National Aeronautics and Space Administration

Enterprise Managed Cloud Computing Overview

Office of the Chief Information Officer

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Office of the Chief Information Officer

Drivers of an Enterprise Cloud Solution

Federal Guidance/Mandates

- Federal Data Center Consolidation Initiative (FDCCI)
- Cloud First Initiative
- The Federal CIO's 25 Point Plan for increasing IT efficiency
- Strategic sustainability performance plans
- Budget sequestration/administrative savings, including reduction in real estate footprint
- NASA Inspector General findings call for Agency enterprise management of cloud usage

Tenets of an Agency Cloud Solution

- Simplify using the cloud for managed cloud providers and end users
- Reduce complexity of IT security and implementation
- Increase control of data and minimize data sprawl
- Leverage volume pricing and economies of scale
- Achieve uniformity in procurement and governance approaches
- Provide a uniform "pay as you go" approach
- Assure that expenditures do not exceed budgetary thresholds
- Implement and share best practices
- Improve customer service

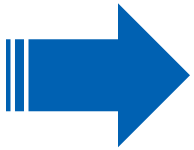
Agency Needs and Expectations

- Workforce interest in cloud services in increasing very rapidly
- No longer a question of whether adoption will occur; "how" is the new concern
- Ability to do more mission faster and at a lower cost
- Scalability to get to the next magnitude of discovery
- Easy access to NASA public data for non-NASA individuals
- Better ways to address big data sets
- Reduction of capital investments
- No more waiting to access hardware/software innovations
- Eliminate under-utilized assets

Case for an Enterprise Approach

If each NASA community or project addresses the wide array of Requirements for Cloud Computing:

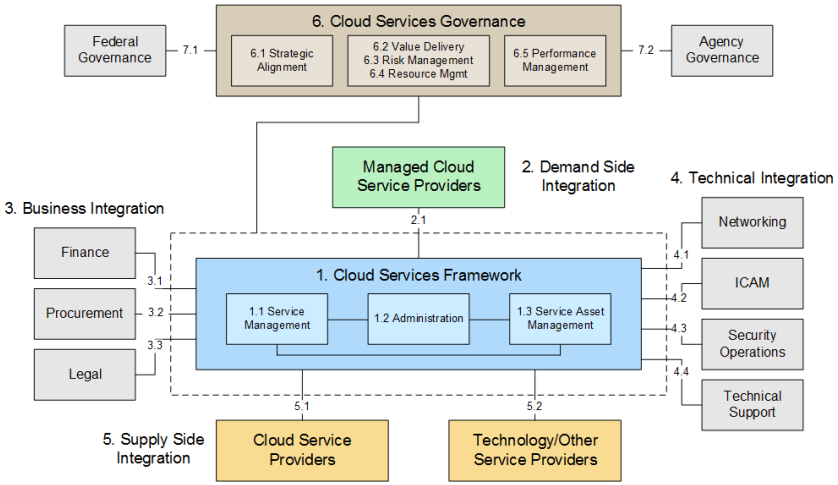
- Projects may interpret and fulfill requirements differently
- Unknown security posture and risks
- Inconsistencies in policies, processes, and implementations
- Highly inefficient approach that results in large Agency spend
- Chaos

Strategy 

Do the "heavy lifting" once for the Agency and enable projects to leverage the capabilities we've created.

Goal: All cloud use at NASA will be MANAGED cloud use

NASA's Enterprise Approach

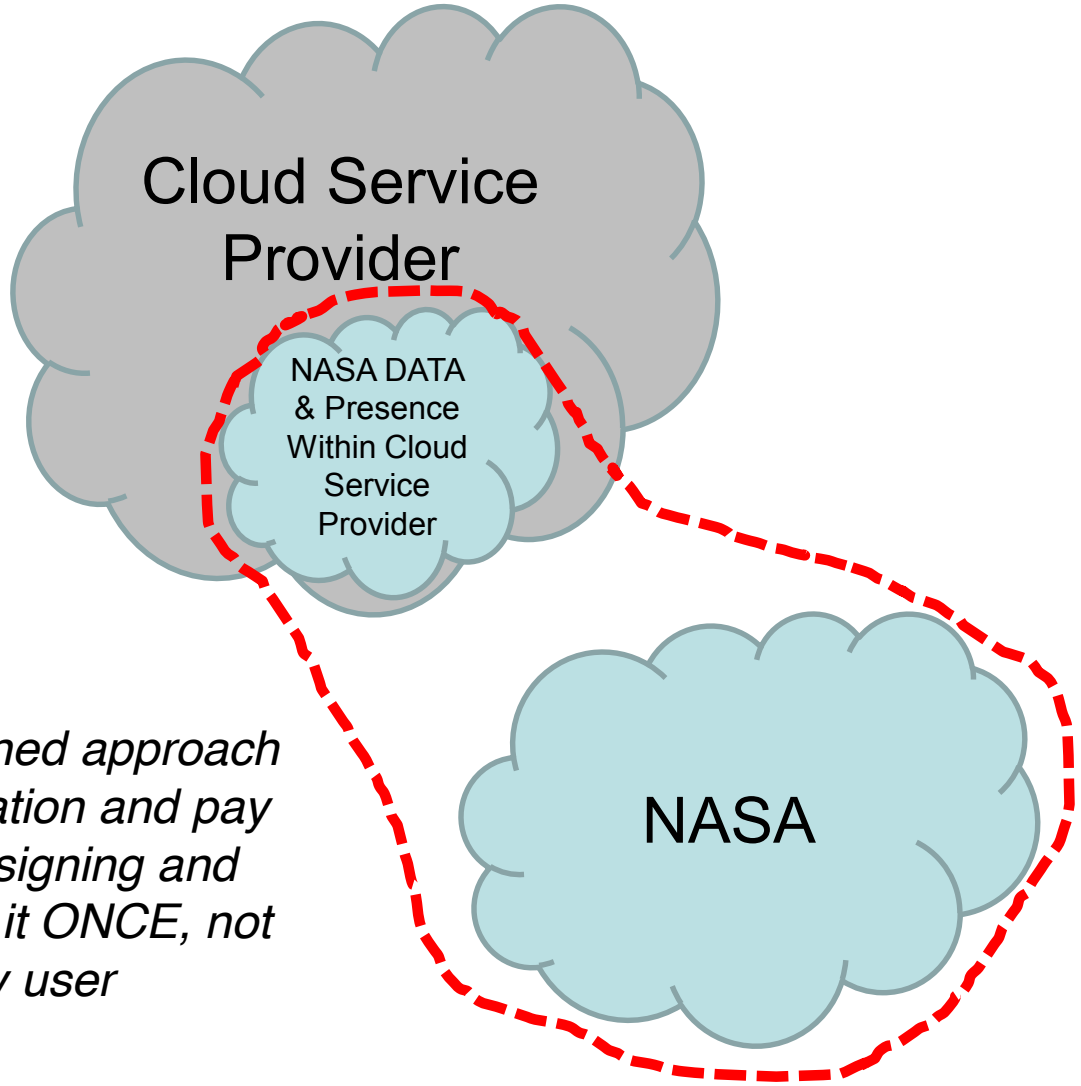


Cloud Computing at NASA is provided through the Computing Services Program in the Office of the NASA CIO

Key Elements of an Enterprise Approach

- Focus on consumption of commercial Cloud Services instead of building Agency Clouds
  - Expend limited resources on highest risk
- Standardized Agency governance
- Standards and guidance for technical integration with Agency infrastructure, processes, services
  - Networking
  - Security operations
  - Authentication services
- Integrated hierarchical approach to FedRAMP compliance
- Common procurement vehicles with proper terms, conditions, best practices
- Payment system to facilitate "pay as you go" within Agency constraints
- Integration with Agency IT service catalog and help desk

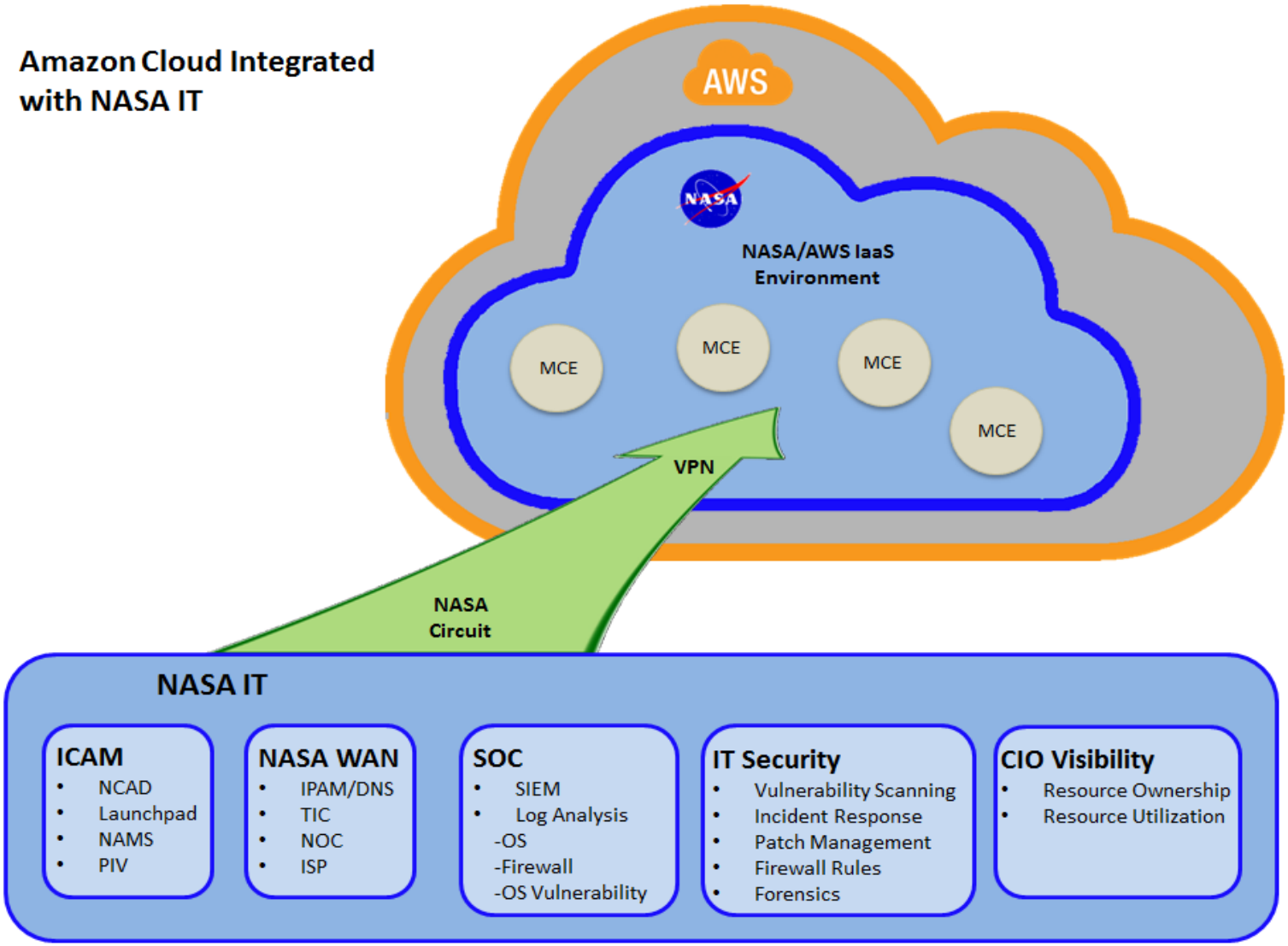
Enterprise Approach: New Boundary



Define a planned approach for this integration and pay the cost of designing and implementing it ONCE, not once for every user

Example: AWS Integration

Amazon Cloud Integrated with NASA IT



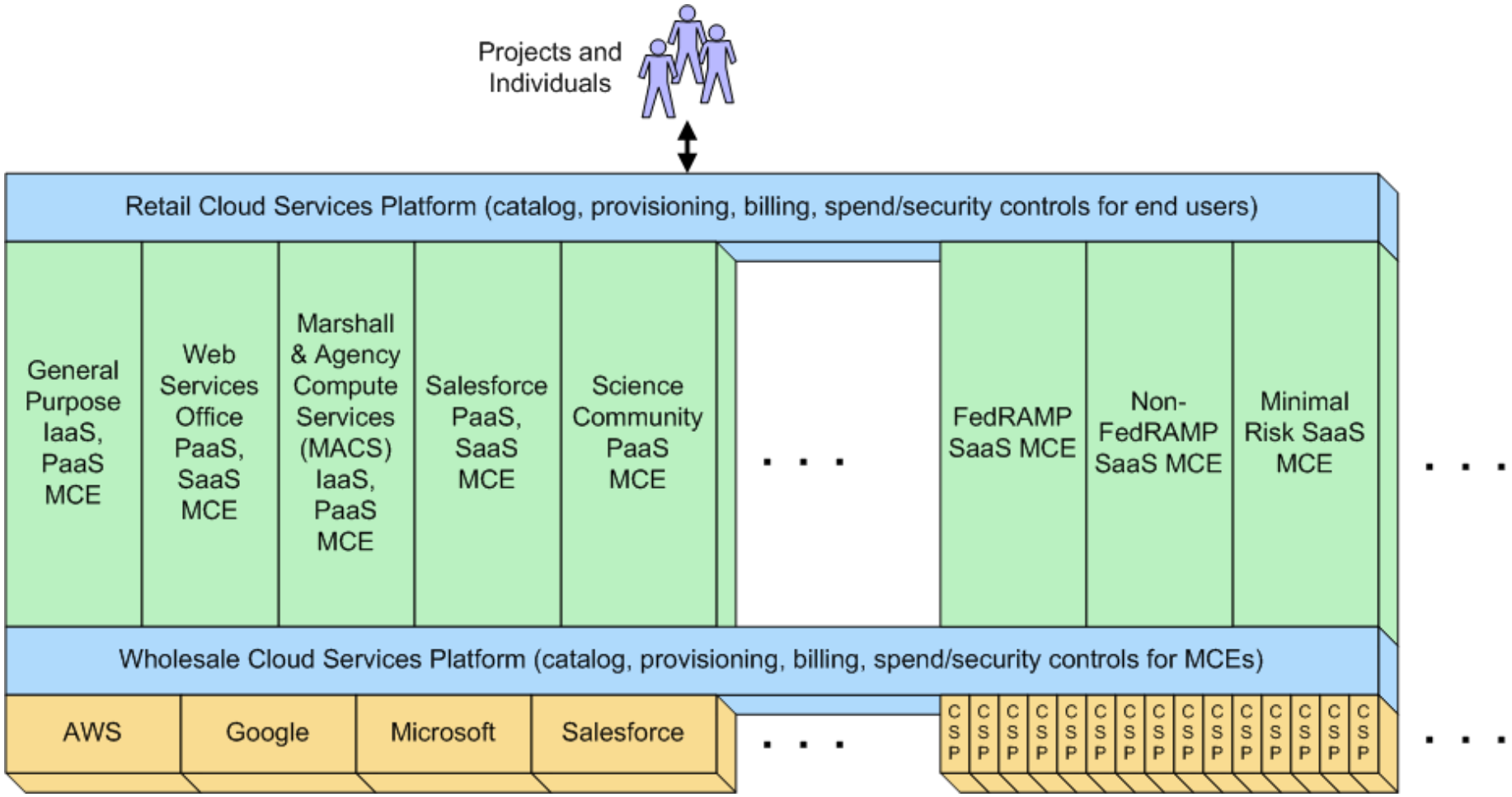
Cloud Framework Reduces Agency Cloud Costs

An enterprise approach results in faster adoption, greater consistency, managed risks, and lower Agency costs.

Providing Value and Savings to Customers

- Computing Services Program Office (CSPO) Cloud Strategy: Do the "heavy lifting" once and enable programs and projects to leverage the results
- Each program/project saves at least $250K by leveraging the CSPO Cloud Services Framework, thereby avoiding costs for:
  - Security plan development
  - FedRAMP compliance and ATO
  - Procurement of cloud services
  - Development of SLAs and OLAs
  - Network engineering
  - ICAM integration
- CSPO's knowledge and experience reduces costs, frustration, and time by significantly reducing mistakes made during the startup phase

Notional Tiered Cloud Services Architecture



Managed Cloud Environments

MCE Service Providers provide value to Agency communi9es and projects by offering targeted cloud-based services

How to Get Access to NASA Cloud

- Send your WBS with funds to the CSPO
- Request an account via the NASA Account Management System (NAMS) and use of the following options:

1. OCIO's General Purpose Managed Cloud Environment (GPMCE) (virtual data center)
2. Join one of the existing Managed Cloud Environments that serve a community of interest consistent with your requirements
   - » Advanced Information System Technology MCE
   - » MSFC/MITS CIO MCE
   - » HQ CIO MCE
   - » Web Services MCE
   - » LaRC CIO MCE
3. Develop your own MCE (advanced customers only)

Advanced Information System Technology Managed Cloud Environment

- Purpose: Provide AWS services to PI-led projects
  - » Demonstration of capability for NASA science projects
  - » Managed with high degree of automation
  - » PI's resource management assisted by automated alerts and enhanced reports with same latency as AWS
  - » PI does not need to do Procurement, only WBS + estimate
  - » PI does not need to prepare ATO
  - » No Sensitive, but Unclassified (SBU) Projects at this stage
- Status: IOC August, 2016
  - » 3 projects implemented as test cases
  - » Low ATO expected in July, 2016
- Further info: Michael.M.Little@nasa.gov

NASA's Future in the Cloud

The current challenges of process and structure will soon be replaced by new challenges of scalability and variability.

Broad Adoption is Around the Corner

- General consensus of Cloud knowledgeable people is that within 5 years:
  - 75% of all new project starts will be born in the Cloud
  - 100% of NASA's public data will be served from the Cloud
  - Up to 40% of legacy systems will be migrated to the Cloud on lifecycle modernization
- Success criteria for Cloud adoption:
  - On-board 2 communities per year for 5 years
  - Demonstrates a rich representation of NASA's overall business being done in the Cloud

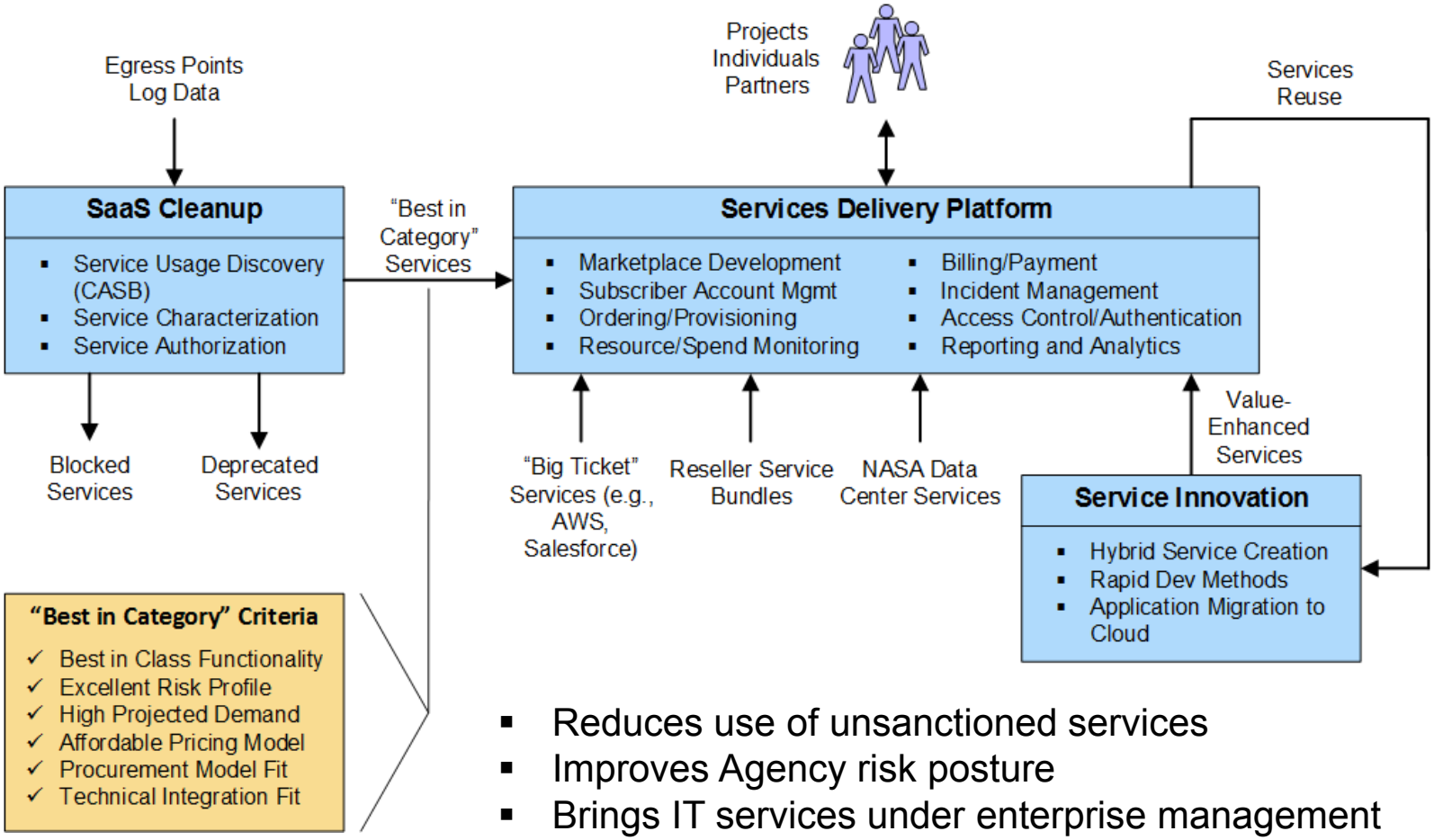
Computing Services Goals

Goals are aligned with Federal, Agency, and OCIO guidance, mandates, goals, and objectives.

Long-Term End Results

1. NASA experiences widespread adoption of cloud computing by programs and projects.
2. NASA has the right amount and optimal balance of computing and storage resources to address program and project requirements.
3. NASA computing and storage services are governed, managed, and operated using an enterprise-managed approach.
4. NASA computing and storage services and service management processes are open and malleable to enable service innovation.

Computing Services Strategy

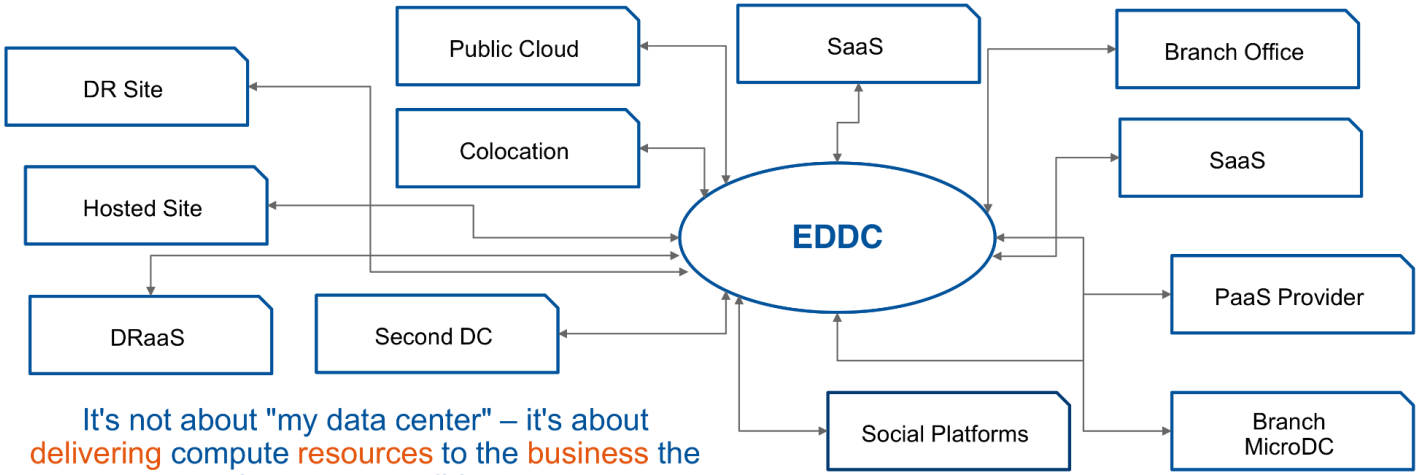


- Reduces use of unsanctioned services
- Improves Agency risk posture
- Brings IT services under enterprise management
- Provides a unified services delivery approach
- Enables innovation to address mission requirements

Enterprise Defined Data Centers

4 Enterprise Defined Data Centers

The New Data Center is Everywhere



It's not about "my data center" – it's about delivering compute resources to the business the best way possible.

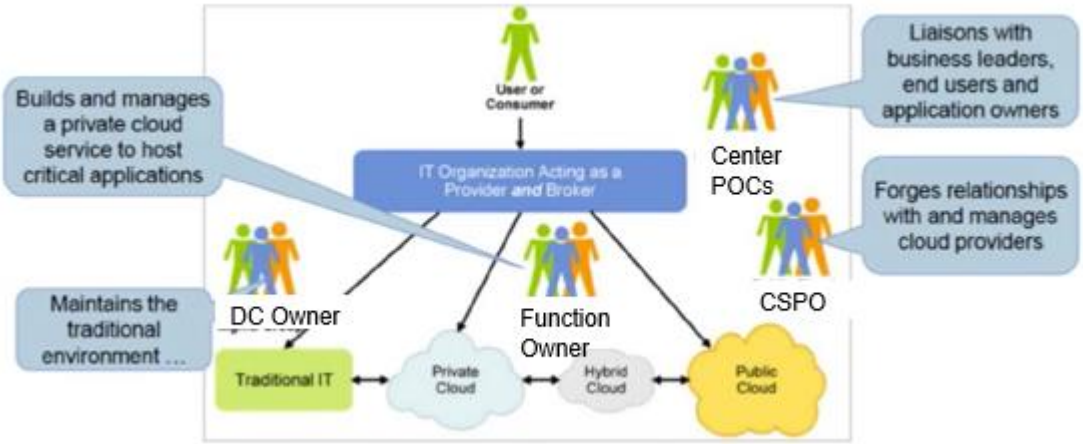
#GartnerSYM

Gartner

Where Do Your Computing Requirements Fit?

Where to go?
- Cloud
- Local NASA Data Center
- Remote NASA DC
- Other Federal DC
- Non-NASA owned DC

Kinds of things you need to know to help decide:
- Type/sensitivity of data (L/M/H, PII, SBU, ITAR/EAR)
- Type of services needed (hosting, housing, database, development environment, application, security, storage, etc)
- Type of workload (human rated, flight project, general purpose, internal/external, geographically diverse, fault tolerance, etc)
- Storage requirements (performance, growth, who supplies)
- Access requirements (who needs access, from where, with what credentials, foreign nationals?)
- Facilities requirements (square footage, power load, cooling and air flow requirements)



Hybrid Environments Are the Future!