Better Business with Cloud Computing

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What is "The Cloud" ?

According to National Institute of Standards and Technology (NIST), cloud computing is defined as – A model for enabling convenient, on-demand, metered 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.

- This cloud model promotes availability and is composed of various service models and deployment models.
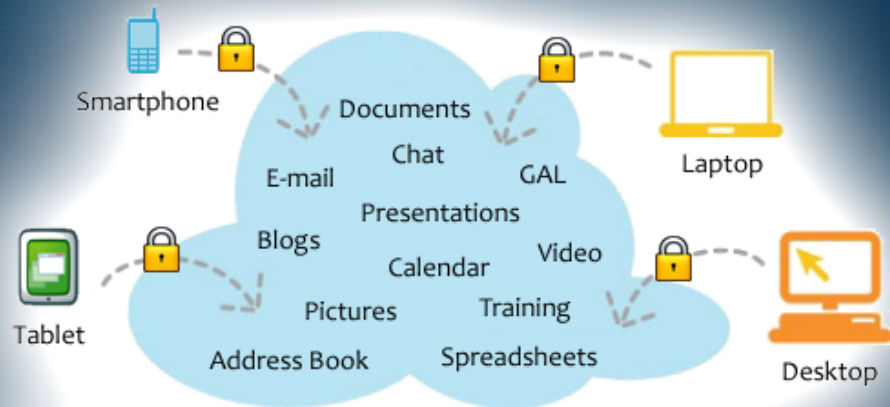
Cloud Computing
Having secure access to all your applications and data from any network device
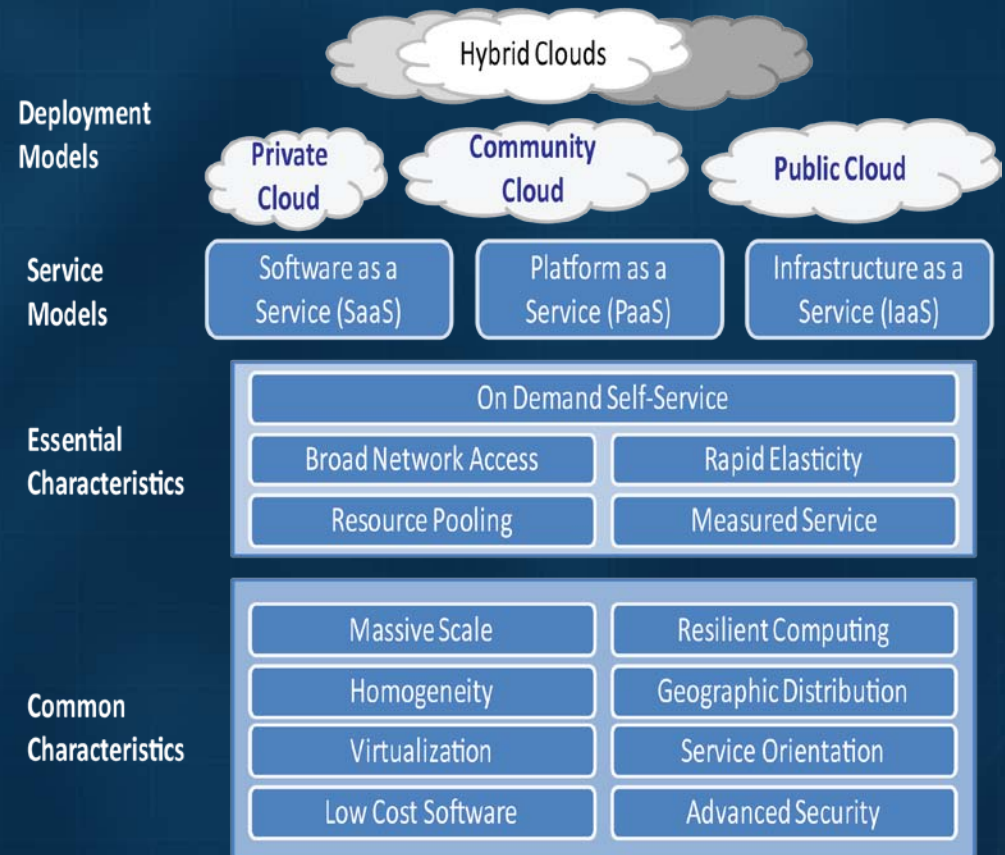
Cloud Concepts

Deployment Models

- Private Cloud
- Community Cloud
- Public Cloud
- Hybrid Cloud

Service Models

- Infrastructure as a Service
- Storage as a Service
- Platform as a Service
- Software as a Service
- "XaaS"
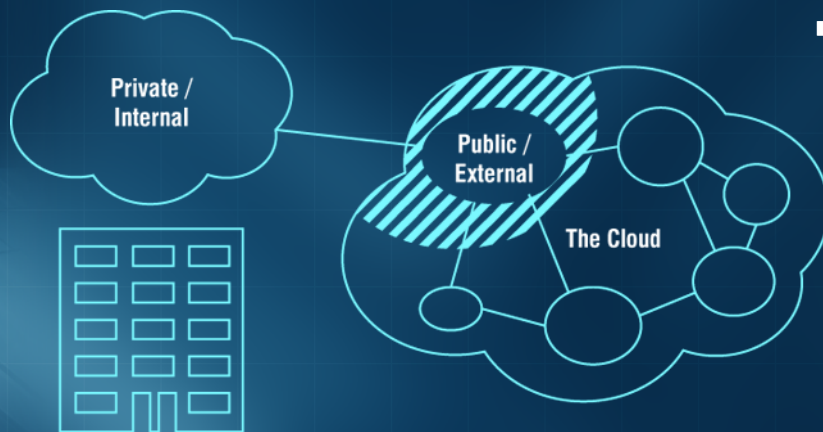
The NIST Cloud Definition Framework

Hybrid Clouds

Deployment Models
- Private Cloud
- Community Cloud
- Public Cloud

Service Models
- Software as a Service (SaaS)
- Platform as a Service (PaaS)
- Infrastructure as a Service (IaaS)

Essential Characteristics
- On Demand Self-Service
- Broad Network Access
- Rapid Elasticity
- Resource Pooling
- Measured Service

Common Characteristics
- Massive Scale
- Resilient Computing
- Homogeneity
- Geographic Distribution
- Virtualization
- Service Orientation
- Low Cost Software
- Advanced Security

Deployment Models – Types of Clouds

Private Cloud

Community Cloud

Public Cloud

Hybrid Cloud

Hybrid Cloud

- The cloud infrastructure is a composition of two or more clouds (private, community, or public) that remain unique entities but are bound together by standardized or proprietary technology that enables data and application portability.

- Example's DOE Hand Flash Federal Cloud (AHPAC) / Storage Agent, use cloud Microsoft Azure / Amazon Simple Storage Service (Amazon S3) for archived data but maintain in-house storage for operational customer data.

IaaS

PaaS

SaaS

SolaS
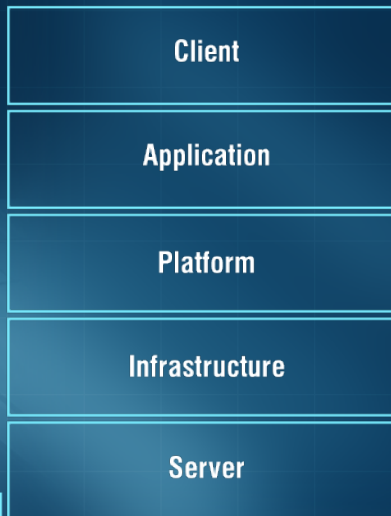
Client

Application

Platform

Infrastructure

Server

Infrastructure as a Service (IaaS) / Platform as a Service (PaaS)

- Delivers computer infrastructure, typically a platform virtualisation environment, as a service, along with raw (block) storage and networking.
- Examples: Amazon EC2, Verizon
- Examples: Google Apps, Web Hosting Sites such as GoDaddy, RackSpace

- Delivers a computing platform and/or solution stack as a service, allowing developers to install and run their applications without the cost and complexity of buying and managing the underlying hardware and software layers
- Examples: Amazon, CloudEmployee
- Examples: Google Apps, Salesforce.com, CRM on Demand, Office365

Benefits

- Increase operational efficiency through cost-effective sharing of expensive infrastructure
- Achieve economies of scale by leveraging shared resources
- Improve security posture in tiered environments
- Rapid and agile deployment of customer environments or applications
- Rapid allocation of capacity when there are sudden changes in demand
- Improve service quality and accelerate delivery through standardization
- Promote green computing by maximizing efficient use of shared resources, lowering energy consumption

Benefits To DOE of Moving To A Community Cloud
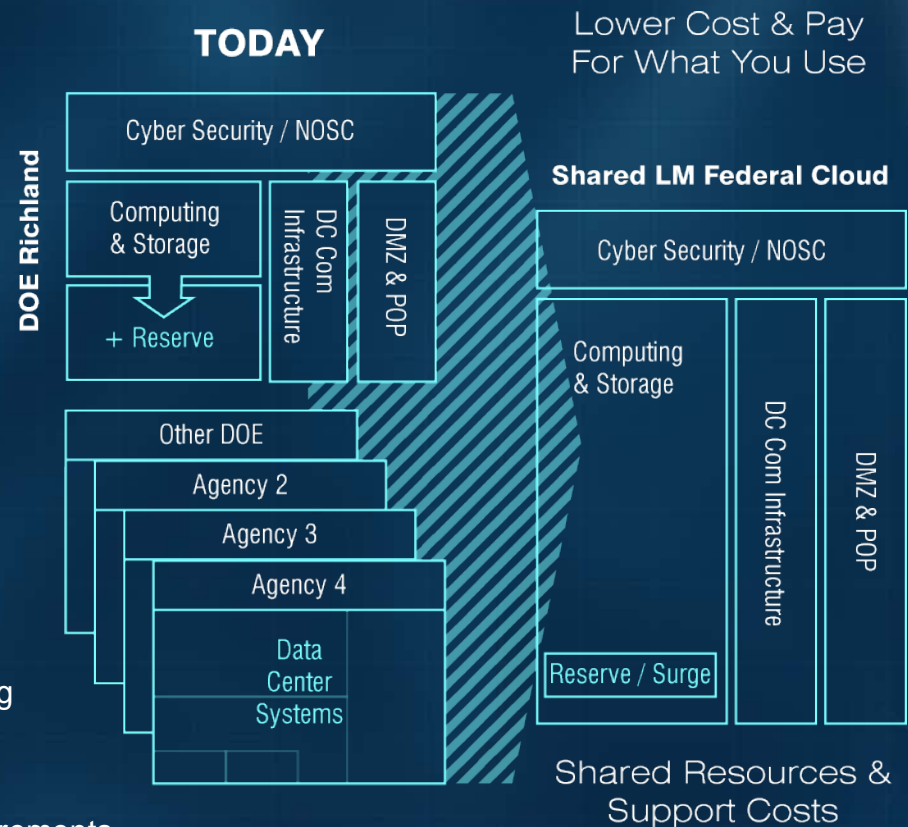
Eliminate…

Redundant

- Hardware and Software
- Reserve Capacity – scaling & growth
- Security/Communications Systems
- System Engineering, Integration, Test
- Cyber Security Engineering
- Redundant Maintenance, Operations, Administration, Patch Management
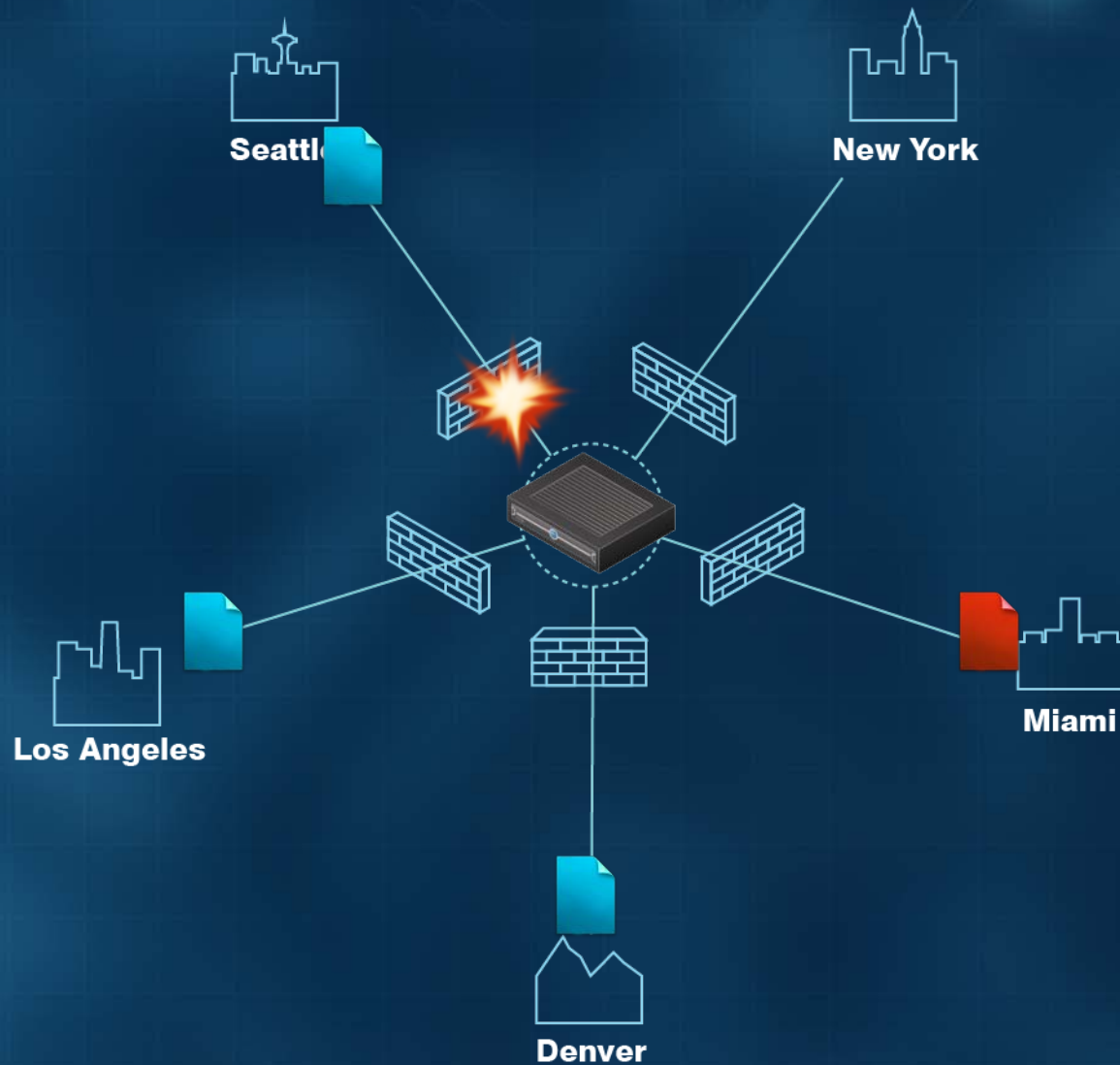- NOSC Operations

Inefficiencies and Artificial Complexity

- Different Compute, storage and com architectures
- Different Security platforms, troubleshooting, patching requirements
- Different threat response, hardening requirements.
- Different patch management, test , deployment requirements.

Delays and Cost in adding new resources compared to

Cloud Service Delivery Model

TODAY

DOE Richland

Cyber Security / NOSC

Computing & Storage

+ Reserve

DC Com Infrastructure

DMZ & POP

Other DOE

Agency 2

Agency 3

Agency 4

Data Center Systems

Lower Cost & Pay For What You Use

Shared LM Federal Cloud

Cyber Security / NOSC

Computing & Storage

DC Com Infrastructure

DMZ & POP

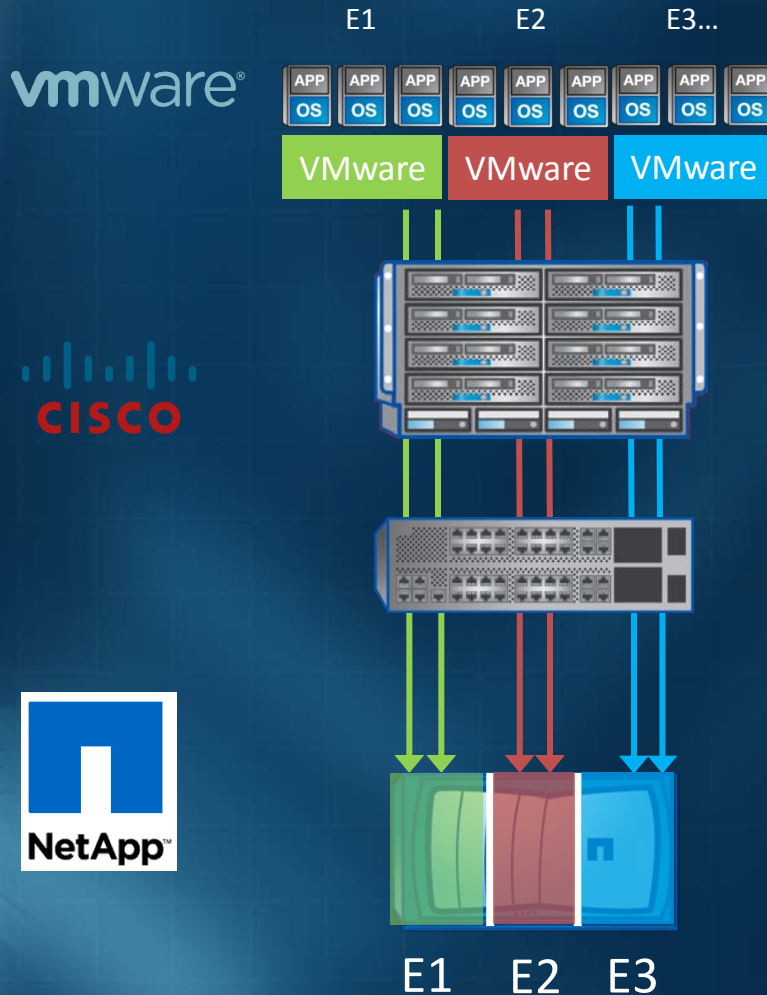Reserve / Surge

Shared Resources & Support Costs

Fusion Router

Security Foundation
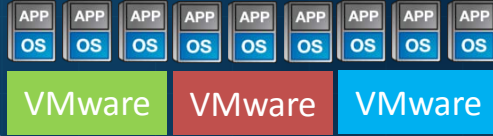## Built on FlexPod to Securely Isolate Shared Resources

- Industry's only end-to-end solution
- Preferred Secure Multi-tenancy Architecture for DOE
- Consistent QoS at each layer
- Manage each resource pool independently
- Reduce risk and cost while boosting IT agility
- Cisco Validated Design

Advanced Secure Multi-tenancy
Built on FlexPod to Securely Isolate Shared Resources

LM Continuous Security Situational Awareness & APT Threat Management System

APP OS APP OS APP OS APP OS APP OS APP OS APP OS APP OS APP OS

VMware   VMware   VMware

Resource Pools 99.999% Highly Secure to 99% Secure Enough
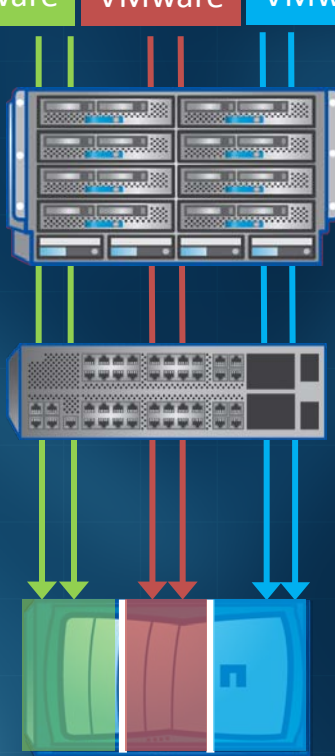
Resource Pools 99.999% Highly Secure to 99% Secure Enough

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Major Innovation Legacy

FY2009
- WiMax
- Mobile PM Office
- VoIP Pillot
- Over $43M in savings to date

FY2010
- Stinger
- VoIP Production
- Unified Messaging
  - Conference
  - Voicemail
  - Instant Messaging

FY2011
- Chimera Application Virtualization
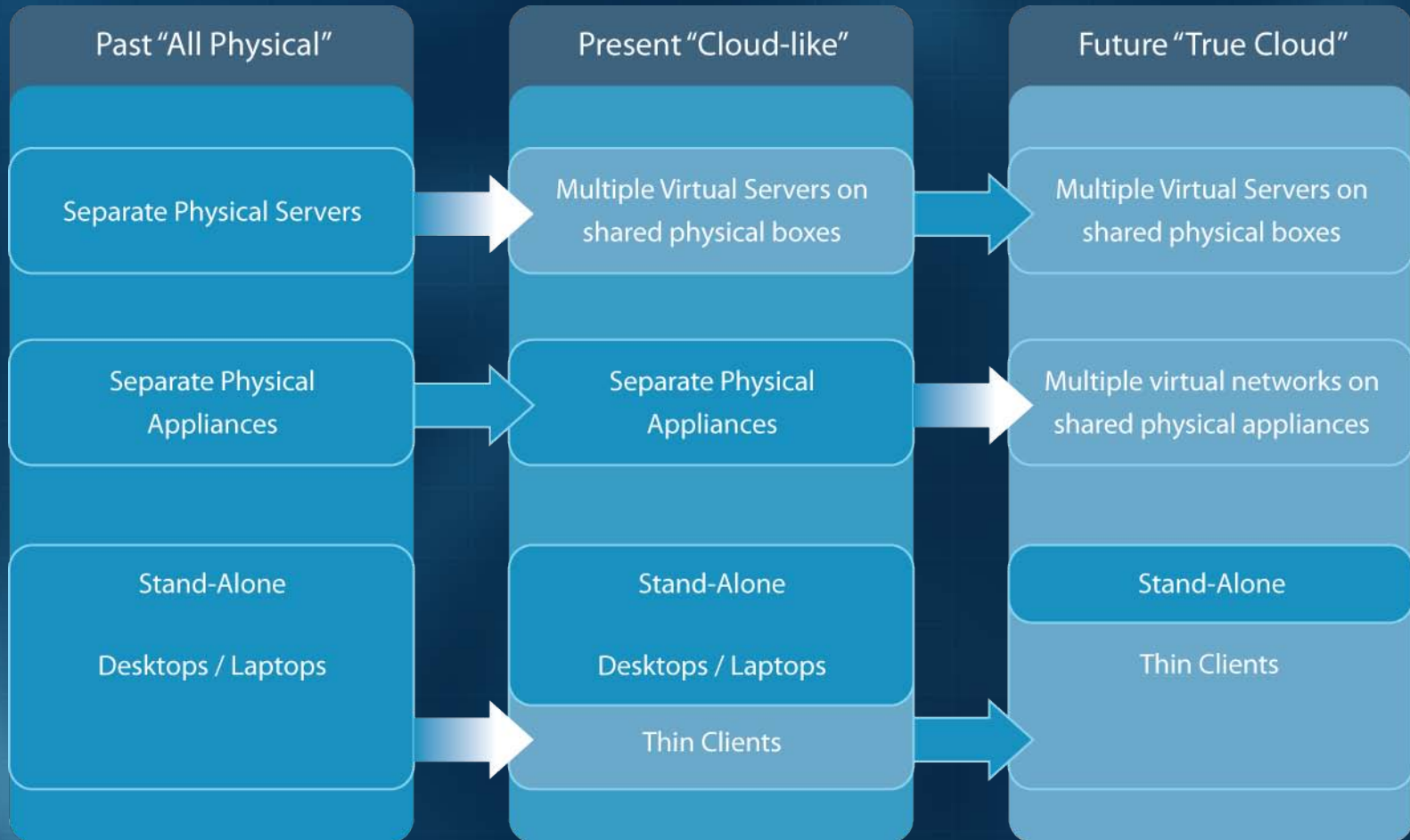- Thin Client
- VDI
- VoIP transition complete

FY2012
- DOE RL/ORP cloud (HFNet)
- Hanford Cloud
- Thin Client continues
- Hosted VoIP
- Telecom facilities consolidation
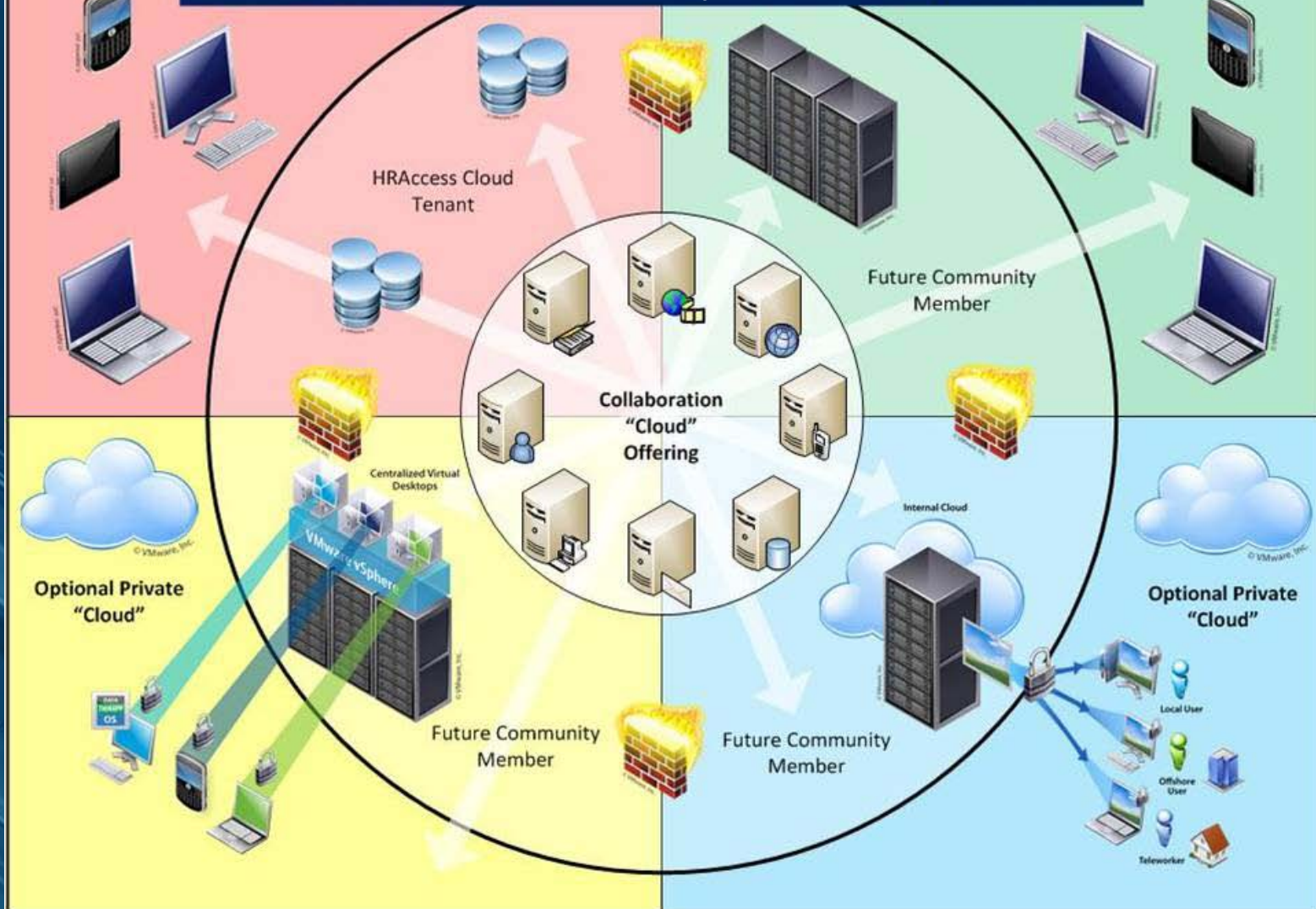
- Data Center Consolidation
- Server Virtualization
- Tablet Applications

- T&M to Fixed Price Services
- Self-Performed Telecom
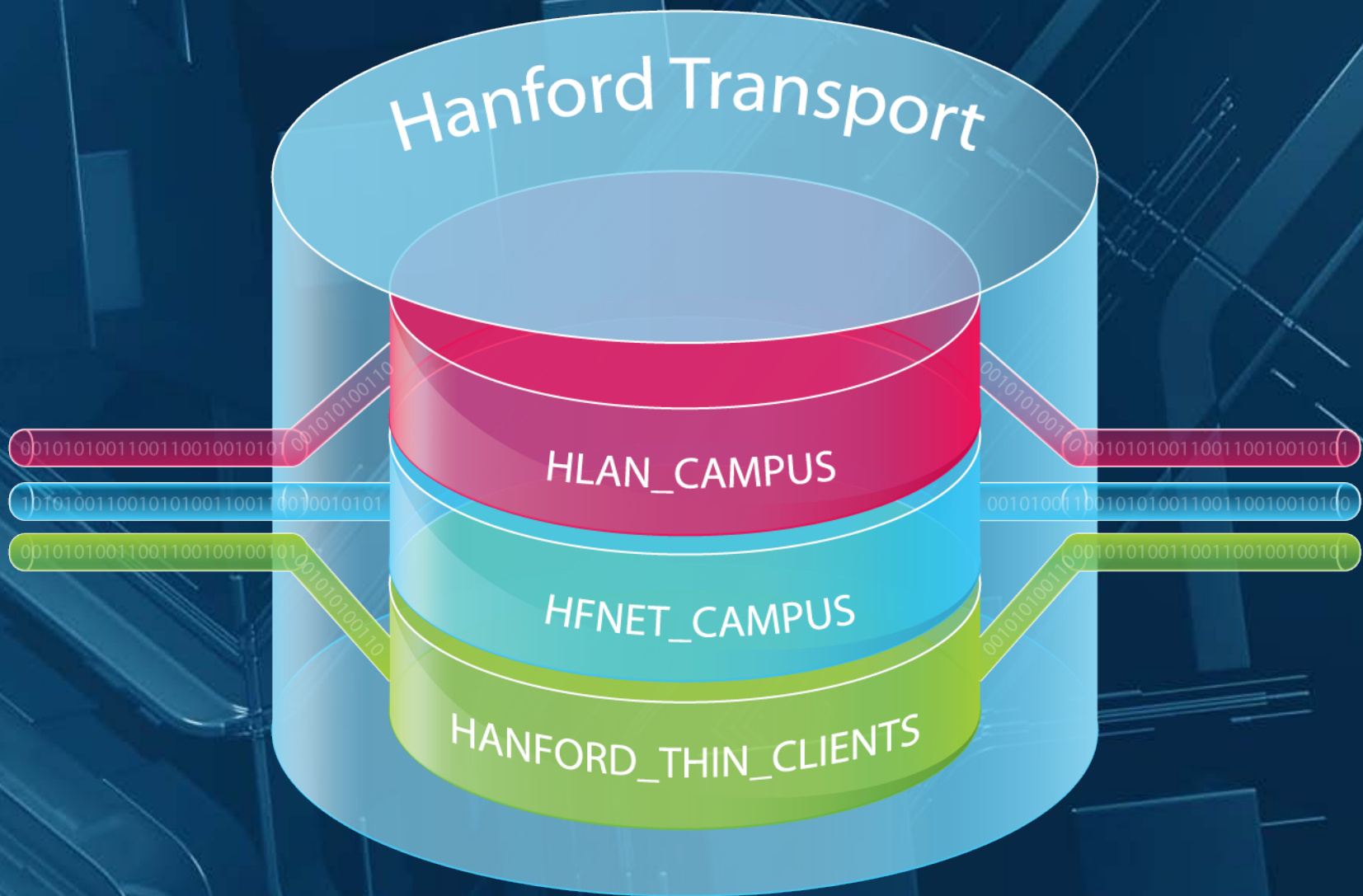- All SLA's met/exceeded since 2001

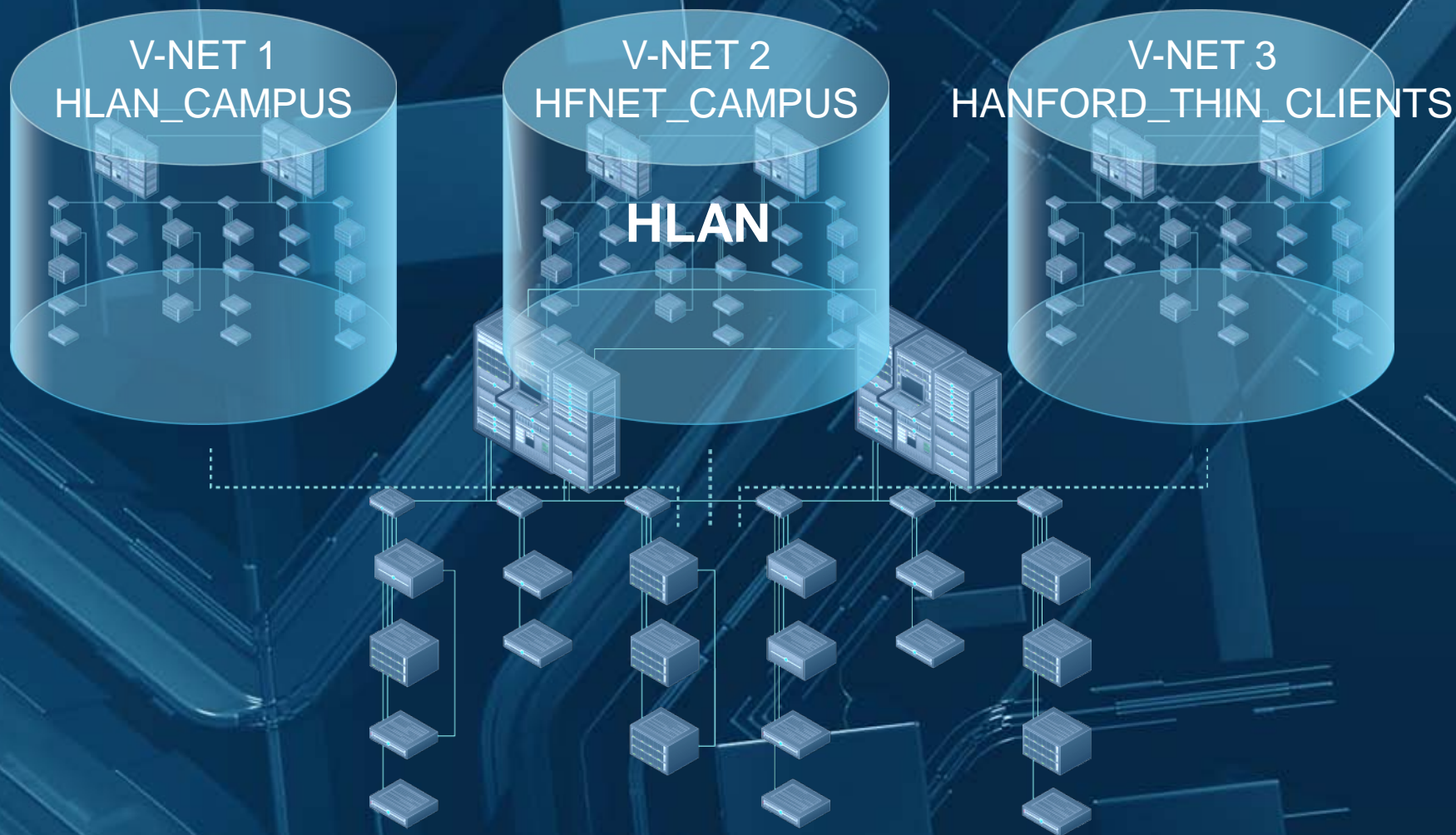# Progressing toward the Cloud

Community Cloud

Network Virtualization

HLAN to HANFORD TRANSPORT
Network Virtualization

V-NET 1
HLAN_CAMPUS

V-NET 2
HFNET_CAMPUS

V-NET 3
HANFORD_THIN_CLIENTS

HLAN

HANFORD TRANSPORT - PHYSICAL

Hanford Cloud Technologies

Key Enablers

- Datacenter Consolidation – 2005/2006
- Data & Voice Network Convergence – 2008-2010

Major Projects Implemented or In Process

- Hanford Federal Cloud Initiative
- VoIP
- HFNet (Hanford Federal Net)
- Chimera Application Virtualization
- Thin Client

Common Business Drivers

- Productivity gains from improved service delivery
- IT Management efficiencies
- O&M Cost Savings

DOE Federal Cloud Initiative

Cloud Attributes

- Responsive to demand elasticity
  - Customers pay only for what they use
- Multi-tenancy benefits
  - "More tenants" results in lower per tenant base cost
- Private Cloud for Federal / DOE
- Service fee business model
  - Not new capital for upgrades, improvements

Additional Attributes

- Builds on previous initiatives
  - E.g., VDI/thin client, Chimera, VOIP, …
- Builds on knowledge gained from other customers
- Accommodates various customer models
  - Self-managed vs. "landlord"-managed choices (e.g., IaaS, PaaS, SaaS, other options…)
- Automated virtual provisioning and patching
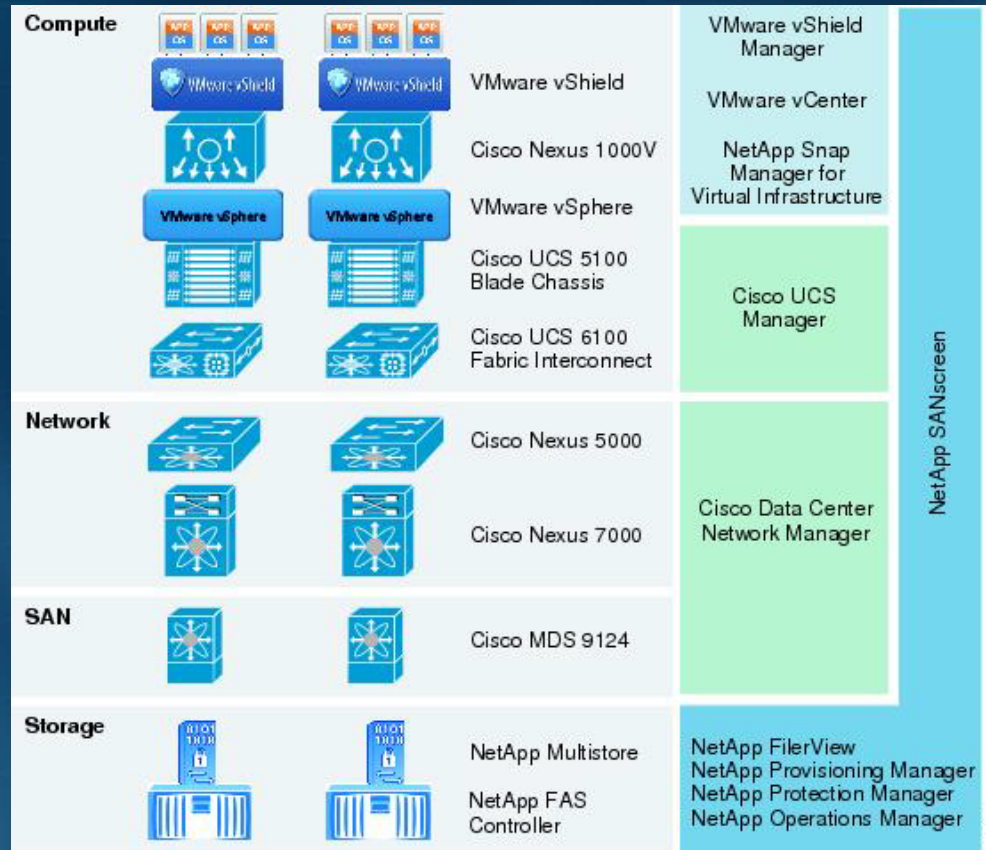- Expandable beyond Hanford site
  - Other DOE sites

Hanford Federal Cloud Initiative

Related Projects
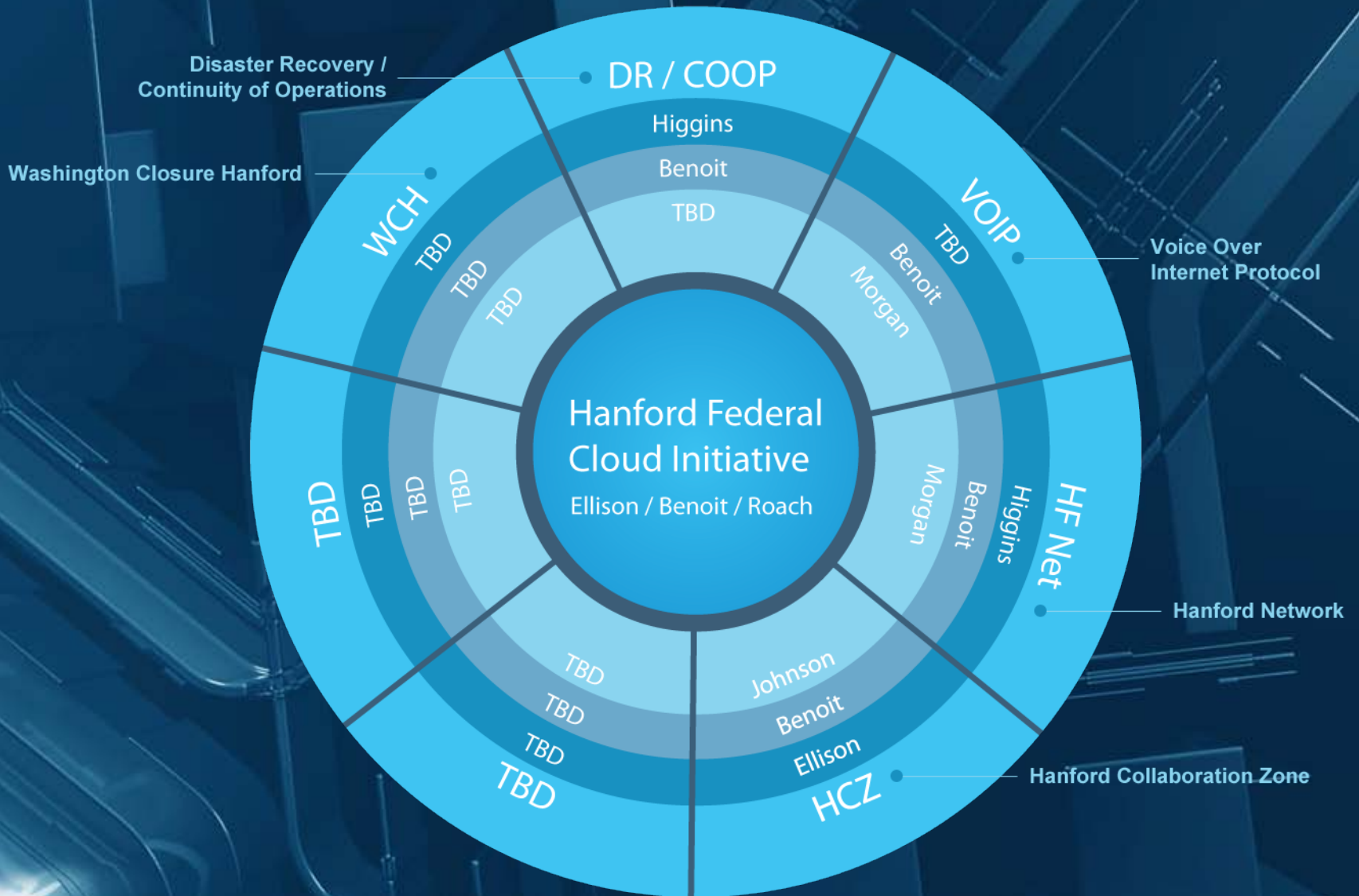
Cloud Architecture

NetApp / Cisco / VMWare FlexPod

What is the Hanford Federal Cloud Initiative?

07/31/2012 - PI 2012

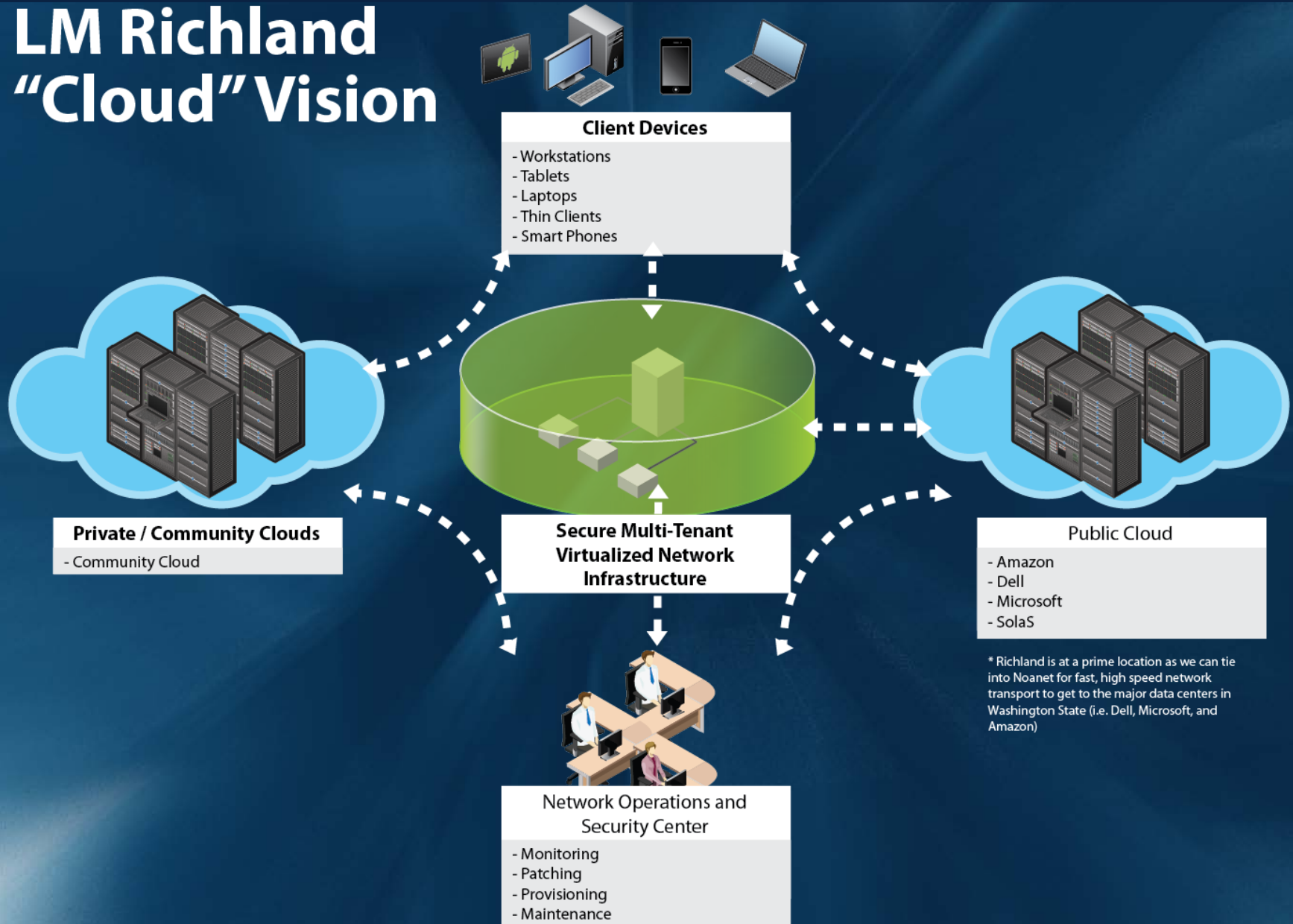12/31/2011 - True Cloud

09/30/2011 - Initial

Cloud Management Software deployment

Continue storage reconfiguration / segmentation
UCS Server Deployment
NetApp vFiler Implementation
Redundant ISP Link Move
G4 DMZ

Network Segmentation / Network Hot Standby
Router Protocol (HSRP) & Redundancy in data
centers
Initial storage reconfiguration / segmentation
Nexus top-of-rack switch deployment
Core Firewall Deployment

Comprehensive Vision

Future

Close Out