



# Cloud Computing Overview: A Federal Government and Agency Perspective

Presented to: ArchitecturePlus Seminar - Cloud Computing, Web 2.0 and Beyond:  
A Vision of Future Government Operations

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- Chair, Federal Cloud Computing Advisory Council (CCAC)
- Chair, Federal CIO Council IPv6 Working Group

# Administration Priorities for Infrastructure Modernization and Cloud Computing

*“The Federal technology environment requires a fundamental reexamination of investments in technology infrastructure.”*

*“The Infrastructure Modernization Program will be taking on new challenges and responsibilities. Pilot projects will be implemented to offer an opportunity to utilize more fully and broadly departmental and agency architectures to identify enterprise -wide common services and solutions with a new emphasis on cloud computing. “*

*“The Federal Government will transform its Information Technology Infrastructure by virtualizing data centers, consolidating data centers and operations, and ultimately adopting a cloud-computing business model.”*

**FY2010 Federal Budget  
Analytical Perspectives  
Cross Cutting Programs**

**<http://www.whitehouse.gov/omb/budget/fy2010/assets/crosscutting.pdf>**

# Cloud Computing Definition



*“Cloud computing is 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. This cloud model promotes availability and is composed of five essential characteristics, three delivery models, and four deployment models”.*

## **NIST**

**Definition of Cloud Computing, Draft version 14**

**<http://csrc.nist.gov/groups/SNS/cloud-computing/index.html>**

# Cloud Computing Definition (continued)

## **Five Characteristics:**

- On Demand Service
- Ubiquitous Network Access
- Location Independent Resource Pooling
- Rapid Elasticity
- Measured Service

## **Delivery Models**

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

## **Deployment Models**

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

# Cloud Computing PMO

**To support the Federal Cloud Computing Direction and Deployment Approach, the ITI Line of Business PMO has been refocused as the Cloud Computing PMO**

## **Building on ITI LoB Initiative:**

- Continue the migration towards a services-based environment that is technology and vendor-agnostic
- Enable rapid deployment of technology solutions for the Federal government without developing stove-pipes
- Enable scalability for existing and new capabilities
- Increase savings through virtualization
- Potentially reduce cost of infrastructure, buildings, power, and staffing
- Improve the government's ability to create a transparent, open and participatory government

# Building Upon the ITILoB Effort

## ITILoB

## Cloud Computing

**GOAL: To achieve an optimized, cost-effective, government-wide information technology infrastructure that supports agency mission, while providing reliability and security in service delivery.**

- ❑ Established a vision for Government-wide ITI Optimization
- ❑ Created a collaborative governance framework involving 23 Federal Agencies
- ❑ Captured and analyzed critical information in terms of:
  - Optimization strategies
  - Common Solutions
  - Performance Metrics
  - IT Infrastructure Tools used across Government
- ❑ Benchmarked Federal ITI Data



- ❑ Will use the information gathered through the ITILoB effort to deploy “Common Solutions” using a Cloud Computing technology platform
- ❑ This initiative will:
  - Follow a service oriented approach
  - Be based on agency business needs
  - Maintain a collaborative governance framework

# Cloud Computing Delivery Model Overview

Model	Capability Provided	Example Services
SaaS	To use the provider's applications running on a cloud infrastructure and accessible from various client devices through a thin client interface such as a Web browser	<ul style="list-style-type: none"><li>▪ Citizen Engagement (Wikis, Blogs, Data.gov)</li><li>▪ Government Productivity (Cloud based tools)</li><li>▪ Business Enablement (Salesforce.com)</li><li>▪ Enterprise Applications (Core Mission &amp; Business Svcs)</li></ul>
PaaS	To deploy onto the cloud infrastructure consumer-created applications using programming languages and tools supported by the provider (e.g., java, python, .Net)	<ul style="list-style-type: none"><li>▪ Database and Database Management Systems</li><li>▪ Developer / Testing Tools</li><li>▪ Virtual Environments</li></ul>
IaaS	To provision processing, storage, networks, and other fundamental computing resources where the consumer is able to deploy and run arbitrary software, which can include operating systems and applications	<ul style="list-style-type: none"><li>• Computing</li><li>• Storage</li><li>• Application hosting</li></ul>

# Deployment Model Overview

## PRIVATE CLOUD

Operated solely for an organization.

## COMMUNITY CLOUD

Shared by several organizations and supports a specific community that has shared concerns

## PUBLIC CLOUD

Made available to the general public or a large industry group and is owned by an organization selling cloud services.

## HYBRID CLOUD

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

# Phased Approach for Delivering Cloud Computing



	Phase 1	Phase 2	Phase 3
Target Apps	Light-weight collaboration & productivity tools and basic infrastructure / platform	Rich productivity tools, enhanced platform capabilities	Enterprise Applications in the cloud and integration services
Target Availability	Aug – Oct 2009	Nov 2009 – Feb 2010	Mar – Jun 2010
Cloud Delivery Models	Commercially Available Public Clouds	Public and Outsourced Private Clouds	Private and Hybrid Clouds
Procurement	Advantage, BPA	Smart-Buy, BPA, Directed RFP	Smart-Buy, BPA, Directed RFP
Security	Low-Impact FISMA Security	Low and Medium Impact FISMA Security	Low , Medium and High Impact FISMA Security
Software as a Service (SaaS)	TARGET AVAIL: Aug 2009 SERVICES (5-10 vendors):	TARGET AVAIL: Nov 2009 SERVICES (30-50 vendors):	TARGET AVAIL: Jun 2010 SERVICES (50-100 vendors):
Platform as a Service (PaaS)	TARGET AVAIL: Sep 2009 SERVICES (3-5 vendors):	TARGET AVAIL: Jan 2010 SERVICES (5-10 vendors):	TARGET AVAIL: Apr 2010 SERVICES (10-20 vendors):
Infrastructure as a Service (IaaS)	TARGET AVAIL: Sep 2009 SERVICES (3-5 vendors)	TARGET AVAIL: Feb 2010 SERVICES (5-10 vendors):	TARGET AVAIL: Mar 2010 SERVICES (10-20 vendors):

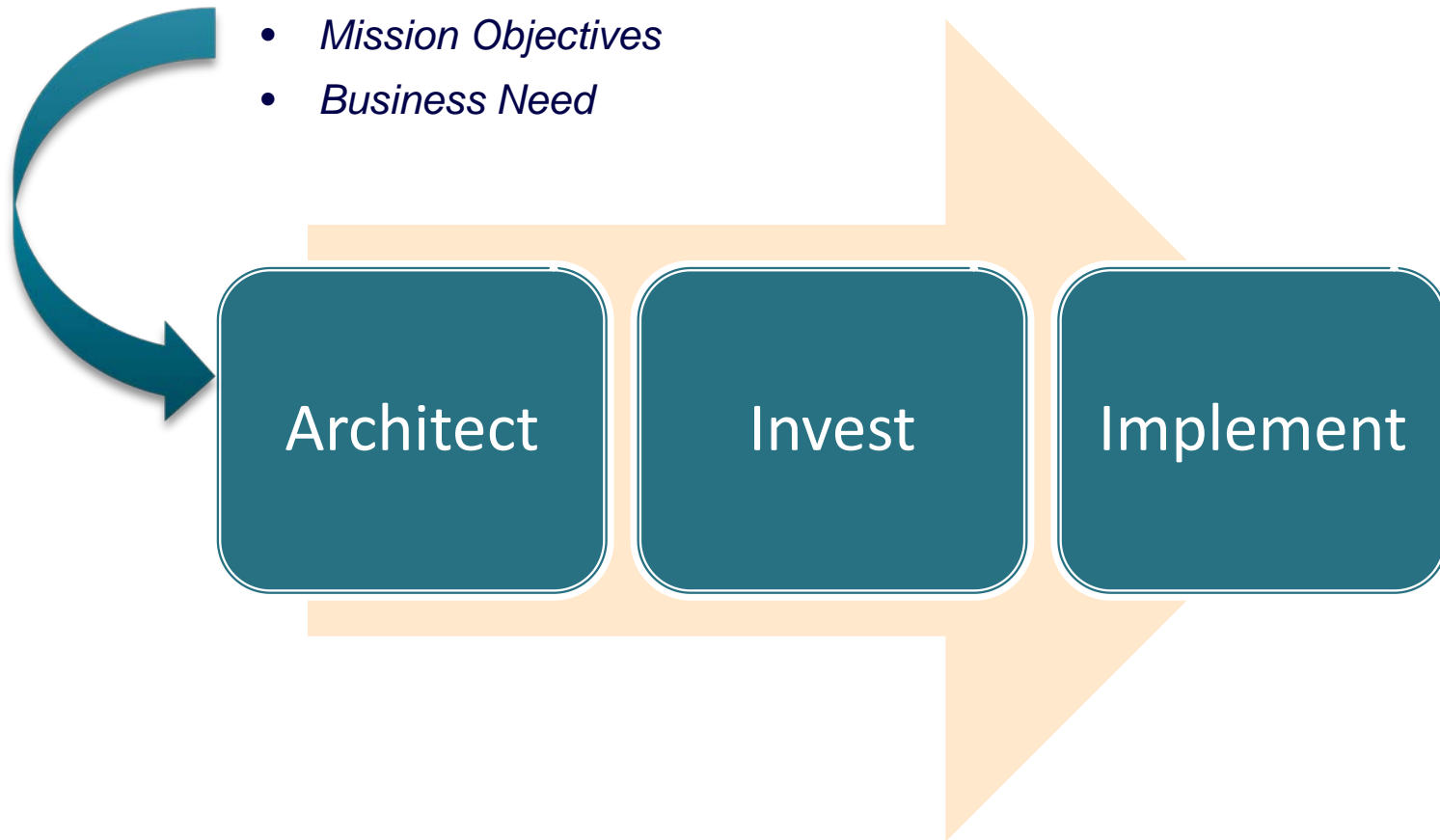
# Anticipated Benefits

- Rapid provisioning and deployment of services
- On-demand scalability and elasticity for new services and capabilities
- Creation of a services-based environment that is interoperable and standards-based
- Opportunity for Cost Savings
  - Leverages economies of scale
  - Promotes innovation and service sharing
  - Allows for “Measured” Payment (Pay per Use)
- Enables agencies to reinvest in, and concentrate on, core mission objective

# Deployment is Only Possible through Effective IT Planning

Driven By:

- *Strategic Goals*
- *Mission Objectives*
- *Business Need*



# Putting Effective IT Planning into Practice

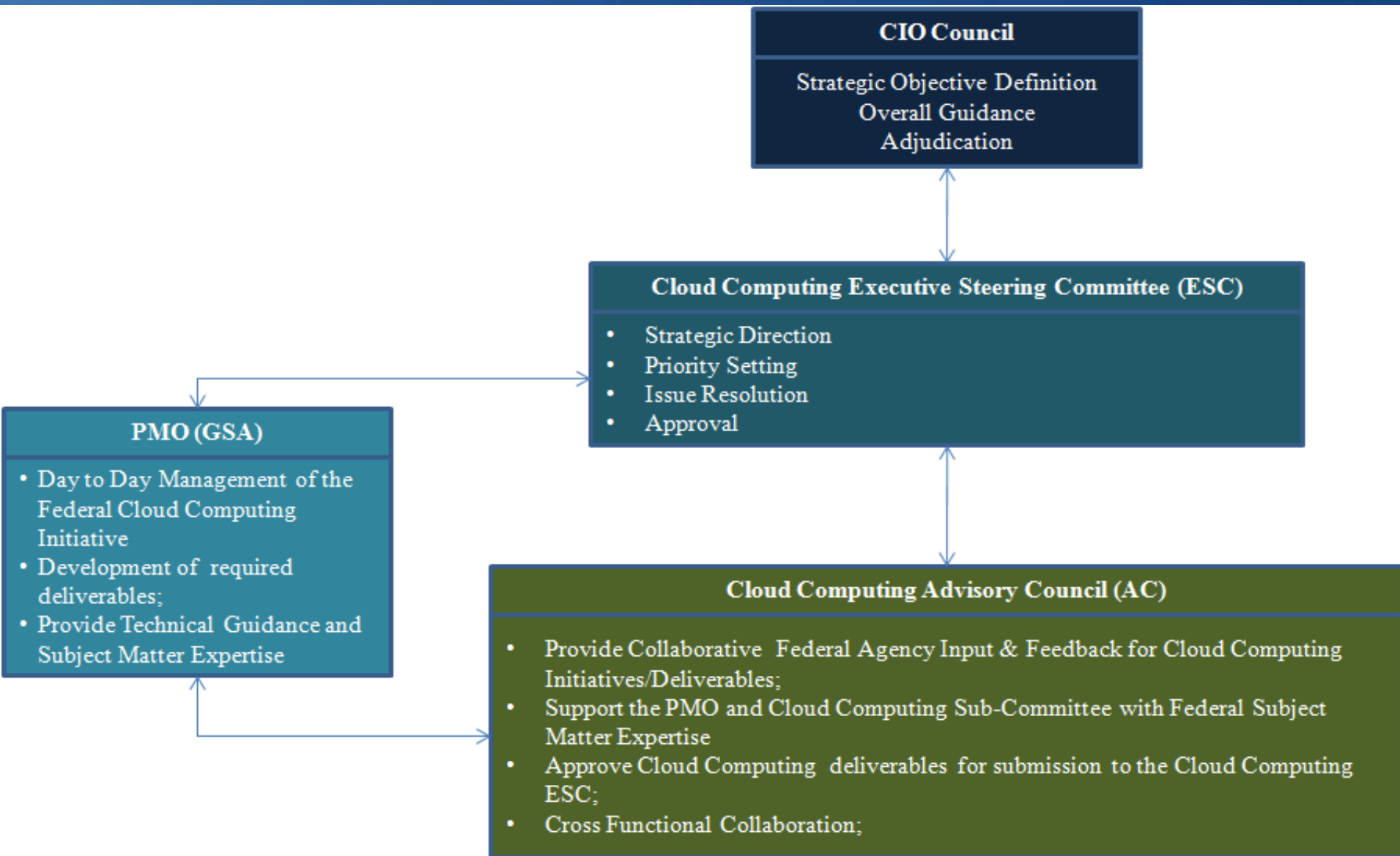
- Do not use Enterprise Architecture as a compliance or reporting exercise. Use it as a management tool to achieve true business transformation.

- Build a bridge between EA and IT Operations, fostering continuous collaboration.



- Use EA analysis to drive the Capital Planning process by making specific investment recommendations that will result in cost savings and performance improvements.

# Governance Structure



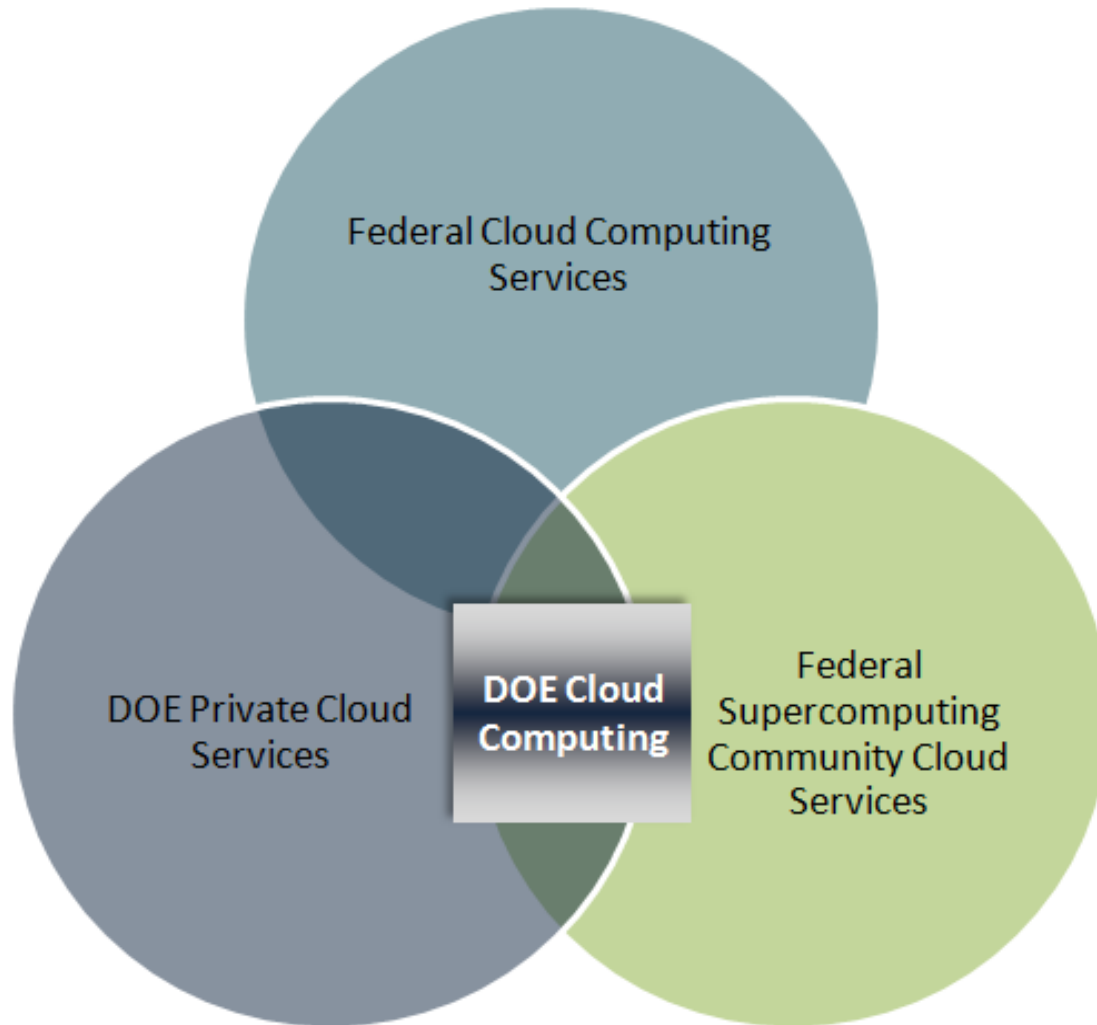
# Executive Committee Roles and Membership

Mission	Membership
<ul style="list-style-type: none"><li data-bbox="48 462 1373 554">❑ To provide executive level strategic guidance and direction for the Federal Cloud Computing Initiative</li><li data-bbox="48 579 1306 671">❑ To provide review and approval of Cloud Computing PMO and Working Group deliverables, as appropriate</li><li data-bbox="48 696 1282 739">❑ To provide a regular interface with OMB and the Federal CIO</li><li data-bbox="48 765 1338 905">❑ To provide Executive-level sponsorship of the Cloud Computing initiative's plans and direction so that they are effectively carried out at the Agency-level.</li><li data-bbox="48 931 1277 1022">❑ To set priorities for the Federal Cloud Computing initiative, in consultation with OMB and the Federal CIO.</li></ul>	<p data-bbox="1398 496 1831 636"><b>Chairs:</b> Casey Coleman, GSA CIO</p> <p data-bbox="1398 699 1740 791">Carl Staton, DOE Deputy CIO</p> <p data-bbox="1398 853 1818 1042"><b>Members:</b> ❑ OMB ❑ Federal Agency CIOs &amp; Executives</p>

# Advisory Council Roles and Membership

Mission	Membership
<ul style="list-style-type: none"><li><input type="checkbox"/> To provide Federal Agency subject matter expertise in support of the Federal Cloud Computing initiative and the ESC's strategic direction;</li><li><input type="checkbox"/> To provide/represent Federal Agency Cloud Computing issues, requirements, and business needs;</li><li><input type="checkbox"/> To effectively disseminate the approved Federal Cloud Computing vision, strategy, and plans throughout their respective agencies. Facilitate Agency outreach activities;</li><li><input type="checkbox"/> To review the Federal Cloud Computing PMO's deliverables, as appropriate and to provide specific feedback;</li><li><input type="checkbox"/> To execute specific tasks as assigned by the ESC and/or OMB.</li><li><input type="checkbox"/> To enable cross-functional collaboration with other related Federal initiatives – such as TIC, IPv6, FDCC, etc.</li><li><input type="checkbox"/> To share best practices and current activities</li></ul>	<p><b>Chair:</b> Peter Tseronis, Deputy Associate CIO, DOE</p> <p><b>Vice Chair:</b> TBD</p> <p><b>Membership:</b></p> <ul style="list-style-type: none"><li><input type="checkbox"/> Federal Agency IT Infrastructure Representatives</li><li><input type="checkbox"/> Federal Enterprise Architects</li></ul>

# Cloud Computing at DOE



# Potential Cloud Impact on DOE Core Mission Areas

## ● **Supercomputing in the Cloud Objectives**

- Establish a coordinated and collaborative approach to developing a common/shared supercomputing capability within the Federal Government
- Extend the Government's supercomputing resources (through pooled investment and common capabilities), thus allowing US agencies to make supercomputers available to researchers.

## ● **Smart Grid and the Cloud Objectives**

- Allow for the more efficient deployment of technologies used to save energy, reduce cost and increase reliability – including:
  - Integrated Communications
  - Sensing and measurement technologies,
  - Advanced control methods

- **Internet Protocol version 6 (IPv6)**

- The "next generation" protocol designed to replace the current version Internet Protocol, IP Version 4 ("IPv4").
- Addresses the growing shortage of IPv4 addresses and improves areas such as routing and network auto-configuration.

- **The Federal Vision**

- The deployment of secure, end-to-end, IPv6-enabled network services which support federal agency core missions and applications.

- **The Business Need**

- Increased operational efficiencies, security, support for mobile devices, and agency collaboration;
- Allows for future growth and enhancement to meet federal business needs. IPv4 address exhaustion (expected 2011-2012) will eventually break the ability to communicate effectively across the Internet core.

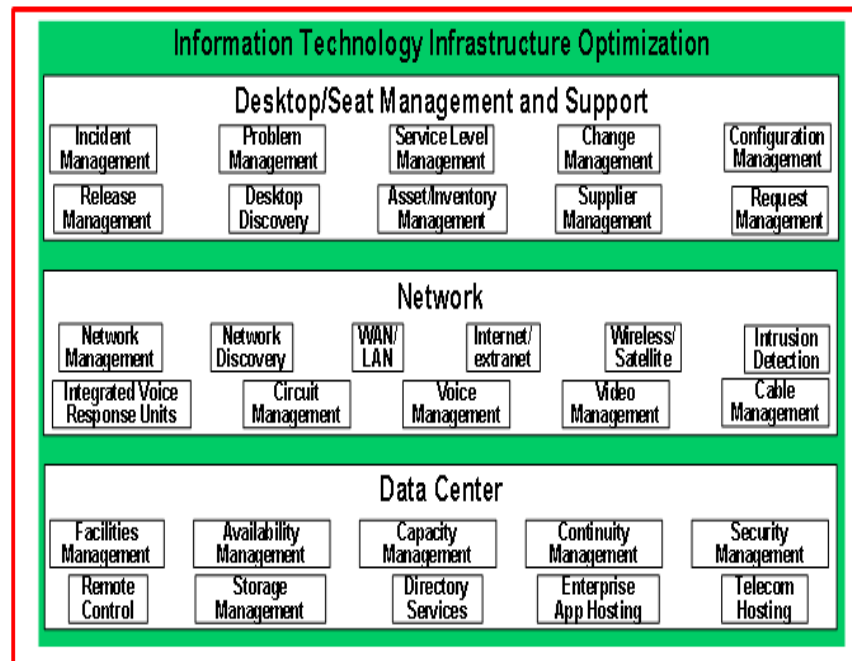
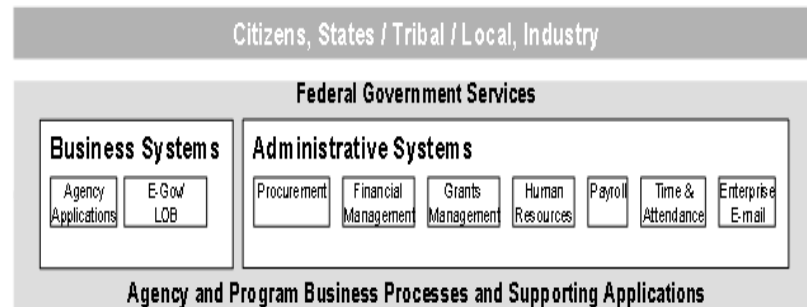
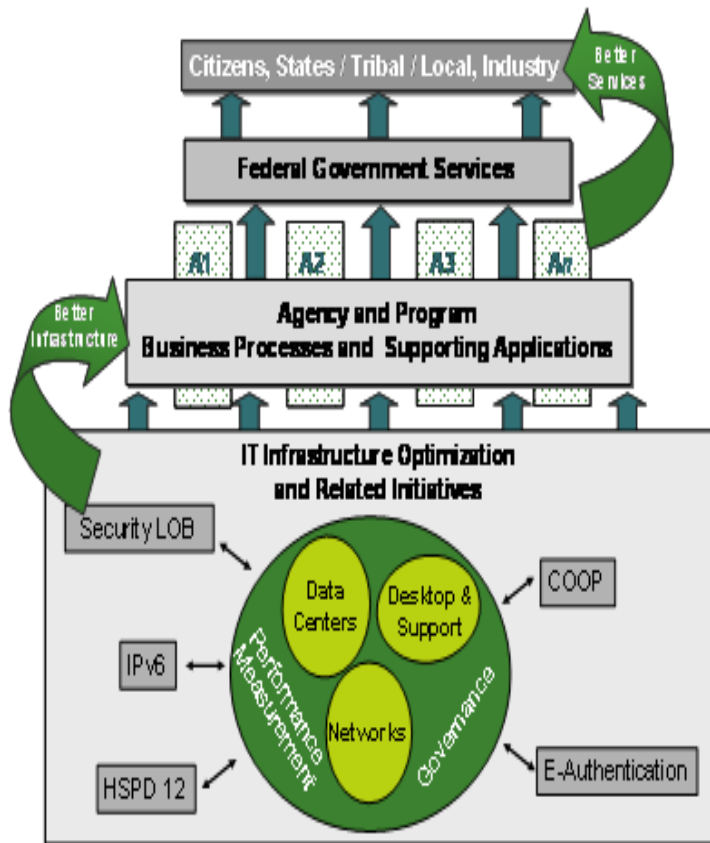
# Cloud Computing & IPv6

## IPv6:

- Is a necessary upgrade for applications that communicate across the Internet.
- Is critical to supporting the vast networks provided by cloud computing (which relies on the continued growth and operation of the Internet).
- Provides for continued growth and operations of the Internet

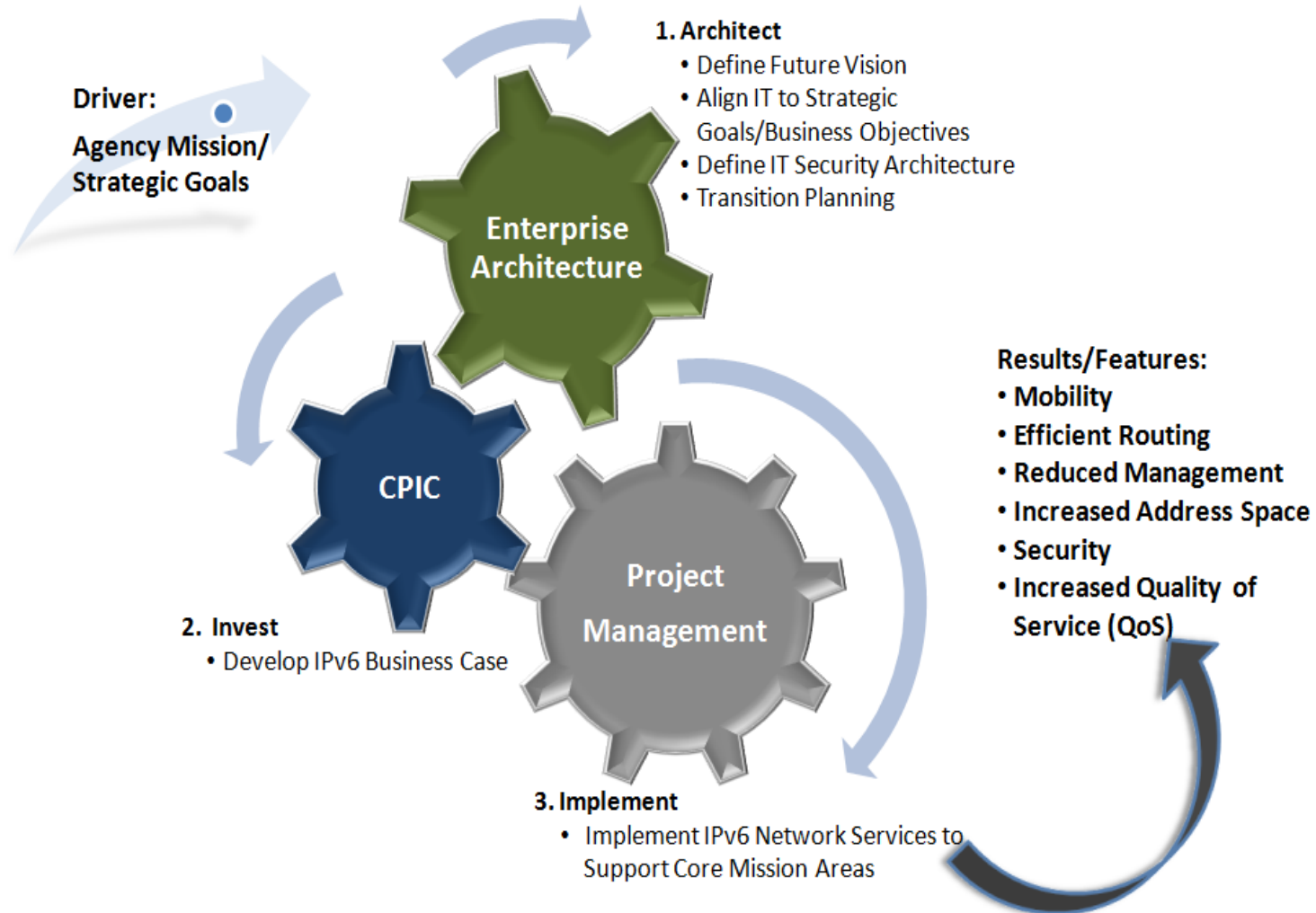


# IPv6 Impacts IaaS

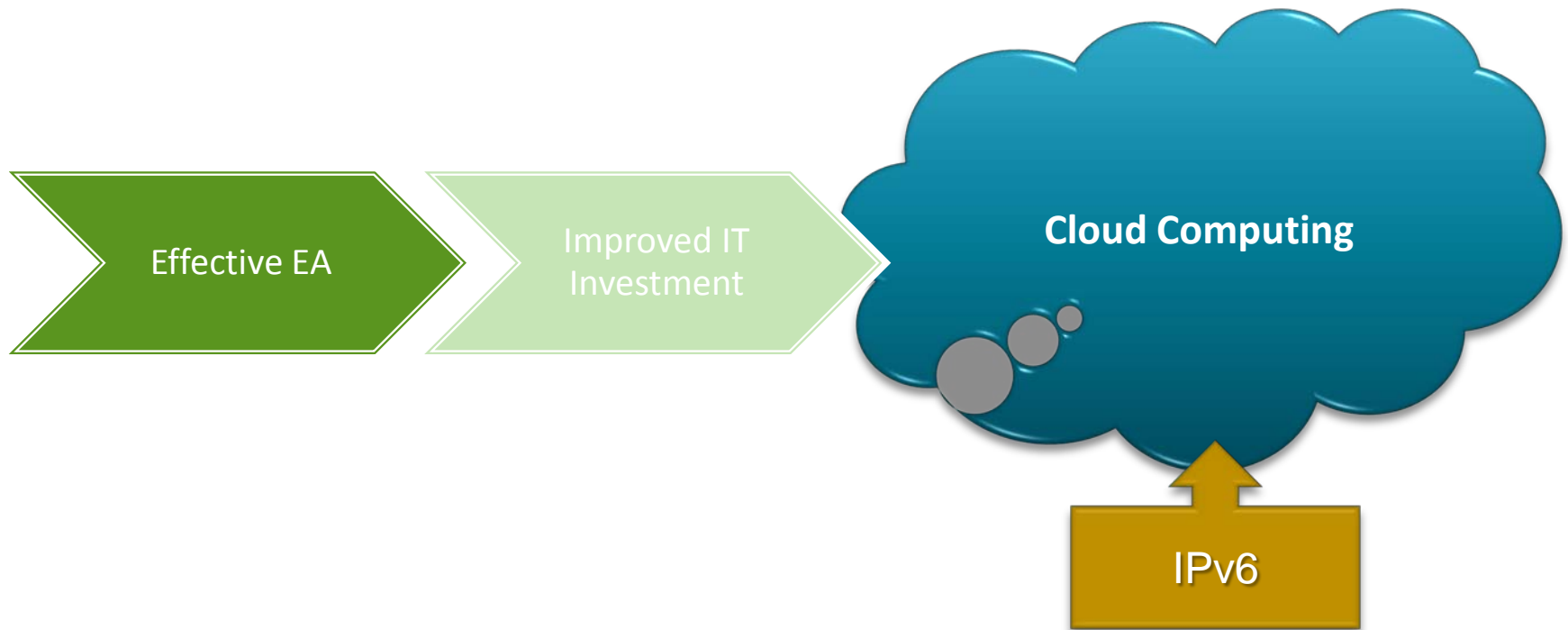


IPv6 Impact

# Example: Effective IPv6 Investment Planning



# Line of Sight



***Innovative and Collaborative Business Transformation***

