Enterprise Architecture, Cloud Computing and the US Federal Government

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Salient Quotes!

"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." - Peter Mell and Tim Grance, NIST

"Any sufficiently advanced technology (cloud computing???) is indistinguishable from magic."–Arthur C. Clarke

"The interesting thing about cloud computing is that we've redefined cloud computing to include everything that we already do. I can't think of anything that isn't cloud computing with all of these announcements. The computer industry is the only industry that is more fashion-driven than women's fashion." – Larry Ellison

Acknowledgements

- This Presentation is based on a white paper developed by the Enterprise Architecture Shared Interest Group (EA SIG) of the Industry Advisory Council (IAC)
- The IAC "is a non-profit, public-private partnership dedicated to improving government through the application of information technology…it provides an objective, ethical and trusted forum where government and industry exchange information and collaborate on technology issues in the public sector."

- The white paper was released on Monday and is titled:

The Role of Enterprise Architecture in Federal Cloud Computing

White Paper Summary and Purpose

- The purpose of the white paper is to provide guidance to Federal IT managers in developing an architected approach to implementing cloud computing.
- It contends that to be fully effective and provide the greatest value to Federal agencies, cloud computing must:
  - Be architected as an integral part of the agency's Enterprise Architecture
  - Provide for an effective governance mechanism
  - Be implemented as services as part of a Service Oriented Architecture
- Cloud Computing affects the people, process, and technology of the enterprise and each of these must be dealt with. This white paper explains the basic elements of cloud computing and ties it to solid architectural foundations.

Outline

- Cloud Computing Architectural Framework
- Fundamental Shift in the Organization Model Providing IT Services
- The Importance of Enterprise Architecture and SOA
- The Importance of Service Level Agreements
- Cloud Computing Reference Model/Architecture – Link to ITIL
- Critical Success Factors for Cloud Computing
- Government Cloud Computing Initiatives
- The Debate Surrounding Cloud Computing
- Enterprise Architecture: Bringing Clarity to Cloud Computing Decisions
- Recommendations
- Conclusions

Introduction

- Intended Audience
  - CIOs, CTOs, Chief Architects
  - Those responsible for leveraging IT assets
- Objectives
  - Explain the basics of Cloud Computing
  - Tightly tie Cloud Computing's success to EA and SOA
  - Explain the potential role of the Enterprise architect in the Cloud
- Background
  - In March 2009 the Federal CIO Council named Cloud Computing as a government priority .
  - On December 9, 2010 as part of its "25 POINT IMPLEMENTATION PLAN TO REFORM FEDERAL INFORMATION TECHNOLOGY MANAGEMENT" Vivek Kundra, US Chief Information Officer, issues a "Cloud-First Policy"

Cloud Computing Architectural Framework

- Core Elements:
  - Essential Characteristics
    - On-Demand Self-Service
    - Broad Network Access
    - Resource Pooling
    - Rapid Elasticity
    - Measured Service
  - Service Delivery Models
    - Software as a Service - SaaS
    - Platform as a Service - PaaS
    - Infrastructure as a Service - IaaS
  - Cloud Deployment and Consumption Models
    - Private Cloud
    - Community Cloud
    - Public Cloud
    - Hybrid Cloud

Fundamental Shift in the Organization Model Providing IT Services

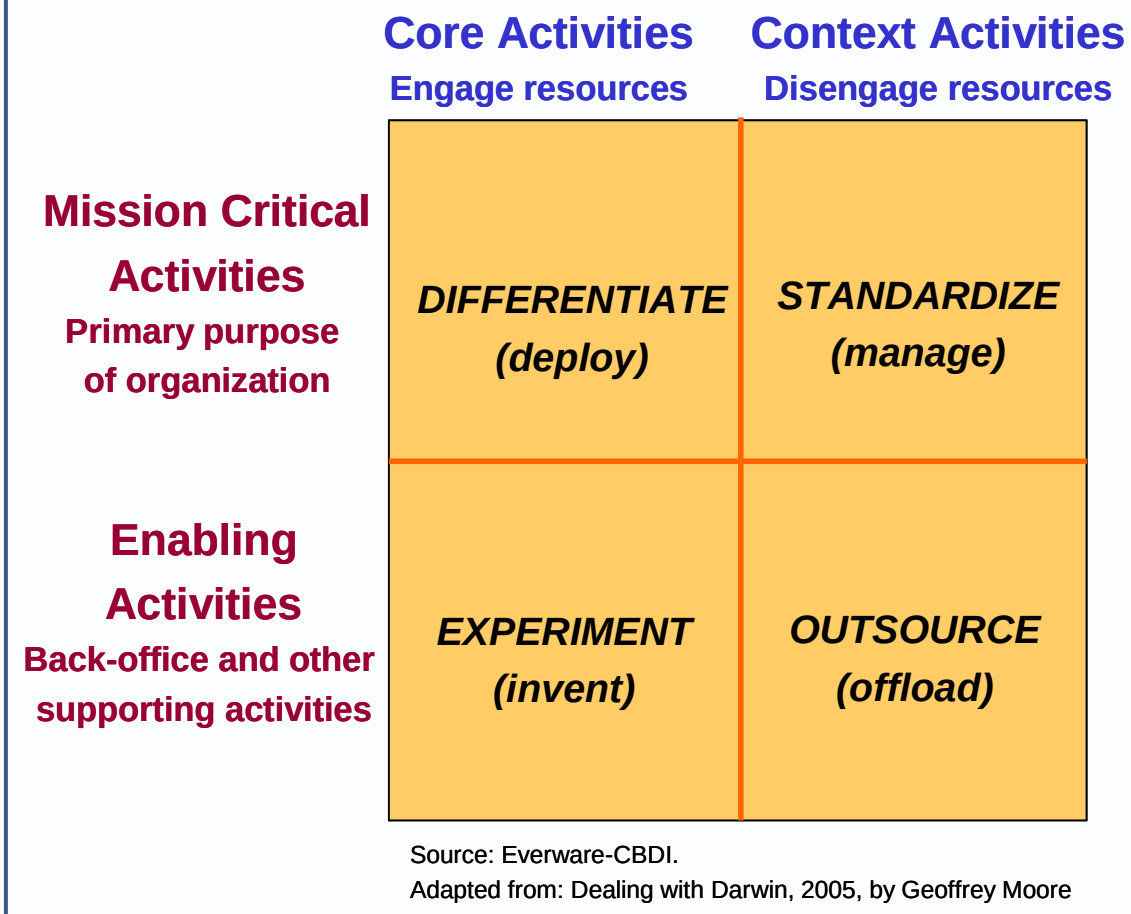
- IT is experiencing a major shift
  - Away from efficiency and automation [of processes]
  - Towards business agility and management of complexity
- Cloud Computing represents another step in the transition to Information Technology as a service
  - IT organizations need to characterize their requirements and offerings as services
  - ITSM and ITIL are steps in this direction
- Key tie must be back to the business/mission requirements

The Importance of Enterprise Architecture and SOA

- GOAL: Provide flexible and scalable platform for delivering services
  - Flexibility: Exchange of services
  - Scalability: Virtualization
- SOA as the foundation for Cloud
  - Layered architecture of services
    - Facilitate service identification
    - Applying appropriate governance
    - Decisions around service sourcing
- Geoffrey Moore: Some activities are better suited for standardization and outsourcing (e,g, public cloud) – 4 dimensions
  - Core activities define an organizations uniqueness
  - Context activities must be performed but do not contribute to uniqueness
  - Mission Critical activities direct produce value output
  - Enabling indirectly support the mission

Categorizing Capabilities and Services

- Using Portfolio Management approach:
  - Identify services
  - Characterize each service
  - Determine best method for obtaining each service
- Public Cloud may be Appropriate for: Context-Enabling Services
- Mission Critical Context Activities may also be a cloud candidate



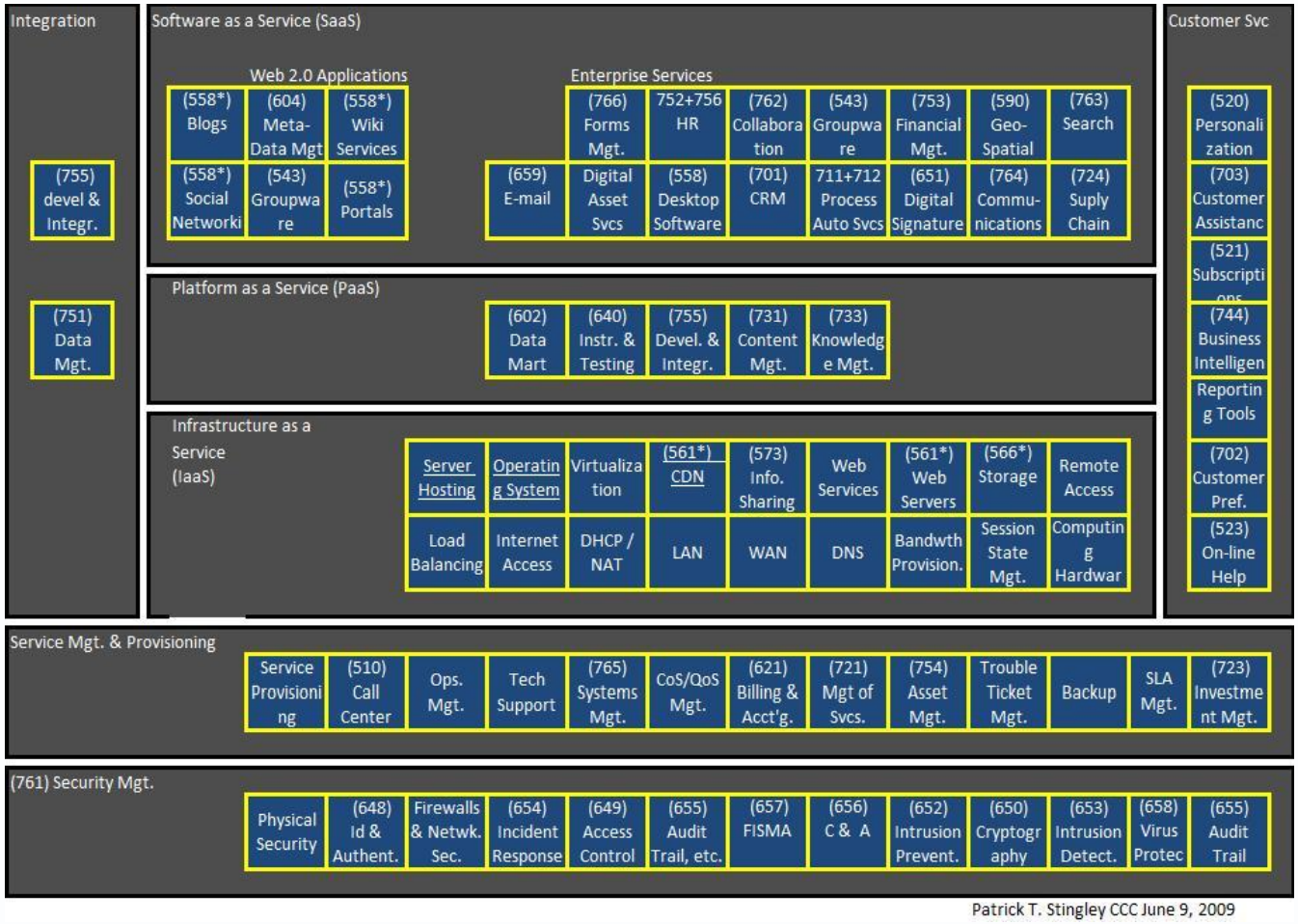
Source: Everware-CBDI.
Adapted from: Dealing with Darwin, 2005, by Geoffrey Moore

The Importance of SLAs

- Appropriate Governance through monitoring, managing and providing appropriate incentives (for efficiency at all levels)
- SLAs may include some or all of the following:
  - Performance Parameters
  - Location of Data
  - Metrics of Events
  - Backup/Recovery and Continuity Requirements
  - Quality of Service
  - Cost Parameters/Metrics
  - Reliability
  - Refresh Cycles (Releases/Versions)
  - Specific Penalties and Incentives
- Enforcement through Operationally Specific Contracts
- EA should Play a Major Role in the Development and Governance of SLAs

Cloud Computing Reference Model/Architecture – Link to ITIL

- Patrick Stingley, CTO, Bureau of Land Management – Cloud Services mapped to the FEA Services Reference Model (SRM)



Critical Success Factors for Cloud Computing

- Approached as would with any major change initiative!
- Key Factors:
  - Management Processes
    - Oversee the effective transition to Cloud
    - Develop SLAs/OLAs
    - Lifecycle awareness and management
  - Trust Mechanisms
    - Enforceable Contracts form the Basis
    - Address Security/Transparency Concerns
    - NIST's Security Content Automation Protocol (SCAP) for guidelines and certifications
  - Competencies
    - Architecting for the design and consumption of Cloud Services
    - Training around SOA and Cloud
  - Structure (Reference Architectures, Governance, Principles, etc.)
    - Provide the aligning factors and framework for success
    - EA Critical element needed to provide for the alignment

US Government Cloud Computing Initatives

- NASA Nebula at Ames Research Center: offers highly cost effective and energy efficient IaaS, PaaS and SaaS fro a Hybrid Cloud
- DoD/DISA
  - Rapid Access Computing Environment (RACE) offers PaaS
  - GIG Content Delivery Service (GSDS) offers PaaS
  - Forge.mil offers PaaS and SaaS
- APPS.gov: Storefront to rapidly find, research and procure Cloud Services
- DOE Laboratory Cloud Computing Environment: Hybrid Cloud environment for Scientific Collaboration and Development
- Supporting Efforts:
  - Federal Cloud Computing Program Management Office
  - Cloud Computing Advisory Council
  - Cloud Computing Security Working Group
  - Federal Risk and Authorization Management Program
  - Citizen Enabling Open Government
- GSA Award of $6.7M Cloud Email Service Contract to Unisys and Google

The Federal Debate Around Cloud Computing

- The next panacea or the next overhyped technology mash-up?
- GSA Leading the Federal Government foray into the Cloud
- Risk and Security the two largest issues
  - Mistrust because of large vendor lead
  - Mistrust because of federal employee perceived diminished roles
  - Mistrust because of diminished budgets
  - Mistrust because of loss of data content control
  - Mistrust because a radical departure from “Business as Usual”
- Cost savings and efficiency arguments are very strong!
  - GSA is claiming a minimum of 50% savings
  - The Budget “writing is on the wall”!
  - Cross-agency resource sharing – a long time goal
  - OPEX vs. CAPEX
  - “Green”
- The Debate is Far from Over

EA – Bringing Clarity to Cloud Computing Decisions

- EA Provides Structure and a Comprehensive Method to elucidate and clarify Performance, Cost, Security, Risk, Governance, Regulatory Compliance, Management and Best Practices.
- EA can help answer the questions:
  - Is Cloud Computing appropriate for our agency?
  - Which systems, applications and business processes are the best candidates for cloud outsourcing?
  - How do we determine the interrelationships between systems and with the business processes and data they support?
  - What would be the most effective cloud configuration for our agency (private, public, hybrid, community, etc.)?
  - How do we protect sensitive agency data in the cloud?
  - What's the best way to assess and manage our risk profile in a cloud environment?
  - What are our actual costs of operations today?
  - How well are agency IT investments performing in terms of reliability and availability?

EA – Bringing Clarity to Cloud Computing Decisions (cont.)

- EA can help answer the questions: (cont)
  - How will cost and performance change in a cloud environment?
  - For agency budgetary and regulatory compliance, what needs to be included in vendor quality-of-service commitments?
  - What needs to be included in service-level agreements (SLA) to meet agency requirements for performance, availability and security?
  - How do we effectively monitor SLA performance?
  - Who is responsible for potential monetary losses due to insufficient access or denial of service?
  - How do we monitor potential operational inefficiencies and what are the costs of localized replication of governance?
  - What measures are in place to prevent unauthorized access, inappropriate use and loss of control of proprietary agency information and applications?
  - How do we comply with Federal records management requirements in a cloud environment?
  - Where do we start? How do we get from where are today to a cloud environment?

EA – Bringing Clarity to Cloud Computing Decisions (cont.)

- Virtual Government Operations that are lean and responsive is the Vision government is attempting to achieve: Cloud Computing can play a major role in the achievement of that Vision
  - EA, practiced as “just-in-time” and “just-enough”, is critical to achieving that Vision – and not just for Cloud
  - EA must move to the front of the “decision curve”
  - Leverage EA Strengths:
    - Clear, practical communications
    - Readily understood and appropriate analysis
    - Focused on Business Outcomes
    - Solid risk/benefit analysis and mitigation opportunities; metrics management
    - Providing alternatives and trade-offs to decision makers (Cloud or another solution)
    - Governance enforcement
    - “Big Picture” view of an agency and across agencies

Recommendations

- Don't rush out to buy – even with the "cloud-first" directive
  - Use the Agency's Enterprise Architecture to determine what is appropriate
  - Review in the light of "Core" and "Context" analysis
  - What are the Governance – especially Security – issues
- If Cloud seems to be a fit: what is the most viable deployment (public, private, community, hybrid) option
- Reevaluate your risk management in light of the additional considerations invoked by going to the Cloud: Security, Compliance, Monitoring, Measuring, Operational Dependencies, etc.
- Through Governance create air-tight SLAs that meet the organizations requirements and goals
- Analyze, analyze, analyze...
  - Risk versus Value
  - Cost versus Benefits
  - Control versus Savings

Conclusions

- Cloud Computing is already making its way into the computing fabric of the Federal Government
  - Some taking a strategic approach
  - Some taking an ad-hoc/tactical approach
- Architected, Service Oriented and Governed Approach will provide the most and clearest Benefits to the Agency
  - Architected: Provides "big picture" holistic approach to the benefits to be derived
  - Service Oriented: Cloud computing enables the consumption of services from other and varied platforms and their composition/orchestration into appropriate solutions
  - Governed: Ensuring the Value is obtained through appropriately monitored SLAs and OLAs and contracts that carry both "carrot" rewards and "stick" penalties

Enterprise Architecture, Instantiated as SOA and Properly Governed will provide the Greatest Possibility of Success in the Implementation of Cloud Computing

Questions, Comments & Contact Information

White paper is available at:

www.actgov.org/EACloud

Executive summary available at:

www.actgov.org/EACloudExecutiveSummary

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