Cloud Issues for Federal Leaders & Technologists

Deciding Which Federal IT Systems to Migrate to Cloud

Presented By:
AI Mink
SRA International
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What Can you Expect Today?

✓ What’s Cloud, Really
   Federal Government Perspective

✓ Federal Guidance & You
   Mandates have arrived

✓ Cool Insights
   From Federal Cloud activity

✓ How do you decide?
   Decision Factors you can trust
Where I got this from!
What’s Cloud, Really
Definitions Related to Cloud

1. Characteristics
   – On demand provisioning
   – Elasticity
   – Broad Network Access
   – Measured service
   – Resource Pooling (Multi-tenancy)

2. Delivery Models
   – Infrastructure as a Service (IaaS)
   – Platform as a Service (PaaS)
   – Software as a Service (SaaS)

3. Deployment Modes
   – Public
   – Private
   – Hybrid
   – Community

Cloud – a mix of old & new
What’s Cloud, Really
1. Essential Characteristics

On Demand Self-Service

Broad Network Access  Rapid Elasticity

Resource Pooling  Measured Service

Run this checklist -- Not everything new in IT is Cloud…
2. What’s Cloud, Really

Delivery Models

0. Facilities as a Service (FaaS)
- Floorspace
- HVAC
- Electricity
- Connectivity
- Physical Security

1. Infrastructure as a Service (IaaS)
- Storage
- Virtual Machines
- CDN
- Web Servers
- Server Hosting

2. Platform as a Service (PaaS)
- Testing Tools
- Developer Tools
- DBMS
- Directory Services
- Database

3. Software as a Service (SaaS)
- Gov Productivity
- Gov Enterprise Apps

4. Activity (AaaS)
- Process
- Citizen Engagement

- Citizen Engagement
- Gov Productivity
- Gov Enterprise Apps

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What’s Cloud, Really

3. Cloud Deployment (Sourcing) Models

- Public
- Private
- Hybrid
- Community
“Cloud First” Policy (Dec 2010)
- ... Agencies default to cloud-based solutions
- Each Agency CIO will be required to identify three “must move” services...

Roles & Responsibilities (Feb 2011)
- Agencies will be responsible for evaluating their sourcing strategies to fully consider cloud computing solutions
Q: Rate the challenges/issues of the 'cloud'/on-demand model

(Scale: 1 = Not at all concerned  5 = Very concerned)

<table>
<thead>
<tr>
<th>Issue</th>
<th>% Concerned</th>
</tr>
</thead>
<tbody>
<tr>
<td>Security</td>
<td>87.5%</td>
</tr>
<tr>
<td>Availability</td>
<td>83.3%</td>
</tr>
<tr>
<td>Performance</td>
<td>82.9%</td>
</tr>
<tr>
<td>On-demand paym’t model may cost more</td>
<td>81.0%</td>
</tr>
<tr>
<td>Lack of interoperability standards</td>
<td>80.2%</td>
</tr>
<tr>
<td>Bringing back in-house may be difficult</td>
<td>79.8%</td>
</tr>
<tr>
<td>Hard to integrate with in-house IT</td>
<td>76.8%</td>
</tr>
<tr>
<td>Not enough ability to customize</td>
<td>76.0%</td>
</tr>
</tbody>
</table>

% responding 3, 4 or 5

IT executives and their line-of-business (LOB) colleagues.

Source: IDC Enterprise Panel, 3Q09, n = 263
Cool Insights

Concerns of Federal (DoD) IT Leaders

Killaly, 2011.
Cool Insights
FedRAMP for Security

Today
- Independent Risk Assessments
- Large costs
- Slower acquisition
- Significant effort

With FedRAMP
- Greatly reduced costs
- Enables rapid acquisition
- Reduced effort

Common Sense in Play?
Cool Insights

Feds Placing Bets on Cloud

- Website
- Email
- Development
- Combination
- Document Management
- Office Automation
- FOIA
- Collaboration
- eCPIC
- Financial
- Work Flow
- Telephony
- Grants
- Email Archiving

- Web Management
- Weather Modeling
- Survey
- Social Media
- Records Management
- Process Automation
- PKI
- Notification
- HR
- GIS Distribution
- ESD
- Earth Observations
- Device Management
- Clearances
- Claims
How Do You Decide?

Controls
- Decision Factors
- Guidance

Inputs
- Candidate System List
- Provider Capabilities

Mechanisms
- FAA IT Governance Processes

Outputs
- Services in Cloud
How Do You Decide?
Decision Factors You Can Trust

Value Criteria
What benefit does Cloud Migration provide?
- Efficiency
- Agility
- Innovation

Other Criteria
• Color of Money

Readiness Criteria
Is it Feasible to migrate to Cloud now?
- Security
- Service Characteristics
- Market Characteristics
- Network Readiness
- App & Data Readiness
- Government Readiness
- Technology Lifecycle
How Do You Decide?  
What is Most Important?

Value Criteria
- Efficiency
- Agility
- Innovation

Other Criteria
- Color of Money

Readiness Criteria
- Security
- Service Characteristics
- Market Characteristics
- Network Readiness
- App & Data Readiness
- Government Readiness
- Technology Lifecycle
Cloud, NDIA, & You

Questions & Closing Comments
Questions?

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Recommendations

• How to go about Slide 14

• Understanding business processes around each of candidate?
• Cloud or business process change

• Consolidation of systems.
• Migration opportunity to clean up the house
  – When you move, you consolidate and clean up.
• Just moving is a waste of resources, time, and money
• Consolidate and optimize
• Clean up portfolio.
• Take cost out,
Migrating to Cloud – Other Considerations

• Quantifying decision factors
• Resolving the “DISA Dilemma”
  ‣ DISA as provider of choice
  ‣ DISA considered too expensive and too slow.
  ✓ FAA IaaS may beat the DISA Dilemma
• Incorporating Cloud Decisions into an organization’s IT governance process
• Getting the money “up front” to Migrate
Drivers for migration to services/cloud
- **Acquisition reform** – mandating performance based contracts (President Obama)
- **“Gates Memo”** – SECDEF driving efficiencies in DoD spending (Aug 2010)
- **Color of Money** – The appropriations for fulfilling a needed capability differ depending on the approach (system vs service) adopted. Cuts in IT spending may drive organizations to leverage O&M funds to obtain needed capabilities.
- **Federal “Cloud First” Policy** – OMB requires federal agencies to default to cloud-based solutions whenever a secure, reliable, cost-effective cloud option exists (Nov 2010, US Chief Performance Officer Jeffrey Zients)

**Technology**
- Recently able to create commodity/utility computing and applications (e.g. virtualization)
- Scaling to large enterprises

Impediments towards adopting cloud/services
-- Risks (real or perceived)
-- Lack of experience (federal suppliers and acquirers)

The lack of a decision model:
1) slows the adoption of services/cloud,
2) Increases the risk of adopting the wrong decisions for services/cloud
**CMDSM Inference (Relevance) Diagram**

Control $C_i$ → Forecast of Control $C_i$

Input $I_j$ → Forecast of Input $M_j$

Relationship $R_k$ → Forecast of Relationship $R_k$

$\beta(C_i)$

$\beta(I_j)$

$\beta(R_k)$

Migrate? → Execute

Alternate Construct: *Toulmin Logic Model***

**Toulmin, Rieke, and Janik, 1984**
Clouds: A Quick Refresher

**Cloud Deployment (Sourcing) Models**

1. **Public Cloud**
   - The cloud infrastructure is made available to the general public or a large industry group and is owned by an organization selling cloud services.

2. **Private Cloud Commercially Hosted**
   - Publically available Cloud Computing services offered through commercial sources that are dedicated and separate from the Public both physically and logically and must to remain within the U.S. borders to support heightened data security and privacy requirements. Access to these services are provided through a dedicated Government Intranet and is not accessible from the Public Internet.

3. **Private Government Cloud**
   - The cloud infrastructure is operated solely for an organization. It may be managed by the organization or a third party and may exist on premise or off premise.

4. **Community Cloud**
   - The cloud infrastructure is shared by several organizations and supports a specific community that has shared concerns (e.g., mission, security requirements, policy, and compliance considerations). It may be managed by the organizations or a third party and may exist on premise or off premise.

5. **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 (e.g., cloud bursting).
Dr. Andrew Sage (Co-Director)
- Pre-eminent **Systems Engineer**
- Systems Integration and Architecting, Complex Adaptive Systems and Knowledge Management, Economic Systems Analysis, Systems Mgmt
- Elected to the National Academy of Engineering for contributions to the theory and practice of systems engineering and systems mgmt

Prof Paul Strassman (Co-Director)
- **Former DoD CIO** (ASD C3I)
- Distinguished Professor of Information Sciences

Dr. David Schum
- Leading authority on **decision theory**
- Study of the properties, uses, and marshaling of evidence in probabilistic reasoning.
- 2006 Faculty Research Award (GMU, Volgenau)

Dr. Edgar Sibley
- **Information Technology (IT)** Professor and Eminent Scholar
- Design and implementation of systems, several major economic issues such as reengineering, with extensions into large industrial enterprise and governmental efforts

A brilliant team of advisors … with the right portfolio of expertise
## DOT Candidates

<table>
<thead>
<tr>
<th>Organization</th>
<th>Cloud Service</th>
<th>Remarks</th>
</tr>
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<tbody>
<tr>
<td>DOT</td>
<td>Geospatial Services</td>
<td>DOT’s own “Google Maps”</td>
</tr>
<tr>
<td>DOT</td>
<td>Application: Development &amp; Testing</td>
<td>Very popular among Feds</td>
</tr>
<tr>
<td>DOT</td>
<td>Website Hosting+</td>
<td>Shift to “content management”</td>
</tr>
</tbody>
</table>
Migrating to Cloud – Decision Factors

**Value**

**Efficiency:** More affordable without sacrificing capabilities*

– In terms of resources: People, money, physical assets
– **Scoring:** Services that have relatively high per-user costs, have low utilization rates, are expensive to maintain and upgrade, or are fragmented should score highly***

**Agility:** Responsiveness**

– “Done correctly, the enterprise “easily scales; and the converse [is true as well]” **
– Cloud computing approaches put IT agility in the hands of users, and this can be a qualitative benefit. ***
– **Scoring:**
  - Existing services that require long lead times to upgrade or change capacity should score highly ***
  - New or urgently needed services that would benefit from compressed delivery timelines.

**Innovation:** Introducing something new

– This is about new capabilities achieved by leveraging cloud
– Could include new/improved soft quality attributes “ilities” such as better availability
– **Scoring:** Services that would most benefit from innovation should score highly

Migrating to Cloud – Decision Factors

Readiness

**Security:** Compliance with guidance and protection of data
- Statutory compliance
- Data characteristics
- Privacy and confidentiality
- Integrity
- Data controls and access policies
- Governance

**Service Providers’ Characteristics:** Functionality & quality
- Interoperability, availability, performance, performance measurement approaches, reliability, scalability, portability, vendor reliability, and architectural compatibility
- Other regulatory compliance beyond security (e.g. records management)

**Market Characteristics:** Competition and Interoperability
- Ability to switch service providers (avoid cloud vendor lock-in)
- Ability to interoperate with services outside of cloud vendor (e.g. authentication services)

**Network Readiness:** Assured connectivity and bandwidth
Migrating to Cloud – Decision Factors

Readiness con’t

Application and Data Readiness: The core migration
- Clearly articulated and understood interfaces; limited coupling with external systems/services
- Clearly articulated and understood business rules
- Data is clean and able to extract

Government Readiness: Cultural acceptance & cloud expertise
- Culture supportive of change
- Expertise in Service Level Agreements and Cloud services

Technology Lifecycle: Timing of system/program milestones
- Avoid a planned or needed technology refresh
- Avoid a recompete of the legacy contract
- **Color of Money**: Restrictions related to Congressional appropriations
  - Cloud may recategorize costs from capital investment in hardware and infrastructure (CapEx) to a pay-as-you go (OpEx)
Migrating to Cloud – Decision Factors

Security & FedRAMP

Federal Risk and Authorization Management Program

• A government-wide initiative to provide joint authorizations and continuous security monitoring services
  – Unified government-wide risk management
  – Agencies would leverage FedRAMP authorizations (when applicable)
• This does not supplant existing agency authority to use systems that meet their security needs
• Initial focus on cloud computing
Migrating to Cloud – Decision Factors

FedRAMP – Vendor Perspective

Vendor

Acquiring Agencies

Sales

Potential Sales

Vendor

FedRAMP

kill