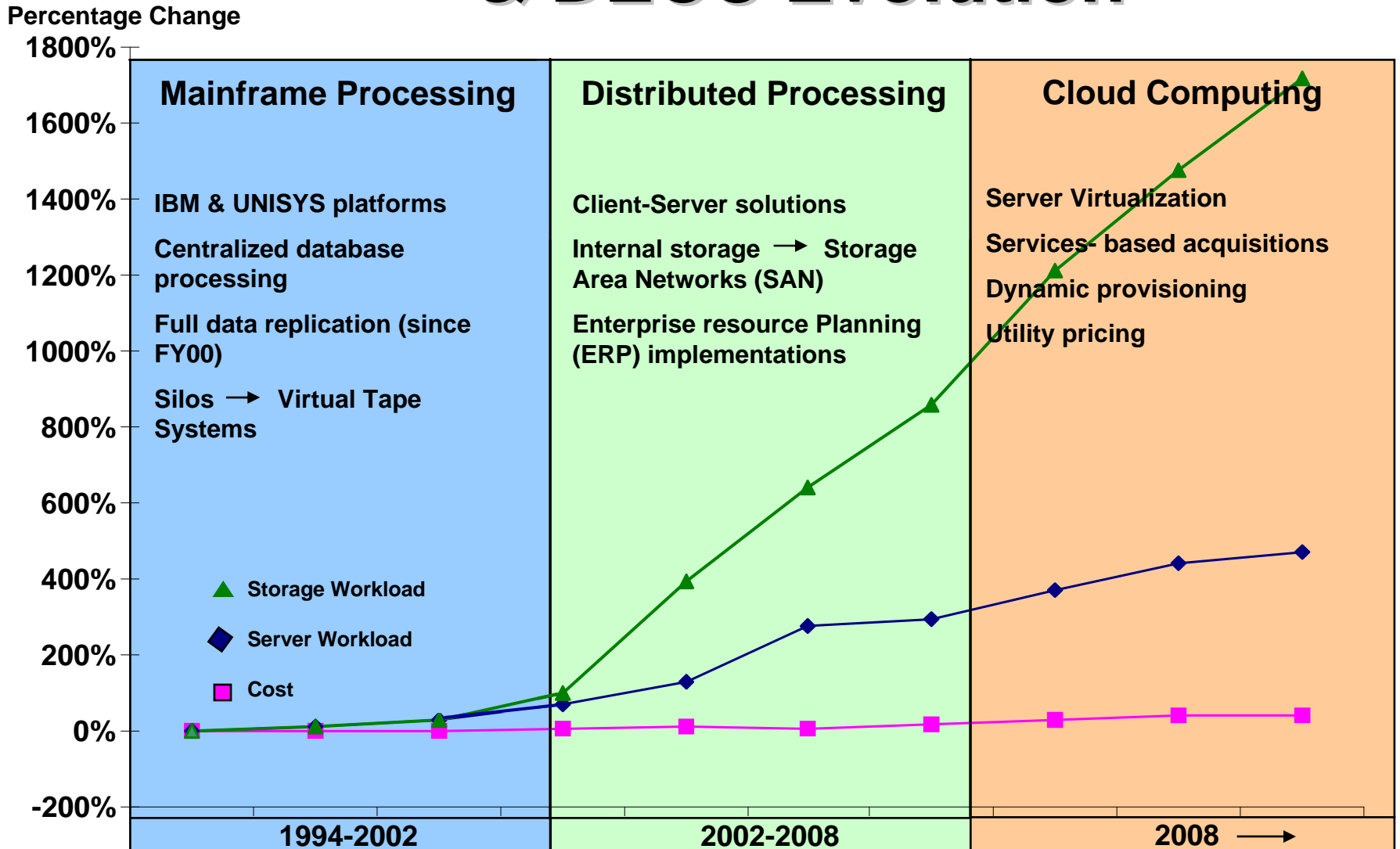
- **What: Distribute content and extend computing to the Edge**
  - 50 Regions/25 Cities
  - Deployed deep into SWA
  - SIPR (20 Nodes) and NIPR (24 Nodes)
- **Who (# Applications): Army (4), Navy (8), AF (4), USMC (2), DoD (28)**

- **Impact:**
  - Saving millions in IT expansion
  - End user performance gain as much as 30 times
  - Significant bandwidth off-load
    - 2X to 30X Performances Improvements
    - 85.7% DISN Bandwidth Offload (avg.)



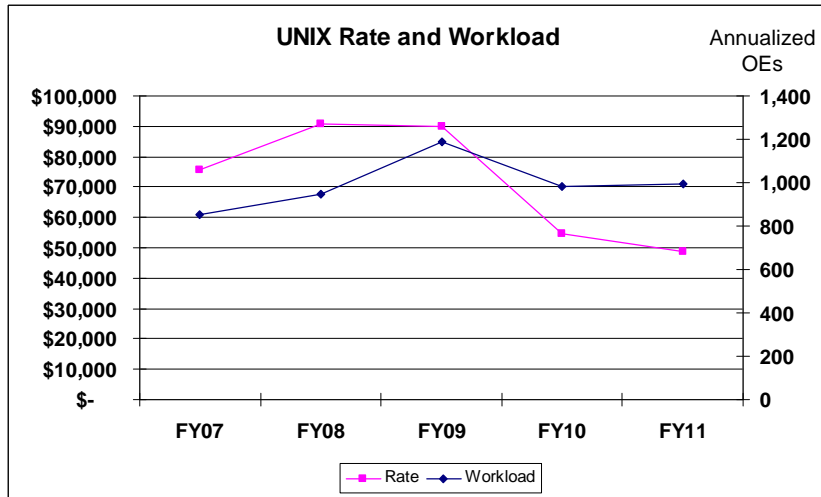
**Extending Computing Power to the Edge**

# Computing Technology & DECC Evolution

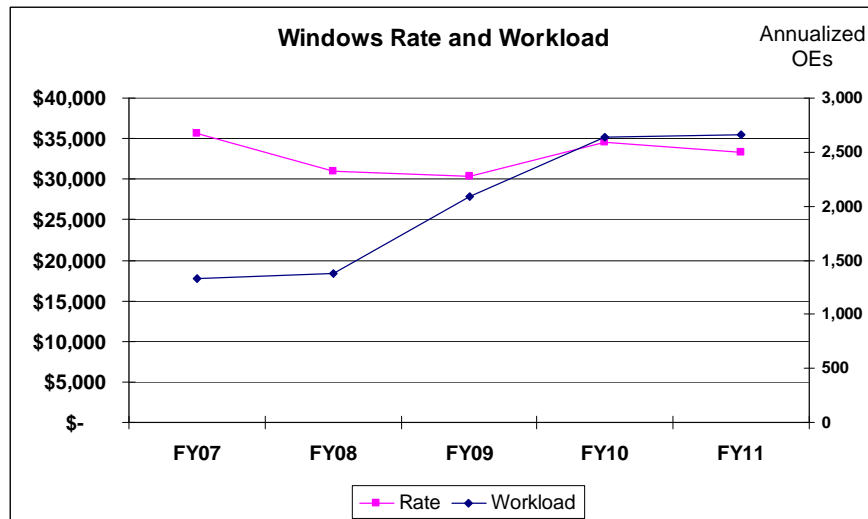
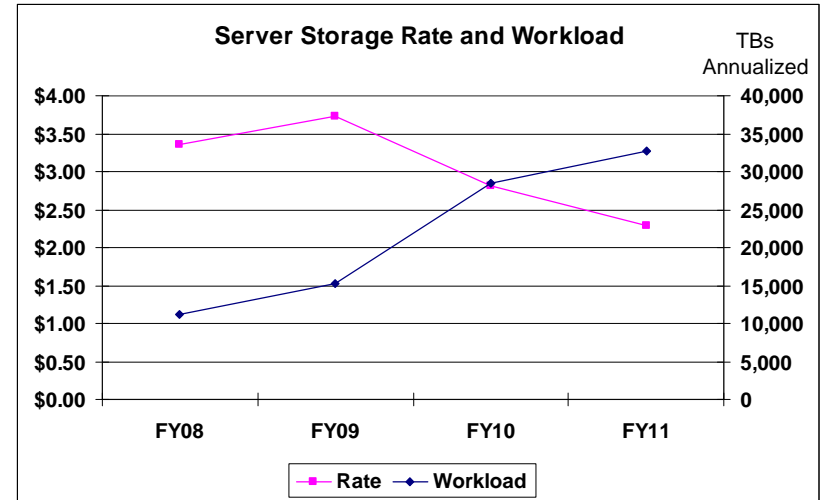


**Continuous DECC consolidations and transformations have yielded significant reductions in unit cost**

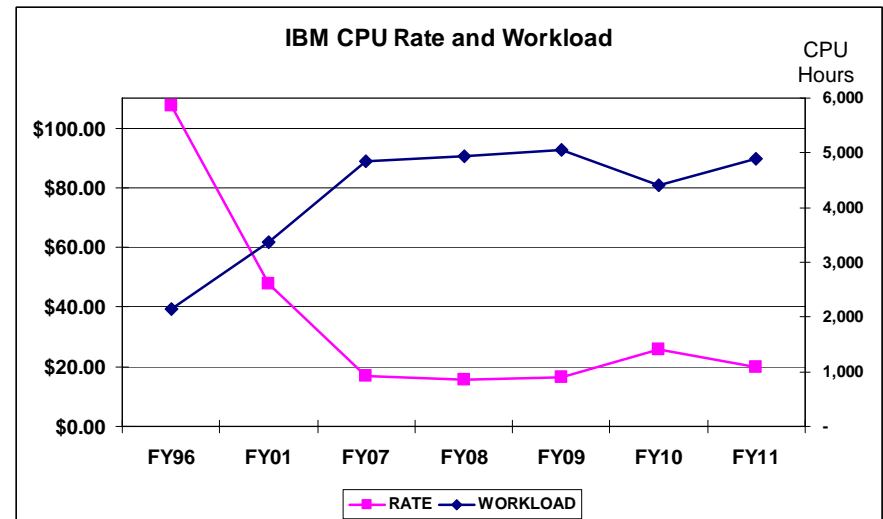
# Server & Storage Rates



Includes basic & hardware services – small OE



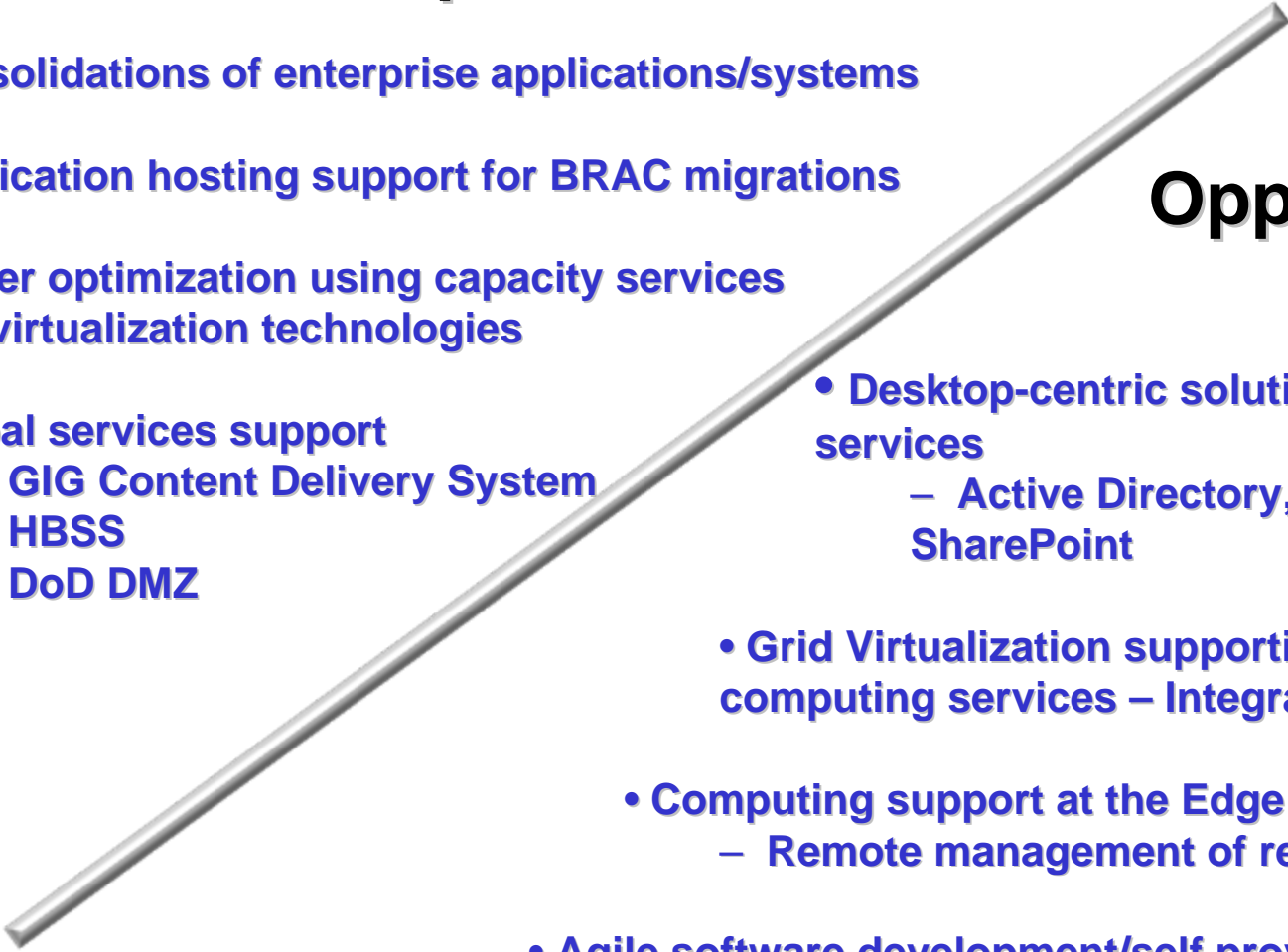
Includes basic & hardware services – small OE



# Enterprise Computing

## Partnerships

## Opportunities

- 
- Consolidations of enterprise applications/systems
  - Application hosting support for BRAC migrations
  - Server optimization using capacity services and virtualization technologies
  - Global services support
    - GIG Content Delivery System
    - HBSS
    - DoD DMZ
  - Desktop-centric solutions for common services
    - Active Directory, Exchange, SharePoint
  - Grid Virtualization supporting dynamic computing services – Integrated Orchestration
  - Computing support at the Edge
    - Remote management of regional nodes
  - Agile software development/self provisioning support

# “The Cloud”

A model for enabling convenient, on-demand network access to a shared pool of configurable computing resources (e.g., networks, servers, storage, applications, and services) that can be rapidly provisioned and released with minimal management effort or service provider interaction. (NIST)

## Characteristics

Rapid  
Elasticity

On Demand  
Self-Service

Broad Access

Resource  
Pooling

Measured  
Service

## What's new?

Acquisition Model:  
Based on purchasing  
of services

Technical Model:  
Scalable, elastic,  
dynamic, multi-  
tenant, & sharable

Access Model: Over  
the network to ANY  
device

Business Model:  
Based on pay for  
use

# Computing As A Service



# Acquisition Model: Capacity Services

## Innovative Services Contracts

- **Vendors provide capacity to CSD:**
  - Acquire processing, storage and communications capacity as a service
  - Pay much like a homeowner pays for utilities, e.g., by megawatt-hours, BTUs, call-minutes, CPU-hours consumed
  - Install
  - De-install
  - Maintenance (both HW and SW)
- **Benefits**
  - Reduces time to add capacity
  - Reduces overhead
  - Simplifies our cost drivers
  - Streamlines operating system management
  - Facilitates technological currency
- **Capacity is managed by CSD personnel**

## Orders to date

- **Processor**
  - 1251 Total Orders Completed
  - 82% of IBM Mainframe MIPS replaced
  - Average delivery timeline of 10 days
    - 12 days for mainframe
    - 15 days for server
    - 125 orders took less than 5 days
    - 443 orders took between 5-14 days
    - 247 orders took more than 14 days
    - 2 hour provisioning where capacity available
- **Storage**
  - 502 Total Orders Completed
  - 36 Disk capacity assets installed
  - 4544 Storage networking fibre ports
  - Average delivery timeline of 14 Days
    - 7 Days for Disk
    - 11 Days for Network Ports

**Speed, Agility, Utility Pricing, Reduced Overhead  
& Technology Currency**

# Technical Model: Standard Architecture - Server

- **Windows / Linux**

- HP BL460c / BL490c blade, c7000 enclosure, CISCO 3020 switches
  - Mini: < 1 socket & 4 GB memory
  - Small:  $\geq 1 \leq 2$  sockets & 8 GB memory
  - Large:  $> 2 \leq 4$  sockets & 16 GB memory
  - Enterprise:  $> 4$  sockets & 32 GB memory

- **Unix**

- Sun – T5220; M5000
- HP – BL860c; RX3600; RX8620
  - Mini: < 1 socket & 4 GB memory
  - Small:  $\geq 1 \leq 2$  sockets & 8 GB memory
  - Medium:  $> 2 \leq 4$  sockets & 16 GB memory
  - Large:  $> 4 \leq 8$  sockets & 32 GB memory
  - Enterprise:  $> 8 < 21$  sockets & 64 GB memory

- **Virtualization - Drive virtualization as much as possible**

- VMware on x86 ( $\approx 10$  VOs per host)
- Logical domains (LDOM) on shared Solaris environment
- Virtual Server Environment (VSE) on shared HP-UX environment

**Standards = Economies**

# Technical Model: Virtualization

- **Basic concept**

- First implemented more than 30 years ago by IBM as a way to logically partition mainframe computers into separate virtual machines
  - Speed and capacity of processors, memory, network and storage have outpaced the needs of most applications
- 

Current virtual environments:

- 1012 VOEs
- 147 Hosts
- 4 Racks
- 253 Windows Licenses
- 160 Network Cables
- 20 SAN Cables

If these weren't virtualized:

- 1012 Blade/Servers
- 22 Racks
- 1012 Windows Licenses
- 1024 Network Cables
- 128 SAN Cables

**41% virtualized using capacity services**



**1 October 2008**

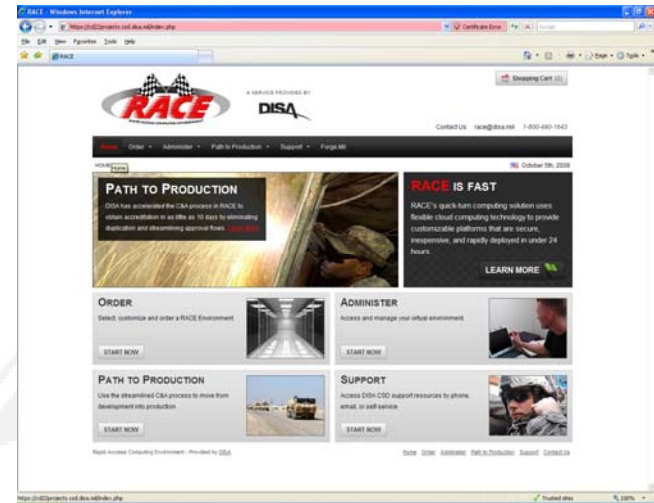
### Development/Test

- ◆◆ 24-hour automated provisioning
- ◆◆ Customer root access
- ◆◆ Ability to promote from Dev to Test
- ◆◆ Standard CSD Operating Environments (LAMP & Windows)
- ◆◆ Minimized and streamlined accreditation
- ◆◆ Increase capacity ~ 24 hours
- ◆◆ Month-to-month service
- ◆◆ Reduced cost

**Today**

### Production

- ◆◆ User self-service provisioning within the PRODUCTION environment
- ◆◆ Ability to promote from test to production
- ◆◆ Streamlined/Automated accreditation
- ◆◆ Pre-established inherited IA controls



### FY10 Initiatives

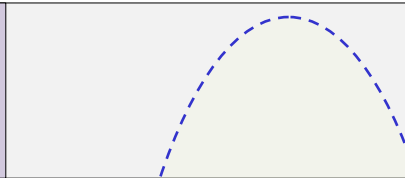
- ◆◆ SIPRNet deployment
- ◆◆ Complete integrate accreditation automation processes
- ◆◆ Continue to refine RACE Portal Interface with Forge.Mil Projects
- ◆◆ Complete integration with DISA standardized configuration management system (BladeLogic)

# DISA's Cloud Maturity

Cloud processing currently limited to x86 virtual OEs

## On Demand – Self Service

OD-SS Available only in RACE T&D currently. To be expanded to Race P2P. Current production OEs are not Self-Service and fulfillment is 24+ hours (not including application environment build)



State of the Art:  
7 Minute provisioning  
Fully automated, self service (manual via Web interface or auto via API) provisioning of OS, Storage and Network, in multiple geographically dispersed zones.

Capacity Services Plus

## Broad Network Access

Broad network access is constrained by DOD IA constructs that delay network access and compartmentalize 'zones' or DMZs. Self service T&D OEs have no broad access at all.



State of the Art:  
7 Minute provisioning  
Fully automated, self service (manual via Web interface or auto via API) provisioning of OS, Storage and Network, in multiple geographically dispersed zones.

Commercial Best Practice

## Resource Pooling

Undeveloped

**Processing:** Virtual OE resources are pooled at DECCs within the constraints of DOD IA policy  
**Storage:** HDP technology enables efficient storage pooling  
**Network:** Consolidated network infrastructures at DECCs provide network pooling

State of the Art:  
Processing, Storage and Network resources are arranged into massive and dynamic pools to support the Cloud offering. The pooled resources are available for either automatic (demand based) or manual self service allocation.

State of the Art

## Rapid Elasticity

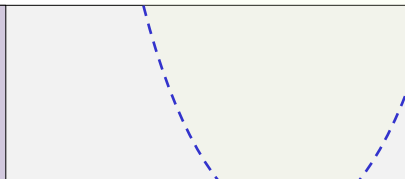
**Current OE Size:** Manual VMWare change on request  
**Current OE Qty:** Manual VMWare provisioning action on request  
**Planned OE Size:** VMWare DRC  
**Planned OE Qty:** RACE P2P



State of the Art:  
Primarily leverages ability to stamp out a large quantity of standard size OEs very quickly. Oes themselves not designed to dynamically change allocated size

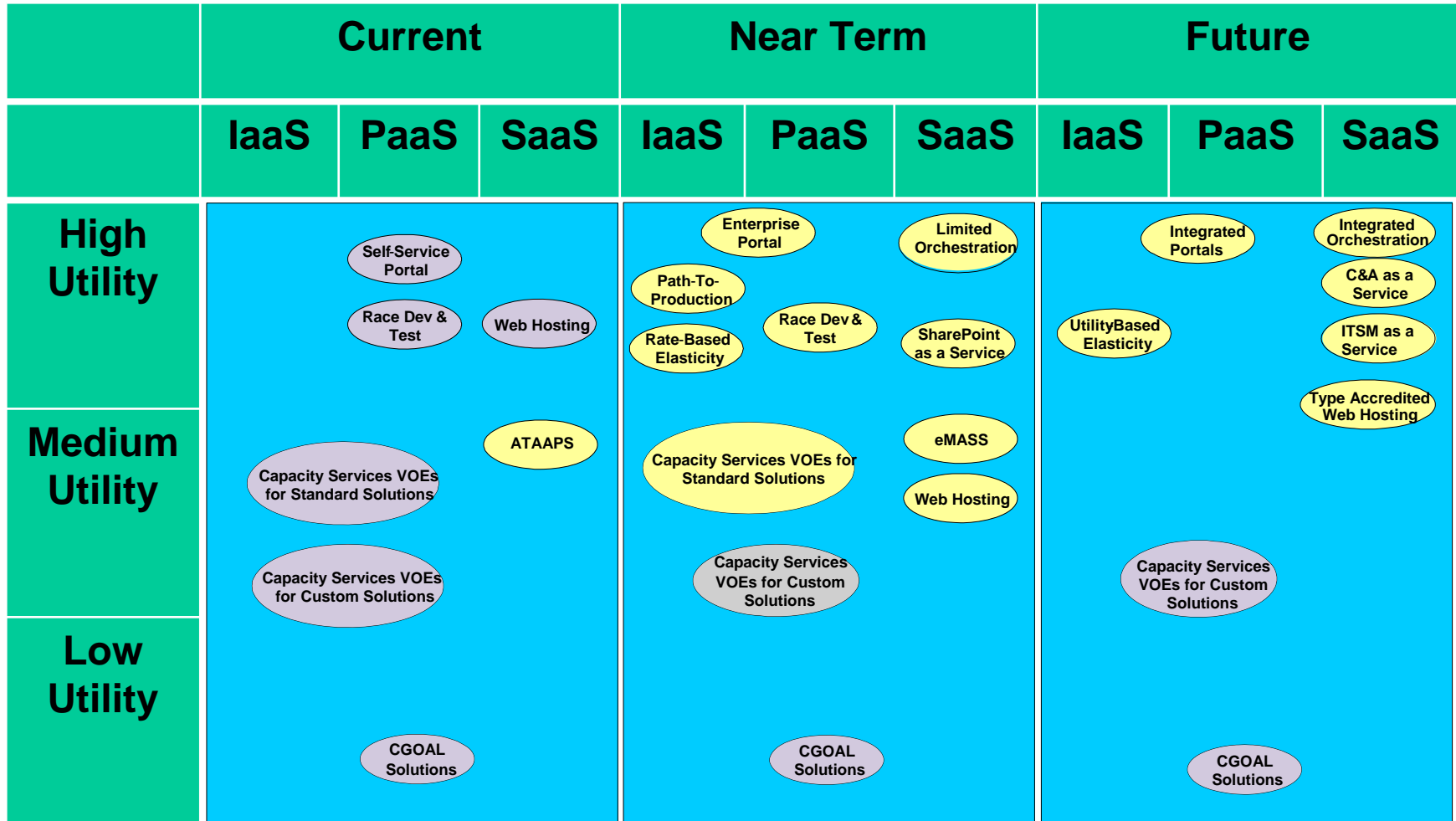
## Measured Service

Resource consumption measurement for billing purposes is manual, not tied to actual consumption. No online tools that enable real-time or near real-time monitoring of utilization by customer



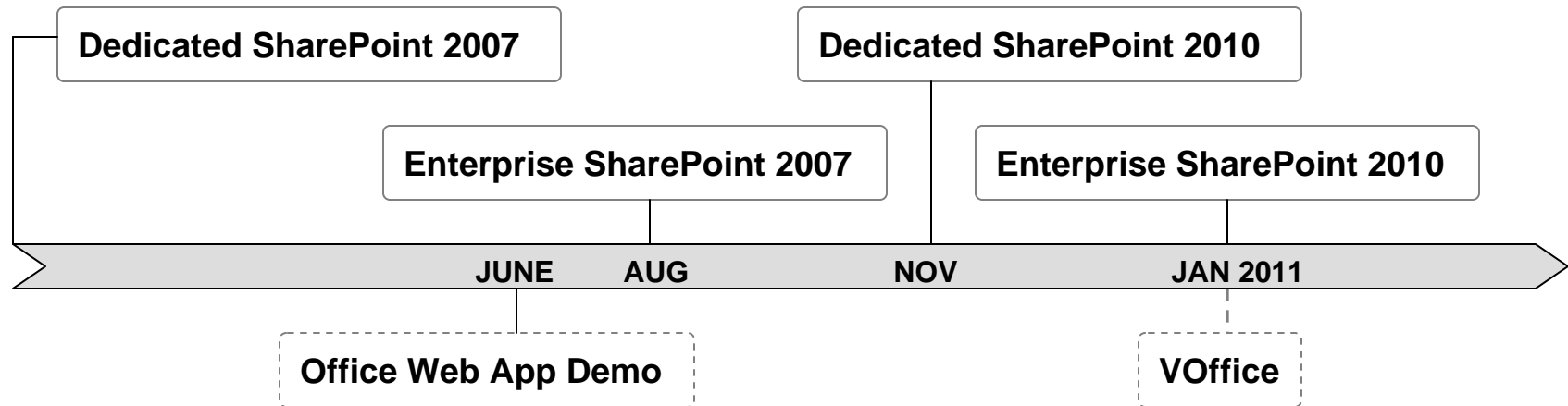
State of the Art:  
Use of OEs in Cloud is automatically billed by the hour. Customer has access to online tools that show real-time utilization of cloud resources and APIs that enable automatic expansion of processing resources to meet both anticipated and unanticipated demand

# Services Deployment Model Roadmap



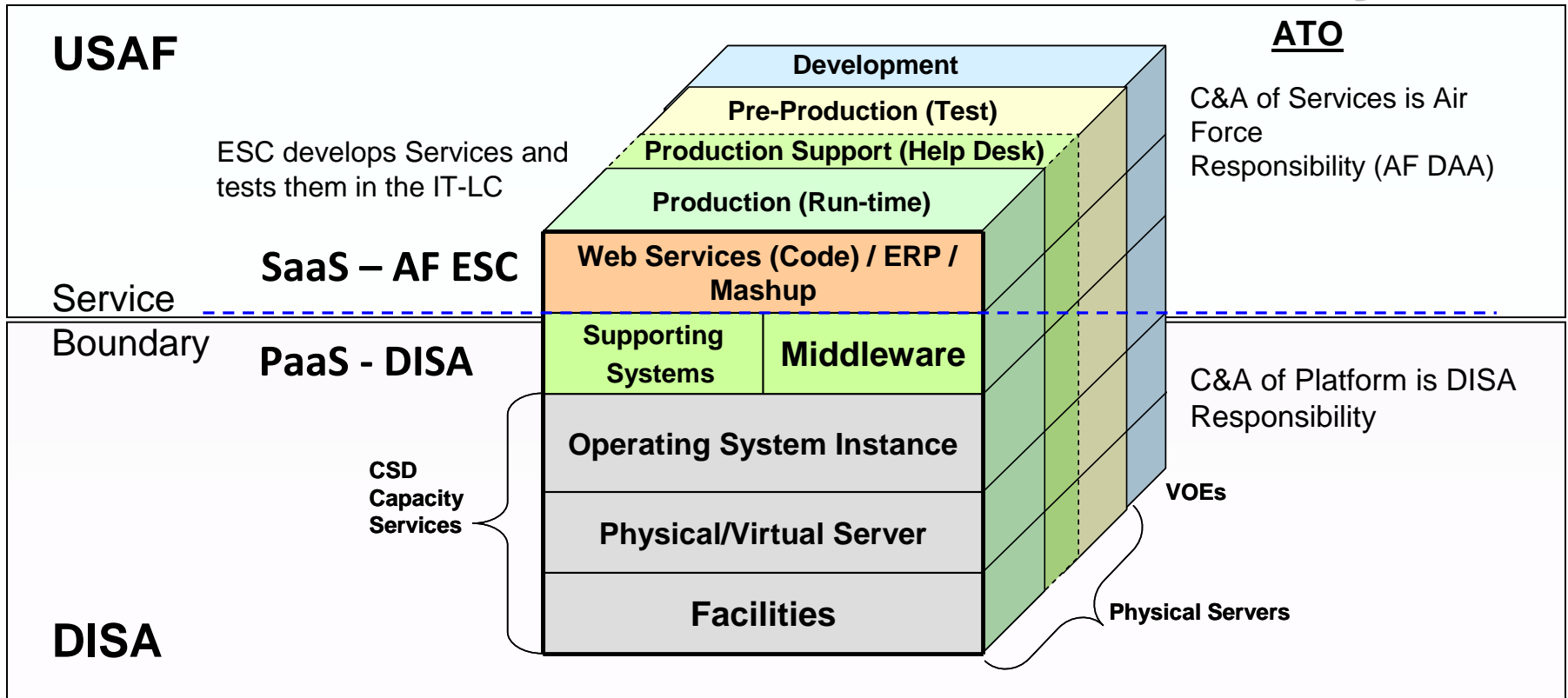
 Target Services

# Platform as a Service: DISA's SharePoint Initiatives



- **Dedicated SharePoint**
  - MOSS 2007 with upgrade path to SharePoint 2010
  - Cost for dedicated hardware
- **Enterprise SharePoint Services (ESPS)**
  - Available in Aug on MOSS 2007 – Shared Governance
  - Upgrade to multi-tenant SharePoint 2010
- **Office Web Applications (VOffice)**
  - Web versions of Word, PowerPoint, Excel, OneNote
  - Capability demonstration – DoD Visitor scenario
  - Optional service for ESPS

# Platform as a Service: A current case study



## PaaS Enterprise Middleware

- J2EE 1.6 and .NET 3.5 Windows Communications Foundation - runtime application programming interfaces for building service-oriented applications
- ERP Platform (SAP/Oracle)
- Data aggregation via Enterprise Mashup Markup Language (EMML) - JackBe

## Operating Model

- Customer brings code only ; DISA provides operating stack and all support services
- **Profound impact on IA accreditation model**

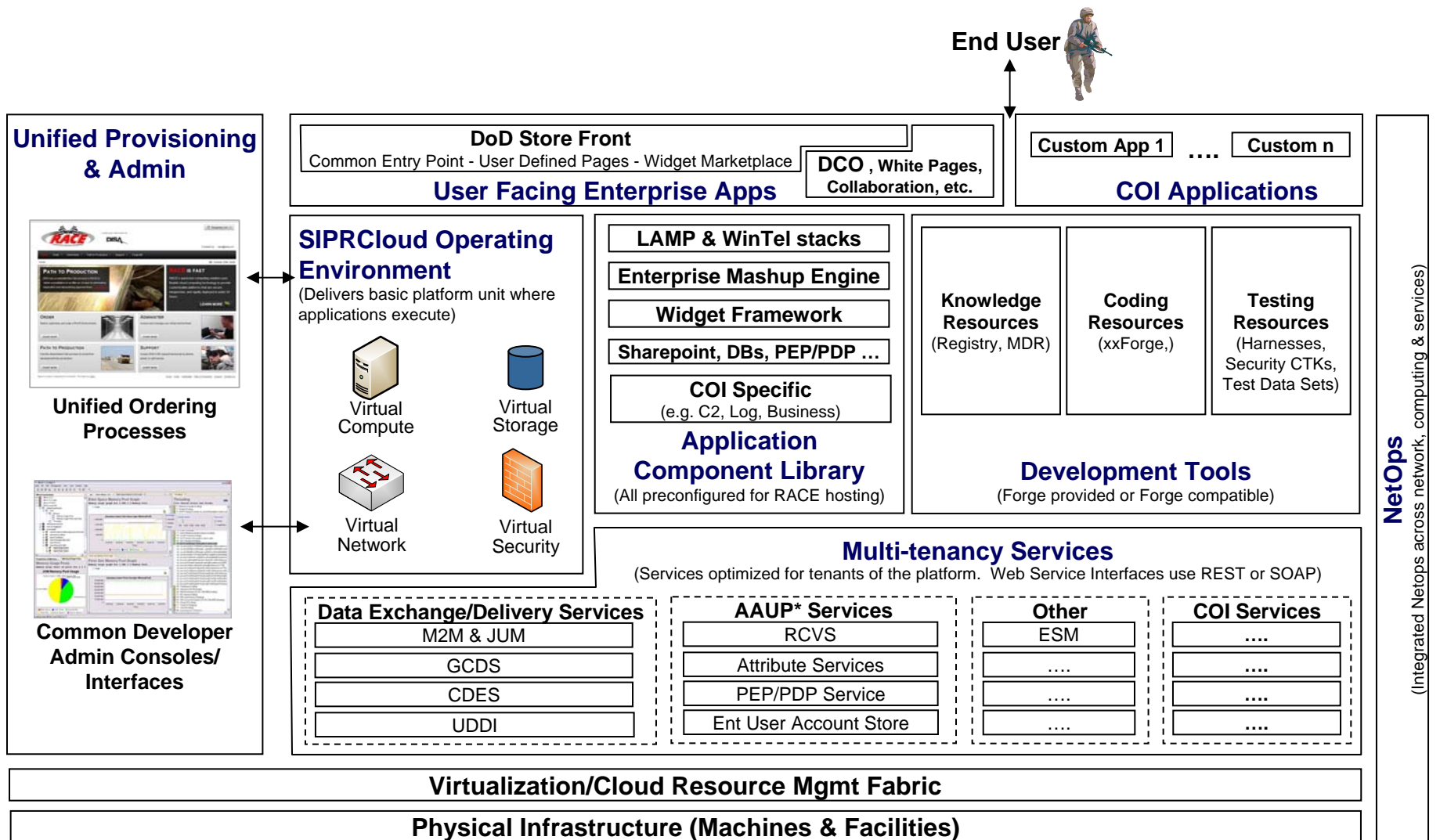


# Summary

- **Understand that it's a journey**
  - Recognize that the infrastructure fundamentals matter
  - Know the “marketplace” and warfighter needs
  - Agility in processes will continue to be refined
- **Close partnership with our customers is imperative**
  - Work together early to avoid misfires
  - Collective buy-in on computing direction
- **Brutal standardization**
  - Drives the economic savings



# Target Service Platform



# DISA Global Content Delivery (GCDS)

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## Globally Distributed Enterprise Computing Infrastructure

Saving Millions in IT Expansion Costs for DoD  
 50 Regions in 25 cities/12 Countries Deployed Deep in SWA  
 DISA's First Cloud Service

## Accelerating Collaborative Applications to Warfighters

2X to 30X Performances Improvements  
 85.7% DISN Bandwidth Offload (June)

## 46 Multi Service Enterprise Applications LIVE

Service & Mission Support Portals, Geospatial & eLearning Applications, Large File Downloads (Anti-virus, MS Patches, CRL)

## Adjusting Quickly to Changes in Network Conditions

Demonstrated availability in theater during Mideast cable cuts  
 GCDS Applications Remained Operational at all times

## Excellent Customer Feedback & Reputation

DISN CLOUD	ARMY	NAVY	AIR FORCE	MARINES	DoD	Pending	TOTAL
NIPRNET	2	8	3	0	10	5	28
SIPRNET	2	0	1	2	18	5	28
<b>TOTAL</b>	<b>4</b>	<b>8</b>	<b>4</b>	<b>2</b>	<b>28</b>	<b>10</b>	<b>56</b>



CONUS DEPLOYMENT	OCONUS DEPLOYMENT	SWA DEPLOYMENTS	GLOBAL DEPLOYMENT
UTAH NEBRASKA CALIFORNIA COLORADO TEXAS OKLAHOMA ALABAMA OHIO PENNSYLVANIA VIRGINIA (3) FLORIDA	ALASKA HAWAII GERMANY ITALY KOREA OKINAWA GUAM	IRAQ (2) KUWAIT AFGHANISTAN BAHRAIN QATAR UNITED ARAB EMIRITES DJIBOUTI	400+ SERVERS 28 DATACENTERS 58 WEB APPLICATIONS 1.7 Gbps of Network Capacity and Growing

● NIPRNET 
 ▲ SIPRNET 
 ■ NIPRNET / SIPRNET PENDING INSTALLATION

Customer	Total BW	BW from Origin	BW Offload Savings
NK0	160 GB	62 GB	61%
NEL (5)	450 GB	45 GB	96%
GDS CRL	7129 GB	5 GB	99.9%
GCSS-AF	150 GB	60 GB	60%
AKO	154 GB	7.6 GB	95%
ADLS	338 GB	30 GB	91%

Both NIPRnet & SIPRNet			
symantec.DoD Symantec	8.74 GB	2.48 GB	72%
McAfee DoD McAfee	2.9 GB	0.12 GB	96%

Customer	Total BW	BW from Origin	BW Offload Savings
CJTF (2)	40.85 GB	16.92 GB	59%
MNFI	956 MB	0.05 MB	99.98%
MARCENT (2)	24.56 GB	6.37 GB	74%
NGA (6)	12.1 GB	5.9 GB	51%
Intelink	238.5 GB	102 GB	57%
TEC	20.4 GB	13.2 GB	35%

# Extending Computing Power To The Edge

# Enabling the Cloud Environment

## Infrastructure

- Standardization
- Consolidation
- Capacity Services
- Virtualization
- Content Delivery
- Rapid Provisioning

## Services

- Software (SaaS)
- Applications
- Communications

## Processes

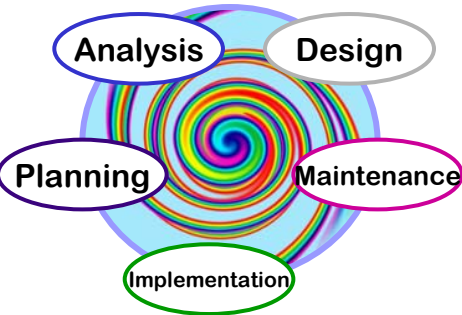
- Metrics & benchmarking
- ITIL
- Service Level Management (SLM)
- Security (Certification & Accreditation (C&A))



**It's A Journey**

# Applications-As-A-Service: Forge.mil (Software Development)

## Systems Development Life Cycle (SDLC)



- The logical process used to develop an information system
- Includes requirements validation, training, and user ownership
- Works like a library – Code checked out, worked on, & checked in



## DoD SDLC

- First standardized approach to an enormous problem
- Proven development model
- Based on the open source community's approach



## Forge.mil "Bits & Pieces"



- **Public:** Freely available to all DoD users
- **Shared:** All DoD users can access the same code development environment for DoD open source and community source software
- **Available:** Today



- Common evaluation criteria and an agile certification process to accelerate the certification of reusable, net-centric solutions
- **Available:** TBD

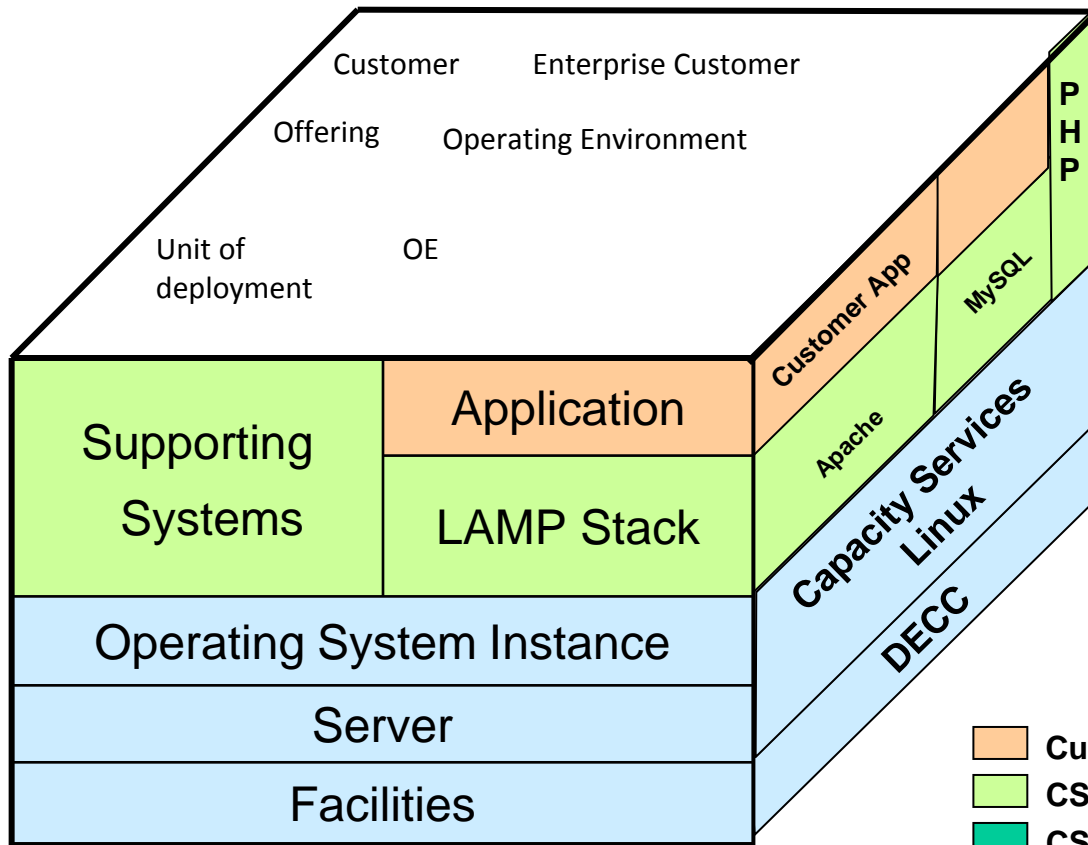


- **Private:** Allows a closed development environment for DoD projects and programs
- Fee-for-service
- **Availability:** Today

## DoD's Software Development Life Cycle

# OS Service

## Service Plane



## Product Plane

## Generic System Description Plane

- Customer support role under IaaS Framework
- CSD Proposed Services under IaaS framework
- CSD Current Services